



**Institute for Strategic Partnerships, Innovation,  
Research, and Education**

A Proposal submitted by  
Florida State University  
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## SECTION I. APPLICANT INFORMATION

### Applicant Information

**Name of Entity/Organization:** Florida State University

**Background of Applicant Individual/Entity/Organization:**

Florida State University (FSU) is a renowned research and learning institution recognized as a preeminent university in Florida. With campuses in Tallahassee, Panama City, and the Republic of Panama, FSU excels in the sciences, engineering, and humanities. The University's extensive research programs span disciplines such as biology, chemistry, engineering, meteorology, nuclear science, oceanography, physics, and psychology. Innovation Park serves as a hub for cutting-edge research, housing notable centers like the National High Magnetic Field Laboratory, the High-Performance Materials Institute, the Florida Center for Advanced Aero Propulsion, and the Center for Advanced Power Systems. The FAMU-FSU College of Engineering, the joint college operated by FSU and the Florida A&M University, is located adjacent to this property and is the academic home to approximately 3,000 students and 300 faculty and staff. FSU's commitment to academic excellence is underscored by its recognition as a top-25 public institution by U.S. News & World Report.

In addition to its academic achievements, FSU has made a significant economic impact. In fiscal year 2019-2020, the University generated \$1.5 billion in direct revenue and contributed \$2.9 billion to indirect industry output, supporting over 35,900 jobs. FSU's graduates with a bachelor's degree were projected to earn \$499,241 more in lifetime earnings compared to high school graduates. These figures highlight FSU's substantial contribution to the local and regional economy. With over 2,600 faculty members and a network of research centers and institutes, FSU's commitment to research excellence is evident in its consistent increase in annual research expenditures, exceeding \$100M over the last decade.

Florida State University is accredited by the Southern Association of Colleges and Schools, Commission on Colleges (SACSCOC). The university was first accredited in 1915. Some departments and programs are accredited through discipline-specific accrediting agencies and governing bodies. The College of Engineering degree programs go through a rigorous accreditation process through the Engineering Accreditation Commission of ABET.

**Federal Employer Identification Number:** 59-1961248

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**Co-applicants & Partners**

**Identify any co-applicants, partners, or other entities or organizations that will have a role in the proposed project or program and such partners proposed roles.**

In addition to FSU, FSU Research Foundation, and FSU Panama City InSPIRE will partner with:

**1. State Public School Districts, Agencies, and Industry**

InSPIRE will expand the existing *Learning System Institute (LSI)* and FSU Panama City relationships with local public school districts in the participating Triumph Gulf Coast counties to proactively grow interest in STEM education and career opportunities to:

- Create pathways for students at public schools in all eight counties to recognized industry certifications, accelerated credit, certificate, or degree attainment at the high school level,
- Promote training and continuous learning opportunities for K-12 teachers, and
- Provide educational tools and resources and ensure that training standards are exceeded in all efforts, coordinating with the Florida Department of Education (FDOE) and industry partners.



*Figure 1: K-12 Educational Partners*

**2. Florida College System and Technical Colleges**

InSPIRE will also work with partner Florida College System (FCS) institutions and technical colleges to develop, promote, recruit, and retain a specialized workforce in the Panhandle across all levels of industry certifications, certificates, and two-year degrees in STEM.



*Figure 2: 13-14 Educational Partners*

New programs will be developed by InSPIRE and existing recognized certifications, certificates, and accredited degree programs enhanced through collaboration with regional educational organizations and in consultation with the Florida Department of Education (DOE). This includes FSU improving and expanding existing 2+2 articulation initiatives with regional colleges to provide access for students who wish to pursue a bachelor's degree and beyond.

It will also include FSU working to embed new certificates and industry certifications in its degree programs and working with local FCS institutions to do the same.

**3. Defense, Military Bases and Federal Government Agencies**

To sustain and expand military bases in the region, it is crucial to attract, train, and keep a highly skilled workforce that can rapidly adapt to changing marketplace and Department of Defense (DOD) demands. In partnership with defense, military bases, and federal agencies, InSPIRE will:

- Customize workforce development and training programs to cater to the specific needs of regional military installations,



*Figure 3: Governmental and Defense Partners*

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- Address unmet needs in prototyping, testing, and evaluation, and
- Conduct confidential, sensitive, and classified applied research and development

#### 4. Industry

A multi-leveled skilled and adaptable workforce, state-of-the-art facilities and industry-responsive resources and policies are the principal attractors for industry to the region. InSPIRE and industry partners will achieve these by:

- Training a workforce to meet the needs of industry partners, for today and the future through training, education, and experiential opportunities,
- Collaboratively designing workforce development programs and the Research & Development (R&D) and Testing & Evaluation (T&E) services provided in key technical areas, and
- Contracting and collaborating with industry partners to meet prototyping, testing, evaluation, research, and development needs.



Figure 4: Industry Partners

#### Funding requested

**Total amount of funding requested from Triumph Gulf Coast: \$98,453,615**

#### Past applications

**Has the applicant in the past requested or applied for funds for all or part of the proposed project/program?**

- Yes
- No

#### Financial status

**Describe the financial status of the applicant and any co-applicants or partners.**

FSU has regularly maintained very high bond ratings and continues to be a strong investment, according to the most recent credit ratings released by S&P Global, Fitch, and Moody's. The University has the highest-rated credit of a public university in the state of Florida, with ratings of AA+, AA+, and Aa1 from S&P, Fitch, and Moody's, respectively. More about the University's financial status can be found in the annual report (**Appendix A**).

**In a separate attachment, please provide financial statements or information that details the financial status of the applicant and any co-applicants or partners.**

Please see **Appendix A** – [FSU Annual Report \(2021-2022\)](#).

**Has the applicant or any co-applicants, partners or any associated or affiliated entities or individuals filed for bankruptcy in the last ten (10) years?**

- Yes
- No

## SECTION II: ELIGIBILITY

### Purpose

**From the choices below, please check the box that describes the purpose of the proposed project or program:**

- Grants to support programs that prepare students for future occupations and careers at K-20 institutions that have campuses in the disproportionately affected counties. Eligible programs include those that increase students' technology skills and knowledge; encourage industry certifications; provide rigorous, alternative pathways for students to meet high school graduation requirements; strengthen career readiness initiatives; fund high-demand programs of emphasis at the bachelor's and master's level designated by the Board of Governors; and, similar to or the same as talent retention programs created by the Chancellor of the State University System and the Commission of Education, encourage students with interest or aptitude for science, technology, engineering, mathematics, and medical disciplines to pursue postsecondary education at a state university or a Florida College System institution within the disproportionately affected counties.
- Grants to support programs that provide participants in the disproportionately affected counties with transferable, sustainable workforce skills that are not confined to a single employer.
- Grants to support unique infrastructure for research, development, demonstration, and prototyping activities that facilitate educational and workforce training programs, support existing commercial and government entities in the eight affected counties, and recruit new companies.

## Detailed description

Provide the title and a detailed description of the proposed project or program, including the location of the proposed project or program, a detailed description of, and quantitative evidence demonstrating how the proposed project or program will promote economic recovery, diversification, and enhancement of the disproportionately affected counties, a proposed timeline for the proposed project or program, and the disproportionately affected counties that will be impacted by the proposed project or program.

### 1. TITLE: Institute for Strategic Partnerships, Innovation, Research & Education (InSPIRE)

### 2. DETAILED DESCRIPTION:

FSU proposes to establish the *Institute for Strategic Partnerships, Innovation, Research & Education (InSPIRE)* as its applied research and workforce development arm in the Florida Panhandle to effect a transformative economic impact in that region. InSPIRE's mission is to accelerate technology innovation, cultivate corporate investment, nurture the growth of new industries, and foster high-skilled, high-wage employment opportunities in the region. *This initiative will profoundly shape the economic trajectory of Escambia, Santa Rosa, Okaloosa, Walton, Bay, Gulf, Franklin, and Wakulla counties, ensuring long-term prosperity for generations.*

#### InSPIRE combines three connected elements:

**1. Advanced research and development (R&D).** With strategic alliances with industry and the federal government, InSPIRE aims to anchor novel R&D projects in the region, with a key emphasis on advanced manufacturing and aerospace technology. These R&D initiatives, ranging from Technology Readiness Level (TRL) 3 (proof of concept) to TRL 7 (prototype demonstration in an operational environment), will amplify the region's industrial prowess, reinforce military bases, and drive the emergence of new industrial sectors. Furthermore, InSPIRE's efforts will fortify national security and strengthen the US's position as a leader in defense systems and advanced manufacturing.

**2. State-of-the-art demonstration, testing, and evaluation infrastructure and expertise.** InSPIRE will build unique, innovative, and one-of-a-kind facilities for advanced applied research & development at scales that are crucial for industry – from small to large Original Equipment Manufacturers (OEMs) to DOD with the ability to conduct proprietary, sensitive, and classified applied work with highly efficient turn-around times. Initial areas of focus are industrial scale, prototyping, cutting-edge advanced manufacturing and aerodynamic and hypersonic T&E activities. New areas and capabilities will continue to be added as InSPIRE grows in cadence with the region and its needs.



Figure 5: Elements of InSPIRE



**3. Workforce training and education.** InSPIRE will introduce new workforce training and education opportunities focused on advanced aerospace and manufacturing to produce the workforce required to attract and retain high-tech companies to the eight-county affected region. By collaborating with educators, employers, and community support resources, InSPIRE will extend outreach and provide relevant career experiences and placements, thereby creating a comprehensive ecosystem for workforce development. *The InSPIRE Technology and Training Solutions Center will be unique to the Florida Panhandle.*

**The primary goal** is to fundamentally transform the regional economic landscape by bringing future-proof jobs, a talented and ready workforce, and supporting infrastructure. This will make the panhandle highly resilient to unforeseen upheavals – natural and economic.

### **3. LOCATION:**

**InSPIRE will be operated by FSU**, headquartered in Bay County, Florida, with an Advisory Board consisting of experts from the community, private and public sectors. What makes FSU's approach different is the *commitment and relationships to ensure InSPIRE serves the specific needs of the Triumph Golf Coast community, industry, defense bases and economy*. It is expected that the principal InSPIRE facilities will be at either the Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park, with satellite nodes that will be active at partner locations across the eight affected counties. The facilities will be owned by a public entity eligible to receive Triumph Gulf Coast project funding (both during and after the terms of the project).

**Over the course of 10 years**, InSPIRE anticipates becoming self-sustainable through a combination of Triumph Gulf Coast funding and partnerships with industry and government stakeholders. By developing infrastructure, facilities, and integrated education programs, InSPIRE will create a long-lasting, positive impact on the disproportionately affected counties in the region.

### **4. TIMELINE:**

The project will begin immediately upon funding and spans 10 years following substantial completion of its facilities and programs, reaching robust self-sustainability. The regional impact of *InSPIRE will have a lasting, transformational impact on the Florida Panhandle for many generations.*

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Figure 6: InSPIRE Timeline

**The bottom line:** *InSPIRE will help propel the Panhandle into a new level of competitiveness, rivaling Huntsville and the billion-dollar R&D and T&E complex at GTRI in Atlanta* for defense, aerospace and manufacturing. This will be accomplished by attracting high-skill, high-wage job creators, fostering industry-led research and development, and building cutting-edge facilities and infrastructure within the Panhandle, enabling the transformation of innovative ideas into tangible prototypes and concept demonstrations.

**Vision, Mission & Impact**

<b>VISION</b>	InSPIRE will establish the Florida Panhandle as the nation’s foremost hub for aerospace and advanced manufacturing, pioneering in demonstration, testing, evaluation, and research and technology development.
<b>MISSION</b>	The mission of InSPIRE is to forge impactful collaborations with industry, government and community partners, attracting new investments and industries to the region, while creating a surge in highly-skilled, high-wage jobs and providing comprehensive workforce training. By doing so, we will position the Panhandle as a formidable contender, rivaling Huntsville in terms of expertise and exponential growth within the aerospace and manufacturing sectors.
<b>IMPACT</b>	Diversifying the economy and creating differentiated employment opportunities and training will have far-reaching generational impact. InSPIRE will create new job opportunities and support existing companies, making first Panama City’s— and then the regional economy in the eight affected counties—highly resilient and attractive to the nation’s top talent and growing aerospace and advanced manufacturing industries.

## InSPIRE positions the Panhandle to meet a national need...

**The big picture:** US dependency on foreign suppliers for vital components is a major security concern and represents a significant threat to our nation. With InSPIRE, the Panhandle can lead the region, state, and nation in R&D and testing for advanced defense systems and advanced manufacturing. It will make the Panhandle central to the nation's ability to compete with China.

To compete, the US must modernize manufacturing systems and processes, using innovative technologies such as advanced aerospace materials and advanced manufacturing. DOD has prioritized development of superior hypersonic systems for defense against near-peer adversaries.

InSPIRE will target these key national needs and position the Panhandle as the solution.

## ...and builds on the region's existing investment

**Regional economic development organizations** are actively growing a cluster of commercial and government entities that would be served by InSPIRE and related maintenance and refurbishment operations (MRO) markets.

- **Triumph Gulf Coast's recent investment** in an aviation MRO near the Northwest Florida Beaches International Airport is an excellent example of the synergy between InSPIRE and current and future industry, including OEMs and their suppliers, the region hopes to attract, retain, and grow.
- **InSPIRE will play a leading role** serving as a magnet to attract and incubate new technology-driven companies while serving the needs of existing industry making the region exceptionally 'sticky' for high-skill, high-wage job creators in the region.
- **InSPIRE will substantially extend capabilities** in key technical areas in its new facilities located in Bay County in alignment with these regional partners and their programs.



Figure 7: InSPIRE Engine

**One important capability expansion is the creation and operation of a SCIF (Sensitive Compartmentized Information Facility),** allowing sensitive and secure programs to be housed at this Institute.

**How InSPIRE will work**

InSPIRE will serve as the applied research and workforce development arm of FSU in the western Panhandle. The InSPIRE-enabled ecosystem will deliver significant growth in the Panhandle in various industries, bolster DOD bases, and generate a highly skilled workforce adept at meeting the growing needs of advanced manufacturing, aerospace, energy, and science and technology-driven enterprises. This unique combination of facilities (Figure 10), expertise, and innovation at InSPIRE, combined with its customized, recognized, Educator Training and accredited Degree Programs will make the Triumph Gulf Coast area a premier location for a highly skilled workforce, industry focused and led R&D and T&E projects.

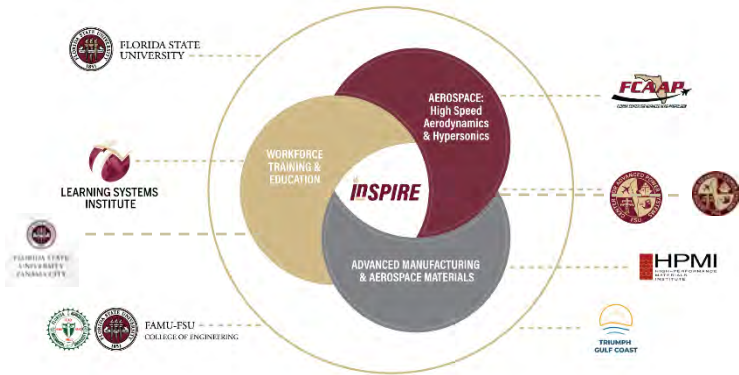


Figure 8: InSPIRE Organizational Advisors and Oversight

To build InSPIRE in the Triumph Gulf Coast region, FSU will strategically integrate the expert knowledge available across FSU while expanding capabilities to serve the specific regional needs of industry, defense bases, economy, and the Triumph Gulf Coast community. InSPIRE will especially leverage expertise and networks of existing FSU Centers of Excellence:

- Florida Center for Advanced Aero-Propulsion (FCAAP)
- High Performance Materials Lab (HPMI)
- Center for Advanced Power Systems (CAPS)
- Learning Systems Institute (LSI)

**RESEARCH AND DEVELOPMENT:** InSPIRE will expand upon, *but not duplicate*, the existing expertise at these centers to stand up and attract industry-scale new and applied R&D to the Triumph Gulf Coast region. These innovation-driven multidisciplinary R&D centers have a long history of advancing key fundamental sciences, developing, and translating transformational technologies to industry applications, and attracting significant resources from industry and the federal government, but these current facilities are limited by scale and a central focus on fundamental research. InSPIRE will create new opportunities currently not possible at existing FSU in Tallahassee. FSU will make the Panhandle region a destination for industry led problem solving, innovation, and test and evaluation services.

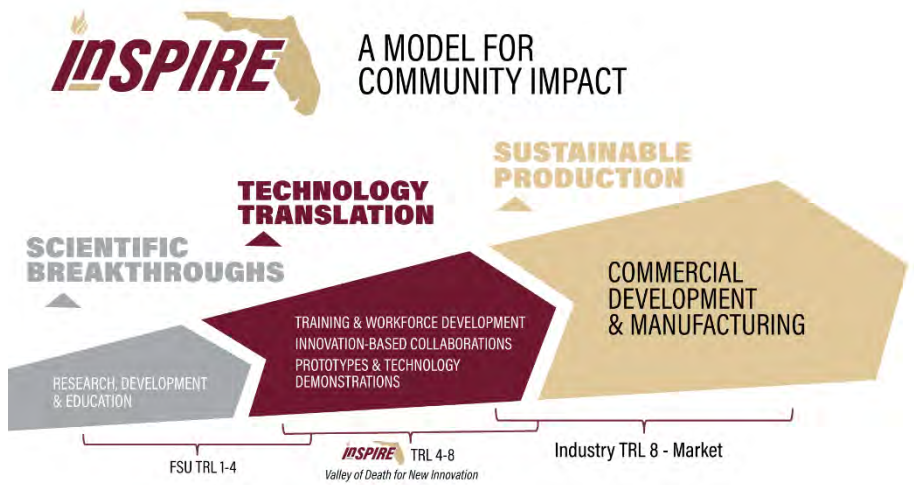


Figure 9: InSPIRE Community Impact

The exposure to innovative industry-led science and technology will prepare students and trainees to become future leaders. InSPIRE's graduates, ingrained with cutting-edge knowledge and skills, will be in high demand.

**EDUCATION AND WORKFORCE TRAINING:** The Learning Systems Institute (LSI) at InSPIRE will work with FSU Panama City, and together they will serve as the coordinator, integrator, and developer of InSPIRE's workforce and educator training programs for K-20 in collaboration with stakeholders in the western Panhandle - the regional industry, school systems, FCS institutions, technical colleges, and universities, and in consultation with the FDOE. Programming will holistically span from K-12 to post graduate continuing education, and thus connect to and complement existing curricula and student success metrics, including those targeted by other Triumph initiatives, but InSPIRE will be focused on careers supporting aerospace and advanced manufacturing, especially those requiring undergraduate and graduate engineering degrees.

InSPIRE programs will lead a comprehensive effort across the region to work with educators, employers, and community support resources to extend outreach. It will create and coordinate a network of K-12 teachers who have been trained to deliver programming and support them through content, materials, and regional aspirational connections for student engagement. The network will provide relevant experiences for career paths, relatable mentorship for guidance and supporting success, and assistance in transitioning across education experiences and completions across the continuum and into career placements.

LSI is uniquely qualified to support this effort—developing and disseminating K-12 STEM education for 50 years, attracting more than \$800M in R&D funding. LSI and FSU Panama City will collaborate on this effort in the eight-county region.

- LSI is trusted by the State of Florida to house Florida's official center for research in STEM (FCR-STEM), established by the legislature in 2006. FCR-STEM, Florida Center for Research in Science, Technology, Engineering, and Mathematics, has made a measurable impact on improving STEM education outcomes in Florida. LSI has handled extremely large, sensitive initiatives, including the redesign of the entire education system of the Republic of South Korea.
- FSU Panama City has been heavily involved in outreach throughout many of the counties in the region, especially through the ASCENT program funded by Triumph Gulf Coast.

By combining FSU's unique strengths, funding, and educational networks, InSPIRE will develop and deliver results in short order. This will result in a dramatic shift in the economic trajectory of this region, making it among the most technically advanced hub for industry-driven R&D and employer-driven, highly trained workforce development. Additional details on the resources, history and success of these centers and institutes can be found in **Appendix B**.

**INFRASTRUCTURE:** InSPIRE facilities will be established in a strategically staged manner and in collaboration with industry and DOD stakeholders.

- InSPIRE will stand up a facility with T&E equipment. The estimated cost of industry-relevant, aerospace, *high-speed aerodynamic* and *advanced manufacturing* equipment are notionally illustrated in Figure 11.
- The InSPIRE facility will initially support education programs, *Advanced Simulation*, an *Advanced Engineering and Manufacturing Lab*, and *Aerospace Composites and Prototyping* and be fully operational by Year 2.
- The specific capabilities of other advanced and more complex facilities will occur in Years 3-5, determined by input and needs of industrial partners, including some that have recently been funded by Triumph Gulf Coast or are being actively recruited by the regional EDAs.
- Meetings with many partners have occurred with more progressively planned based on the region's needs and focus.
- InSPIRE will be a crown jewel for the Panhandle—to be used to attract and grow a diverse, well-resourced technology-defendant/leading industry.



Figure 10: InSPIRE Facilities Map

Core Facilities Investment	
Workforce Training and Advanced Manufacturing	\$33.9M
Aerotesting	\$97.3M
<b>TOTAL</b>	<b>\$131.2M</b>

Figure 11: InSPIRE Core Facilities & Equipment Cost

InSPIRE anticipates using Triumph Gulf Coast funding in the first sixty (60) months to co-support equipment acquisition and installation and operational costs to create and stand-up core facilities. InSPIRE will be a model for the future of production training and innovation and is planned to be robustly self-sustaining after the fifth year, with continued investment to extend the capabilities of the core facilities. Additional details on the roll-out plan for T&E and R&D facilities, education and workforce training programs can be found in **Appendix C**.

**Through targeted investments, InSPIRE will create new programs** complementary to existing FSU and local strengths and specific to regional economic development needs. The Institute's executive leadership will proactively work with the EDAs in the Panhandle and state of Florida to attract new clients and industry to the region.

**InSPIRE will make the Panhandle competitive with Huntsville for industry growth & expertise**

InSPIRE will be a transformational resource and vibrant economic ecosystem for generational impact on the Triumph Gulf Coast region. With a focus on aerospace and advanced manufacturing (space, aviation - defense and commercial) and a commitment to grow and evolve based on the regional needs of the industrial and government partners, e.g., defense bases and new industry in the Panhandle, InSPIRE will:

- **Attract and grow new industry in the region:** The Institute will serve as an engine for technology innovation, workforce training, and education. It will provide the expertise and infrastructure to support the recruitment and growth of new industry to the region.
- **Bring more jobs to the region** for the coming decades by increasing workforce development, visibility, resources.
- **Attract renowned scientists, engineers and researchers;** enabling it to compete for and win significant, large, federal and industry research funding initiatives.
  - As an example, an FSU partnered team was recently awarded a \$1M *NSF Engines Development Grant* to bring together *Additive Manufacturing industry stakeholders to Florida*. With InSPIRE, the chances of this team winning the next phase, a \$160M, *Type II NSF Engines Grant*, will be greatly enhanced—bringing these dollars and life-changing research to the region. Stakeholder meetings in the panhandle are underway. A community workshop occurred October 2-3, 2023 at FSU Panama City.

### How the project is transformational

**Explain how the proposed project or program is considered transformational and how it will affect the disproportionately affected counties in the next ten (10) years.**

Other regions in the United States have seen significant benefit from strategic investments in innovation capacity and the infrastructure to connect it to local economic opportunity and national needs. The Research Triangle Institute was founded in 1958 to build the Research Triangle Park (RTP) adjacent to the Raleigh Durham Airport. RTP was created in 1959 to leverage the research programs at Duke University, the University of North Carolina, and North Carolina State University. RTP was envisioned as a means to diversify from the traditional industries then prominent in the state, but lagging in a post WW II economy, agriculture, textiles, and wood furniture. Note, RTP struggled into the mid-60's until the state began aggressively recruiting companies to RTP. Since then, the region has become a global leader in technology-based companies serving electronics and computing, engineering, biotechnology, information technology, and advanced manufacturing market sectors. The high density of talent and commercial innovation creates a virtuous cycle for supporting and leveraging education and research programs at surrounding schools. More than 300 companies and 55,000 employees are located in the Park itself, with many more companies in the surrounding 12-country 'Triangle' region now benefiting from the greater ecosystem now in place. Today, RTP's current operating budget is ~\$1B.

The Georgia Tech Research Institute (GTRI) emerged from the Engineering Experiment Station (EES) at the Georgia School of Technology (now Georgia Tech), which was established in 1934 to support translation of technologies to support Georgia's commerce and citizenry. Notable successes in supporting DOD needs through WW II and the space race, including the founding of Scientific Atlanta, grew sustained operations into the 1970's. EES helped Georgia Tech become a designated University-Affiliated Research Center (UARC), which provides closer integration with DOD programs and facilitates stronger research collaborations. In the 1970's when relations with Georgia Tech were restructured to promote better collaboration between the university and EES and create joint appointments of researchers and faculty, operations grew significantly, and EES was renamed GTRI in 1984. Today, GTRI's direct annual funding is more than \$700M, and it is a recognized national resource for technical innovation.

Another example important for InSPIRE is the development of Huntsville (AL) as 'Rocket City,' a capital of US aerospace, in support of the national defense and space programs emerging after WW II. In 1950, the decision to concentrate US jet and rocket development at Redstone Arsenal led to the construction of new test facilities and recruitment of companies to serve emerging needs spanning

from military and commercial aircraft to space vehicles. Today, hundreds of aerospace-related companies are located in northern Alabama, all of the large US companies that serve the aerospace industry have a presence in Rocket City, and the underpinning innovation and workforce base has also led to diverse growth in automotive and biotechnology companies in the region.

Transformational innovation ecosystems tend to be resilient to economic downturns and hardships and thrive on active programs with state and regional community economic developers and education institutions. In the Panhandle and in Gulf South, aerospace, aviation, and manufacturing are prime industry targets for economic development opportunities and economic diversification. Due to military installations and its geographical proximity to several large OEMs and aviation company headquarters, the region is primed for growth. To gain market-share in the significant aviation and aerospace sector, the Panhandle must work immediately to ensure that the proper investments are made now to keep pace with the national trends and demands of the sector. InSPIRE will serve as a beacon that demonstrates the community's commitment to building the necessary infrastructure (both physical and intellectual) required to support new and existing industry.

**Why it matters:** Aerospace, aviation, and manufacturing are important sectors for the U.S. economy and for U.S. global security. The Panhandle is aggressively pursuing complementary steps to remain a key region for these opportunities.

For example, Northwest Florida Beaches International Airport, airport officials, community officials, and economic development officials have created and are pursuing a vision to establish the ECP Aviation Center of Excellence. Their vision connects educational and airport assets to private sector companies. The ECP Aviation Center plans to 1) establish Bay County as a prime location for private sector aviation related companies to invest, 2) diversify the regional workforce beyond the established pillars of tourism and military, helping to remain resilient in the face of unforeseen disasters. Recently, Triumph Gulf Coast approved Project Maple for the ECP Airport Campus, which will establish a private sector partner to compliment the education component.

Key labor needs for the greater 13 county panhandle region, including the 8 affected counties, were identified in a May 2, 2023 report to Florida's Great Northwest – *Labor Supply & Demand Research Analysis Year 2 Update*. This report noted that 115,000 of this region's total 650,000 jobs are government-related, and other public sources show that more than 50,000 of those are at affiliated with key DOD facilities, such as Eglin Air Force Base and the Naval Surface Warfare Center – Panama City. This report identified engineering positions as an area of need, and this need will increase as InSPIRE creates more opportunities for companies to pursue their development, testing, and prototyping activities in the region. InSPIRE's education programs will not only ensure the existing talent need is met, but that a sufficient number of trained graduates will be prepared for the additional new jobs created.

**Success in this space will have transformational, positive impact** on job opportunities and local wages. A large portion of the employment within the Panama City Metropolitan Statistical Area (MSA) is clustered within the hospitality and retail trade. While these sectors are key drivers for the economy, when the tourism industry is impacted by unexpected changes, these sectors are heavily hit.

InSPIRE will support existing programs such as the Aviation Center of Excellence at ECP and Project Maple, and help create new opportunities for future similar, and larger, economic development drivers for the region by providing industry-relevant testing, prototyping, and deployment support and extending STEM outreach more actively into the region. New employment opportunities in not only the Transportation Services Sector, but others that build off advanced manufacturing will be created.



These new jobs are differentiated employment opportunities for residents of the community.

InSPIRE will create ongoing 'business' through its own operations, provide support to existing companies to ensure their success and growth in the region, and recruit customers to locate proximately to the Institute in the region. InSPIRE will serve as magnet for the region, help grow customers, and with each new successful economic development project, the community will diversify its economy and become more resilient to unforeseen events **creating a stabilizing effect** to the regional economy making it highly resilient to major disasters, which have become more common in the recent decade (Deepwater Horizon, Hurricane Michael, COVID-19).

## Viability

**Describe data or information available to demonstrate the viability of the proposed project or program.**

**InSPIRE will be transformational for the Triumph Gulf Coast Region.** The program will enhance education and training opportunities, offer the needed demonstration, test, and evaluation resources to new and existing industries, and produce research innovation that creates new opportunities for growth and expansion.

**InSPIRE is specifically designed to offer proprietary, sensitive, and classified applied R&D**, at industry-appropriate scales with highly efficient turn-around times – from idea generation, to modeling and simulation, to advanced testing and prototyping. The initial areas of focus are industrial scale prototyping, cutting-edge additive manufacturing, and aerodynamic and hypersonic T&E activities for the aerospace, aviation, energy, and related areas in the commercial and defense sectors.

**InSPIRE is designed to specifically attract new and sustainable investment to the region.**

**InSPIRE will leverage and attract industry partners** – from OEMs to secondary and tertiary subcontractors, and investors to establish co-located facilities for ventures that translate into commercial products and services.

**InSPIRE will create and amplify complementary workforce development programming** that is integrated with this capacity and supports implementing and deploying new technologies at the current and future industrial base in the Panhandle.

## The InSPIRE steering committee brings the right experience

The team that will stand up the initial R&D, T&E and Education and Educator and Workforce training elements of InSPIRE is made up of technical and senior leaders who have built and led very successful R&D and Education Centers of FSU and the College of Engineering at the technology-driven Innovation Park in Tallahassee. These FSU Centers of Excellence have decades-long records of attracting resources and funding while training high-demand engineers and scientists (i.e., producing the workforce needed to attract and retain aerospace and advanced manufacturing to the eight-county affected region).

As evidenced over the last decade, HPMI, FCAAP, CAPS, and the College of Engineering have

- Attracted \$246.68M in external funds awarded for R&D and Education.
- Trained 3,598 students with BS degrees, 753 with MS/MEng and 280 with PhD in Engineering.
- Issued more than 150 Patents in the last five years.

The largest source of funds for the above have been from federal agencies, with a majority from DOD and increasing support and collaboration with industry partners. InSPIRE will be able to target and win new contracts and grants that FSU currently cannot target due to scale and capacity.

Similarly, over a comparable ten-year period LSI and its subsidiary FCR-STEM have

- Attracted \$177.87M building the STEM Pipeline in K-12 Education across the state, nationally, and internationally.
- Provided training to more than 40,000 STEM teachers.
- Provided training to more than 3M K-12 students in the last two years.

The team's track record in the above areas, as indicated in **Appendix B**, is directly relevant to InSPIRE providing confidence that the Institute will exceed the target outlined in this proposal.

#### Impact to disproportionately affected counties

**Describe how the impacts to the disproportionately affected counties will be measured long term.**

Florida is one of the nation's fastest-growing states, with very significant growth potential in the Panhandle.

- **InSPIRE will play a key role in building such an economy**, with an initial focus on building capacity in advanced manufacturing, aerospace and aviation.
- **In the early stages of InSPIRE**, the region's defense bases and the supporting ecosystem of contractors, large and small, will be most directly impacted.
- **However, the impact will continue to broaden** as more industry, defense and civil, is attracted to the region making InSPIRE at first a regional and then a national resource.
- **The ultimate aim is to serve as the foundation** for a thriving ecosystem similar to that in Huntsville, Alabama, the Research Triangle in North Carolina, and the near billion-dollar R&D and T&E complex at GTRI, Atlanta.
- **InSPIRE will leverage deep relationships**, expertise and resources that exist in FSU-led Innovation Park in Tallahassee, a thriving R&D enabled ecosystem to build an application-industry focused resource Institute in the Panhandle. The Innovation Park network in Tallahassee has roughly \$100M annual expenditures in research, technology development and education and training—a target that InSPIRE and the ecosystem it creates will exceed once it reaches its full potential.

**The best-in-class testing**, manufacturing, R&D and training facilities at InSPIRE will enable it to form strong collaborations and partnerships with the DOD bases and Industry.

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- This will be a key enabler in attracting increasingly larger slices of the considerable funding and resources.
- The partner Centers of Excellence in Tallahassee – FCAAP, HPMI, CAPS, and LSI, already attract \$34.4M per year (on average 2018-2022), InSPIRE is planned to bring in 2 to 3 times that in its initial phase and 5 times or more once it reaches maturity.

**How the project is sustainable**

**Describe how the proposed project or program is sustainable. (Note: Sustainable means how the proposed project or program will remain financially viable and continue to perform in the long-term after Triumph Gulf Coast, Inc. funding.)**

InSPIRE anticipates using Triumph Gulf Coast funding in the first sixty (60) months to co-support equipment acquisition and installation and operational costs. InSPIRE will be a model for the future of production training and innovation and is planned to be robustly self-sustaining after the fifth year.

The Institute will ensure operational funding through continued support from FSU, legislative budget requests (InSPIRE will be a FSU, EDA, and regional priority), industry support (financial and in-kind), and contracts and grants focused on applied research. InSPIRE's applied research industry outlook (e.g. demonstration, prototyping, T&E and R&D) in parallel with workforce training that establishes a highly trained local workforce will exponentially impact the economic forecast for the Institute, Bay County, and eight county affected area.

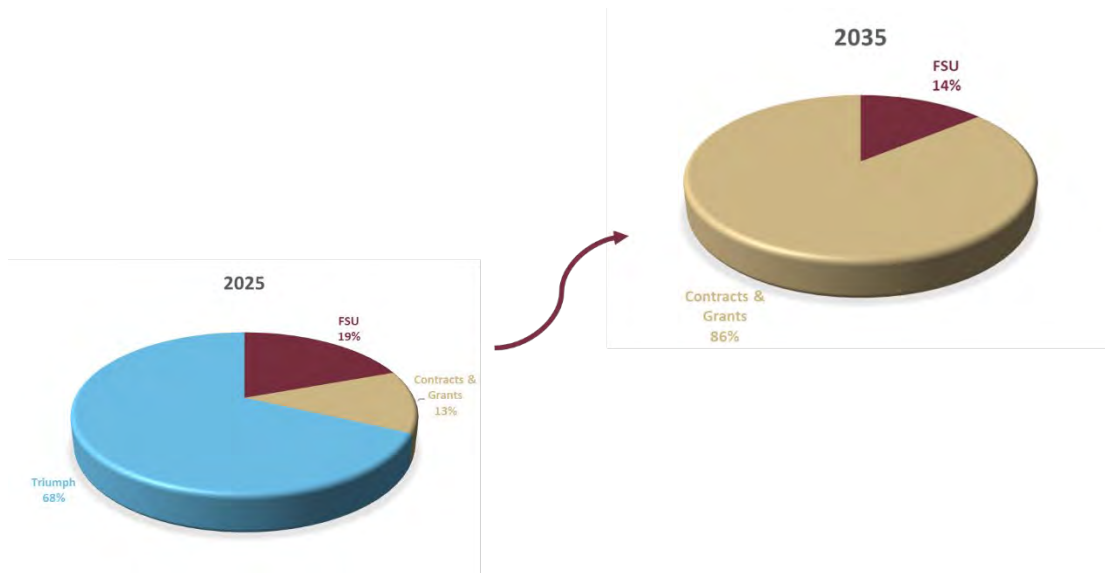


Figure 12: InSPIRE Funding Source 10 Year Transformation

## Measurement

Describe how the deliverables for the proposed project or program will be measured.

### InSPIRE's impact is reflected in:

- The focused high-tech regional workforce training in areas of need that produces *additional higher wage jobs*.
- *Increased R&D and T&E expenditures* that attract companies to the center and the region due to its unrivaled facilities and infrastructure.
- *Additional economic activity* that will be generated due to significant improvement in higher-wage jobs and expenditures.

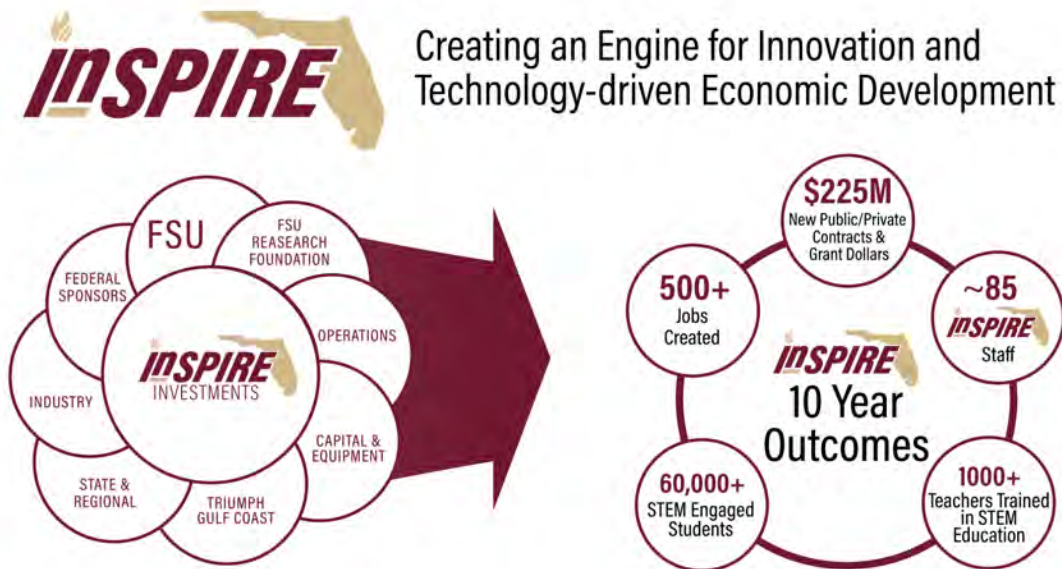


Figure 13: InSPIRE Investments and Outcomes

The productivity and impact of InSPIRE in 10 years following the completion of a substantial portion of its facilities are summarized in the table and details as follows:

**Impact Metric #1:** The addition of nearly **100 new technical and highly skilled new positions** in the region (Bay and other affected counties) including 87 core staff at InSPIRE with an average starting salary of \$104K, and 10 new faculty lines at FSU-Panama City with an average salary of \$119K.

**Impact Metric #2:** Submission of **\$500M** in proposals for R&D, T &E and Workforce Training programs through Federal, State and Private (Industry, Philanthropic) programs and partnerships.

**Impact Metric #3:** **\$225M** in new contract and grant funding and expenditures.

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- Impact Metric #4:** Engage at least **40 companies** in the region each year to assess their education and technology development needs to inform the InSPIRE partner network and strategic resource investments.
- Impact Metric #5:** Host **2 Annual Regional Meetings** to present program outcomes to the community, encourage partnership opportunities between research sponsors and the community, and provide additional professional development and networking opportunities for students.
- Impact Metric #6:** Create **2 recruiting-focused engagements** each year with research sponsors and community economic development partners.
- Impact Metric #7:** **6-10** new companies attracted to the region (including start- up/spinoffs).
- Impact Metric #8:** **8** Teacher Trainer/Supporters prepared and engaged in maintaining and coordinating the InSPIRE Teacher Network.
- Impact Metric #9:** **1,000** teachers trained for Teacher Network (5,000 Teacher Certificates).
- Impact Metric #10:** **200** additional students obtaining accredited science & engineering Bachelor's Degrees.
- Impact Metric #11:** **40** additional students obtaining accredited science & engineering Master's Degrees.
- Impact Metric #12:** **15** additional students obtaining accredited science & engineering PhD Degrees.

**SECTION III: PRIORITIES**

**Which priorities the program meets**

**Please check the box if the proposed project or program will meet any of the following priorities (check all that apply):**

- ✓ Generate maximum estimated economic benefits, based on tools and models not generally employed by economic input-output analyses, including cost-benefit, return-on-investment, or dynamic scoring techniques to determine how the long- term economic growth potential of the disproportionately affected counties may be enhanced by the investment.
- ✓ Increase household income in the disproportionately affected counties above national average household income.
- ✓ Leverage or further enhance key regional assets, including educational institutions, research facilities, and military bases.
- ✓ Partner with local governments to provide funds, infrastructure, land, or other assistance for the project.
- ✓ Benefit the environment, in addition to the economy. Provide outcome measures.
- ✓ Partner with K-20 educational institutions or school districts located within the disproportionately affected counties as of January 1, 2017.
- ✓ Are recommended by the board of county commissioners of the county in which the project or program will be located.
- ✓ Partner with convention and visitor bureaus, tourist development councils, or chambers of commerce located within the disproportionately affected counties.

**Explanation**

**Please explain how the proposed project meets the priorities identified above.**

Statutory Priorities	How the Project Meets the Priorities
Generate maximum estimated economic benefits, based on tools and models not generally employed by economic input-output analyses, including cost-benefit, return-on-investment, or dynamic scoring techniques to determine how the long- term economic growth potential of the disproportionately affected counties may be enhanced by the investment.	STEM Outreach and student engagement will include teacher training and support, and specific program elements that will ensure relevance to student decision-making and success. This will provide new participation opportunities, which over time will lead to new economic success for these historically underserved areas.
Increase household income in the disproportionately affected counties above national average household income.	By creating new technology-based jobs, within InSPIRE, in new start-ups, and through new commercial and/or government operations enabled by the institute, more households in the affected counties will be employed with wages greater than the national average. Additionally, STEM outreach programs will connect more students to existing and induced career opportunities with higher wages.
Leverage or further enhance key regional assets, including educational institutions, research facilities, and military bases.	InSPIRE, by design, builds off of regional assets and strategic investments underway. The six military installations are significantly based on aviation and aerospace operations, FSU research activities in Tallahassee serve as a foundation for the planned applied research of InSPIRE, and FSU-PC and regional education partners will serve as primary curriculum and delivery partners for STEM learning and training.

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Partner with local governments to provide funds, infrastructure, land, or other assistance for the project.	InSPIRE partner Bay County EDA is assisting to ensure co-investment and facility build-out plans and execution are consistent with its vision and strategic investments underway not only there, but in the Northwest Florida/panhandle region.
Partner with K-20 educational institutions or school districts located within the disproportionately affected counties as of January 1, 2017.	InSPIRE STEM outreach programs will work with a network of teachers and other partners to proactively create conduits for students in affected counties to engage in experiential learning relevant to existing and future career opportunities, as well as provide transitional assistance to ensure success in pursuing ongoing career-connected learning opportunities.
Are recommended by the board of county commissioners of the county in which the project or program will be located.	InSPIRE is recommended by the Bay County Board of County Commissioners. <b>Appendix H.</b>
Partner with convention and visitor bureaus, tourist development councils, or chambers of commerce located within the disproportionately affected counties.	InSPIRE will partner with local agencies and other organizations to promote the region. It will also work directly with chambers of commerce to promote STEM learning, technology-based entrepreneurship based on InSPIRE innovation, and greater connectivity between InSPIRE partners, students, teachers, and the communities within the affected counties. This is critical part of building culture of innovation across the region.

Discretionary priorities the project meets

**Please explain how the proposed project or program meets the discretionary priorities identified by the Board.**

Discretionary Priorities	How the Project Meets the Priorities
Are considered transformational for the future of the Northwest Florida region.	InSPIRE will be transformational in creating a culture for innovation and creativity in the Panhandle. The activities enabled by investments in the planned facilities will directly create new industry, ensure success of military installations, and connect a new generation of students to career opportunities previously unavailable to them. Even more significant is the establishment of a physical presence for FSU to directly serve this region under a new model that focuses on economic development and regional impact. This culture of collaborative innovation will create exciting new opportunities for growth for communities, companies, and individuals in the region for generations.
May be consummated quickly and efficiently.	InSPIRE has several elements that can be deployed quickly, while leveraging recent investments. STEM outreach and advanced manufacturing support can be quickly started using existing facility space and programs underway at partners. The aerospace test facilities will take longer, but designs and decades of operational support experience will minimize the buildout timeline.

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<p>Promote net-new jobs in the private sector with an income above regional average household income.</p>	<p>InSPIRE is most focused on this outcome, not only in those directly employed by the Institute, but importantly on new jobs created or supported by its operations. Bay County and other affected counties have successfully recruited related companies with several hundred employees, and others are actively being recruited. The presence of InSPIRE will improve retention and recruitment and quickly build a cluster of these companies. This will create a multiplier through complementary relocation of supply chain partners, new start-ups, and growth enabled through adjacent technologies, such as advanced manufacturing.</p>
<p>Align with Northwest Florida FORWARD, the regional strategic initiative for Northwest Florida economic transformation.</p>	<p>InSPIRE is directly aligned with key Northwest Florida FORWARD <u>goals</u>, including:</p> <ul style="list-style-type: none"> <li>• Foster robust entrepreneurship and innovation ecosystems to drive future economic growth.</li> <li>• Strengthen the region's economy through targeted recruitment of new businesses and supporting existing business expansions.</li> <li>• Connect the talent assets of Northwest Florida to key industry clusters and ensure a dynamic and diverse workforce for new and growing businesses.</li> </ul>
<p>Create net-new jobs in targeted industries to include: aerospace and defense, financial services/shared services, water transportation, artificial intelligence, cybersecurity, information technology, manufacturing, and robotics</p>	<p>InSPIRE focus areas are aerospace and advanced manufacturing. These include a focus on defense applications, will require support from cybersecurity, information technology, artificial intelligence, power systems, and robotics.</p>
<p>Promote industry cluster impact for unique targeted industries.</p>	<p>InSPIRE programming will create a cluster impact around aerospace and related industries.</p>
<p>Create net-new jobs with wages above national average wage (e.g., similar to EFI QTI program, measured on graduated scale).</p>	<p>InSPIRE-related jobs, direct and indirect will be high wage jobs, anticipating 25% above national average.</p>
<p>Are located in Rural Area of Opportunity as defined by the State of Florida (DEO).</p>	<p>While the primary InSPIRE facilities are located in Bay County, significant outreach and on-site programming, especially in STEM areas, take place in rural areas across affected counties and the greater Northwest Florida/panhandle region.</p>
<p>Provide a wider regional impact versus solely local impact.</p>	<p>InSPIRE's collaborative innovation ecosystem will span across the panhandle, while enabling, and ultimately requiring, participation across the region to meet workforce needs.</p>



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Align with other similar programs across the regions for greater regional impact, and not be duplicative of other existing projects or programs.	<p>InSPIRE is conceived to align with and leverage other programs and strategic investments in the region. For example, the technical specifications of the manufacturing, testing, and analysis facilities will not duplicate, but supplement those already existing in Tallahassee.</p> <p>Coordination with existing STEM outreach and technical training programs in affected counties will ensure new programming is additive and not duplicative. LSI is already providing leadership and guidance on state-wide STEM outreach.</p>
Enhance research and innovative technologies in the region.	InSPIRE is focused on creating a collaborative innovation ecosystem in Bay County that serves the entire region. The technology solutions of interest to FSU and partners are of global importance and critical to national security, and working toward and delivering solutions will drive regional economic development.
Enhance a targeted industry cluster or create a Center of Excellence unique to Northwest Florida.	InSPIRE, both as an institute embracing a new model for FSU driving economic impact and as a collaborative innovative ecosystem for aerospace and advanced manufacturing, will be a unique center of excellence in the U.S.
Create a unique asset in the region that can be leveraged for regional growth of targeted industries.	InSPIRE will provide one-stop, quick-turnaround testing services for aerospace and advanced manufacturing. The capacity to direct these resources to serve prototyping and higher TRL projects make them attractive to industry collaboration and fosters an interest in proximate scale-up and manufacturing. Partner companies will find it economically advantageous to co-locate with the facilities, and their development and supply chain partners will have incentives to follow. Further, new innovations will create spin-off/start-up opportunities for FSU, partners, and regional entrepreneurs.
Demonstrate long-term financial sustainability following Triumph Gulf Coast, Inc. funding.	The technical foundation for InSPIRE stems from three existing FSU centers of excellence that have a long history of sustainable operations. InSPIRE's operating model and its location in Bay County will support a more diverse set of partners, project type and scope, which provides a broader platform for sustainability across affected counties.
Leverage funding from other government and private entity sources.	The proposed ten-year budget includes substantial co-investment by partners, including FSU, federal and state government, and private entities. These span from investing in facilities to supporting direct work products.
Provide local investment and spending.	InSPIRE personnel will be based in Bay County, with functional nodes in other partner locations across the affected counties. Facilities will be constructed in Bay County and InSPIRE will use Bay County as its place of business and primary address.

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Are supported by more than one governmental entity and/or private sector companies, in particular proposed projects or programs supported by more than one county in the region.	Multiple partners are supporting InSPIRE. The National Science Foundation Engine Program is supporting a proposal for regional innovation-based economic development that could also co-invest in InSPIRE. Multiple industry partners have provided letters of support, and a group of education partners are executing an MOU to support this regional effort. InSPIRE is already being incorporated into recruiting efforts for Bay County ECD.
Provide clear performance metrics over duration of project or program.	Performance metrics regarding the build out of capabilities and operational and economic milestones are provided.
Include deliverables-based payment system dependent upon achievement of interim performance metrics.	InSPIRE will work with co-investing partners, including Triumph Gulf Coast, to establish a deliverables-based payment system that supports timely facilities build-out while balancing risk-based needs across service providers and co-investing partners.
Provide capacity building support for regional economic growth.	InSPIRE provides support to develop technical services and workforce capacity as needed for regional economic growth.
Include Applicant and selected partners/vendors located in Northwest Florida.	Venture Crossings is a local strategic development, conveniently located to the ECP airport.

Program location: impacted counties

In which of the eight disproportionately affected county/counties is the proposed project or program located? (Circle all that apply)

Escambia Santa Rosa Okaloosa Walton Bay Gulf Franklin Wakulla

County proposal

Was this proposed project or program on a list of proposed projects and programs submitted to Triumph Gulf Coast, Inc., by one (or more) of the eight disproportionately affected Counties as a project and program located within its county?

- Yes
- No

Does the Board of County Commissioners for each County listed in response to question 5, above, recommend this project or program to Triumph?

- Not Applicable

**SECTION IV: Approvals and Authority**

**Approvals**

**If the Applicant is awarded grant funds based on this proposal, what approvals must be obtained before Applicant can execute an agreement with Triumph Gulf Coast, Inc.?**

InSPIRE has been approved and endorsed by the Florida State University Board of Trustees, President Richard McCullough, and senior leadership.

**If approval of a board, commission, council or other group is needed prior to execution of an agreement between the entity and Triumph Gulf Coast:**

Not Applicable

**Timeline**

**Describe the timeline for the proposed project or program if an award of funding is approved, including milestones that will be achieved following an award through completion of the proposed project or program.**

The tables below show the major activities and milestones that are start-up or ongoing to the InSPIRE project.

- We strategically planned the Institute's growth trajectory to establish immediate impact in year one in workforce and educator training, hiring Institute personnel, and construction and infrastructure development.
- This will be closely followed by sustained expansion of both technical capabilities and expert personnel over time through years 5 and 6.
- Industry partner recruitment and development, along with marketing activities, will be ongoing for all programs for the extended life of InSPIRE.
- The Institute will expend Triumph Gulf Coast funding in years 1-4 and is anticipated to be financially self-sustaining beginning in year 5.
- The technical aspect of InSPIRE is anticipated to reach a steady state of operations in years 5-7 and experience a significant ramp up of external funding activity in years 7-15 that would prove to generate an additional return on investment (ROI) to Triumph Gulf Coast's initial funding.

Milestones/Outcomes Example	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
InSPIRE Core Personnel (New Positions Added By Year)	45	29	4	4	3	2				
Teacher Professional Development Programs (Teachers Trained)	100	100	100	100	100	100	100	100	100	100
STEM Curriculum Support and Educational Resource Kits	200		200		200		200		200	
STEM Summer Camps (Students per year)	100	100	100	100	100	100	100	100	100	100
InSPIRE Conferences/Workshops per Year	3	3	3	3	3	3	3	3	3	3
InSPIRE Conference/Workshop Attendees per Year	250	250	250	250	250	250	250	250	250	250
InSPIRE Stakeholders Meetings	2	2	2	2	2	2	2	2	2	2

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Infrastructure Spending	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
Construction	X	X	X							
Design & Engineering	X	X	X							
Land Acquisition	X									
Land Improvement	X									
Equipment Purchase	X	X	X	X	X	X	X	X	X	X
High Performance Computational Resources	X	X	X				X	X		
Computational Visualization	X	X	X					X		
0.5m Hypersonic Tunnel (Mach 6-10)			X	X	X	X	X	X		
Altitude/Climatic Transonic Windtunnel (M=0.8)					X					
High-Bay Vehicle Integration Test Cell	X	X	X			X	X		X	
High-Performance Simulation			X				X	X		
Emerging High-Temp Materials Lab	X						X			X
Aerospace Composite Manufacturing and AMLab Prep - built in Year 1	X	X	X	X	X			X		
ATL/AFP Manufacturing Lab	X	X	X	X	X					
AM Manufacturing Innovation Lab	X	X	X	X	X				X	
AI/ML Drvn Manufacturing Lab	X	X				X				
TRL 5 - TRL 6 Manufacturing & Demonstration Lab	X	X	X	X	X					X

InSPIRE Core Personnel	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10
Hiring Plan										
Institute Administration	18	7	4							
Workforce Training & Education in STEM (Full-time)	12					2				
Advanced Aerospace Materials & Additive Manufacturing (Full-time)	2	6								
Advanced Aerospace Materials & Additive Manufacturing (GRA)	3	14								
Aerospace: High Speed Aerodynamics & Hypersonics (Full-time)	5									
Aerospace: High Speed Aerodynamics & Hypersonics (GRA)	5	2		4	3					

**Authority**

Attach evidence that the undersigned has all necessary authority to execute this proposal on behalf of the entity applying for funding. This evidence may take a variety of forms, including but not limited to: a delegation of authority, citation to relevant laws or codes, policy documents, etc. In addition, please attach any support letters from partners.

Letter FSU VPR Authority to sign: **Appendix D**

Partner Letters of Support: **Appendix E**

## SECTION V: Funding and Budget

### Requested amount of funding & time period

**Identify the amount of funding sought from Triumph Gulf Coast, Inc. and the time period over which funding is requested.**

Florida State University is requesting ~\$95M in funding to seed and establish InSPIRE over its first five years to be used on specialized equipment and operational costs.

### Percentage of total program costs

**What percentage of total program or project costs does the requested award from Triumph Gulf Coast, Inc. represent?**

Requested funds from Triumph Gulf Coast represent less than 25% of total project cost over the Institute's first ten years of development and operations.

### Number of jobs produced and average wage

**Please describe the types and number of jobs expected from the proposed project or program and the expected average wage.**

InSPIRE will generate nearly 100 new highly skilled staff and faculty high wage jobs, and its operations will directly facilitate the creation and/or recruitment of thousands of additional new high wage jobs as the ecosystem grows. Standard economic valuation of jobs and their multiplicative impact on the economy can be used to evaluate the outcomes. These direct impacts have been captured in the InSPIRE metrics) and discussed in the narrative above (Figure 14).

In addition to the above direct impact, InSPIRE will have a very *significant* and *measurable positive impact on the region*, which is illustrated in the FSU Center for Economic Forecasting and Analysis (CEFA) economic impact analysis of InSPIRE operations in years 2023 through 2033, included in **Appendix F**. The total economic impacts are estimated to be a total of 2,915 jobs, \$145 million in income or wages and about \$353 million in total economic output. It should be noted that the K-12 and university-affiliated STEM teachers and students, were not included in the CEFA economic impact analysis. The construction impacts are estimated to total 740 jobs, about \$51 million in income or wages and nearly \$159 million in total economic output. On a permanent basis, the project is projected to generate 2,175 jobs, nearly \$94 million in income or wages, and about \$195 million in total economic output.

### Supplanting existing sources

**Does the potential award supplement but not supplant existing funding sources? If yes, describe how the potential award supplements existing funding sources.**

- Yes
- No

InSPIRE will be jointly funded by Florida State University and industry partners. Additional funding will be realized through FSU state and federal budget requests and contracts and grants. This is represented in Figure 9 in Section II and is a significant outcome for the research institutions participating in successful regional innovation ecosystems.

**Proposed budget**

**Please provide a Project/Program Budget. Include all applicable costs and other funding sources available to support the proposal.**

<b>A. Project Costs</b>	
Equipment	\$ 190,997,000.00
Supplies	\$ 33,010,858.55
Personnel	\$ 111,629,948.55
Lease/Rental Fees	\$ 33,586,850.86
Other Operating Costs	\$ 29,599,913.28
<b>Total Project Cost</b>	<b>\$398,824,571.23</b>
<b>B. Other Project Funding Sources</b>	
FSU	\$ 65,296,955.84
Private and Public C &G	\$ 235,074,000.00
<b>Total Other Funding</b>	<b>\$300,370,955.84</b>
<b>Total Amount Requested</b>	<b>\$98,453,615.39</b>

Note: The total amount requested must equal the difference between the costs in 5A. and the other project funding sources in 5.B.

**Budget narrative**

**Provide a detailed budget narrative, including the timing and steps necessary to obtain the funding and any other pertinent budget-related information.**

InSPIRE's budget includes five primary expense types: facilities lease, equipment, personnel, operations, and materials and supplies broken out across Institute Administration, STEM Workforce Education and Training, Advanced Aerospace Materials & Advanced Manufacturing, and Aerospace - High Speed Aerodynamics & Hypersonics.

Personnel costs include positions required to manage InSPIRE, operate equipment, and deliver on research, education, and workforce and educator training programming. This includes administration and support staff, research and operational engineers, engineering faculty, undergraduate and graduate researchers, and STEM education specialists. Estimated salaries are based on a combination of national and regional baselines, depending on education, experience, and expertise necessary for the position.

The institute as proposed is complex and consists of specialized equipment, some of which will be unique in the US. However, FSU and its partners have significant experience overseeing the construction and operations of similar facilities. Cost estimates are based on these experiences,

adjusted for today's marketplace, listed prices, and recent purchase and installation examples by FSU or peer institutions. Core facilities will be constructed in the first five years of the Institute and extended in later years to serve partner and sponsor needs.

Florida State University has committed \$65 million across the first ten years of the Institute, including new faculty lines to support the new science and engineering students at FSU-Panama City, whose programs will be enabled by InSPIRE. Florida State University coupled with regional economic development groups will ensure that InSPIRE is a top priority related to both state and federal legislative budget requests as well as cooperative agreements with federal and industry specific partners for both in-kind and monetary support. Once InSPIRE reaches its steady state of operations, the primary breadth of funding will be derived from federal, state, and industry contracts and grants related to applied research, technology demonstrations, and workforce and educator training. The timing of expenditures are listed in the budget shown in **Appendix G**.

### Provisions

**Applicant understands that the Triumph Gulf Coast, Inc. statute requires that the award contract must include provisions requiring a performance report on the contracted activities, must account for the proper use of funds provided under the contract, and must include provisions for recovery of awards in the event the award was based upon fraudulent information or the awardee is not meeting the performance requirements of the award.**

- Yes
- No

### Reporting

**Applicant understands that awardees must regularly report to Triumph Gulf Coast, Inc. the expenditure of funds and the status of the project or program on a schedule determined by Triumph Gulf Coast, Inc.**

- Yes
- No

### Co-applicant financial data acknowledgement

**Applicant acknowledges that Applicant and any co-Applicants will make books and records and other financial data available to Triumph Gulf Coast, Inc. as necessary to measure and confirm performance metrics and deliverables.**

- Yes
- No

### Right to request additional information

**Applicant acknowledges that Triumph Gulf Coast, Inc. reserves the right to request additional information from Applicant concerning the proposed project or program.**

- Yes
- No

**SECTION VI: ADDENDUM FOR INFRASTRUCTURE PROPOSALS****Program Requirements****Is the infrastructure owned by the public?**

- Yes
- No

**Is the infrastructure for public use or does it predominately benefit the public?**

- Yes
- No

**Will the public infrastructure improvements be for the exclusive benefit of any single company, corporation or business entity?**

- Yes
- No

**Provide a detailed explanation of how the public infrastructure improvements will connect to a broader economic development vision for the community and benefit additional current and future businesses.**

The facilities developed by InSPIRED and centered in Bay County will support applied research, demonstration, prototyping, and education and training needs for the organizations, companies, and citizens in the Florida panhandle, with an emphasis on the needs within the eight counties served by Triumph Gulf Coast. The operational capacity is being developed in collaboration with FSU leadership, regional economic development leads, and partners, with a focus on supporting and growing the aviation and aerospace activities that are so important for Florida and the panhandle. The Institute will be located at either the Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park.

**Provide a detailed description of, and quantitative evidence demonstrating how the proposed public infrastructure project will promote:**

***o Economic recovery, o Economic Diversification, o Enhancement of the disproportionately affected counties, o Enhancement of a Targeted Industry.***

Impact to rebuilding base operations – new aircraft responsibilities (e.g. F35 operations support and growing MRO demand) are increasing for regional partners

Creation of more deeply technically skilled workforce will grow complementary business opportunities. Advanced manufacturing capacity and worker base supports medical devices, electronics, clean energy, sustainable infrastructure, and other emerging market sectors.

Location in Bay County extends depth of connectivity for FSU and provides for direct engagement in the affected eight counties for FSU and its other partners.

Aviation and aerospace is strategically important, and Institute will leverage past, current, and planned investments, including build-out and future expansion of Venture Crossings Industrial and Technology Park vision.



## Additional Information

Is this project an expansion of existing infrastructure project?

- Yes
- ✓ No

**Provide the proposed beginning commencement date and number of days required to complete construction of the infrastructure project.**

The infrastructure development is estimated to start in late 2024, begin partial operations in early 2026, and fully completed in early 2029.

**What is the location of the public infrastructure? (Provide the road number, if applicable.)**

The primary location of operations is anticipated to be at either the Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park. Specific demonstration and workforce training programs will also be conducted at partner locations in other affected counties, as needed.

**Who is responsible for maintenance and upkeep? (Indicate if more than one are applicable.)**

FSU or an affiliated organization will be responsible.

**What permits are necessary for the infrastructure project?**

Use of existing space at or near Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park.

**Detail whether required permits have been secured, and if not, detail the timeline for securing these permits. Additionally, if any required permits are local permits, will these permits be prioritized?**

Use of existing space will minimize permits required.

**What is the future land use and zoning designation on the proposed site of the Infrastructure improvement, and will the improvements conform to those uses?**

Property is zoned for mixed use appropriate for planned operations.

**Will an amendment to the local comprehensive plan or a development order be required on the site of the proposed project or on adjacent property to accommodate the infrastructure and potential current or future job creation opportunities? If yes, please detail the timeline.**

- Yes
- ✓ No

**Does this project have a local match amount? If yes, please describe the entity providing the match and the amount.**

- Yes
- ✓ No

## **SECTION VII: ADDENDUM FOR WORKFORCE TRAINING PROPOSALS**

### **Program Requirements**

**Will this proposal support programs that prepare students for future occupations and careers at K-20 institutions that have campuses in the disproportionately affected counties? If yes, please identify where the campuses are located and provide details on how the proposed programs will prepare students for future**

InSPIRE will support and drive outcomes across K-20. Direct outcomes include: a STEM Teacher Network that will serve K-12 schools in the affected counties and creation of new science and engineering programs at FSU-PC to support both non-organic growth in BS graduates and the creation of new MS and PhD programs. Indirect outcomes include: amplification of existing programs and growth in related certificate and 2-year AA/AS programs at partner educational programs. InSPIRE will provide for a step-function investment and growth in student outcomes to parallel and serve the new STEM job opportunities it is also helping create.

**Will the proposed program (check all that apply):**

- Increase students' technology skills and knowledge
- Encourage industry certifications
- Provide rigorous, alternative pathways for students to meet high school graduation requirements
- Strengthen career readiness initiatives
- Fund high-demand programs of emphasis at the bachelor's and master's level designated by the Board of Governors
- Encourage students with interest or aptitude for science, technology, engineering, mathematics, and medical disciplines to pursue postsecondary education at a state university or a Florida College System institution within the disproportionately affected counties (similar to or the same as talent retention programs created by the Chancellor of the State University System and the Commission on Education)

The InSPIRE Teacher Network will deliver outreach into K-12 schools within affected counties, including introduction to regional employer/career opportunities and supported connectivity to regional educational partners for further critical thinking and career-focused program studies. Outreach into state and technical college partners will also ensure their instructors have opportunities to participate in the Network and connect to experiential learning within InSPIRE research programs.

Collaboration with technology partner organizations will be leveraged to provide experiential learning opportunities at middle/high school (competitions/camps), technical/trade, and 2-year levels. Certificate credits will be sought as applicable, and support for participants to pursue formal certificate training will be provided by FSU partners.

Significant InSPIRE work will be conducted by undergraduate and graduate students, as part of a targeted, above-organic growth of the engineering program at FSU-PC. These students will conduct collaborative industry-relevant research with partner organizations at InSPIRE facilities and graduate with BS, MS, and PhD degrees in science and engineering. These students will also participate in the Teacher Network to provide mentor and aspirational roles in the greater InSPIRE community of partners.

The educational outreach will be pursued holistically and connected across education levels to provide

a wide funnel and a continuum of support for regional students to pursue a local path for career development.

**Will this proposal provide participants in the disproportionately affected counties with transferable, sustainable workforce skills but not confined to a single employer? If yes, please provide details.**

- ✓ Yes
- No

The education and training programs will partner with K-12 schools, state and technical colleges, and industry and government organizations to create a multi-faceted program for student success. In doing so, participants will be exposed to opportunities along a spectrum of topics and partners, but all with relevance to aerospace and/or advanced manufacturing. The experiences, skills, certificates, and degrees obtained are useful to many adjacent industries, such as electronics manufacturing, energy storage, and medical devices, and will serve as a base for a career at multiple employers as the collaborative innovation ecosystem is grown.

**Identify the disproportionately affected counties where the proposed programs will operate or provide participants with workforce skills.**

Bay county is a central connecting point, with the FSU-Panama City campus and InSPIRE at either the Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park, but partners throughout the region will be engaged to deliver focused K-12 STEM outreach programming, recruit students into a learning pipeline, and provide the follow-on formal technical learning programs to prepare those students for jobs in the region.

**Provide a detailed description of, and quantitative evidence demonstrating how the proposed project or program will promote:**

**o Economic recovery, o Economic Diversification, o Enhancement of the disproportionately affected counties, o Enhancement of a Targeted Industry.**

High wage jobs will be created through the development of the collaborative innovation culture and bringing new industry and government partners to the region, including Northwest Florida Beaches International Airport and/or Venture Crossing Industrial Park. In order for this to occur and provide the economic benefit desired, the education and training elements of InSPIRE will move in parallel ensure the local workforce is available to realize the benefits.

As the ecosystem grows in aerospace, and the workforce becomes more technically competent in those areas, transferable skills in programs such as mechatronics and advanced manufacturing are valuable to other adjacent industries, which can now be more effectively recruited to and supported in the region.

The ecosystem will also support entrepreneurial approaches to innovation and technology deployment, and spin-offs and new start-ups will create another base of opportunity. Students along the continuum of programs will be introduced to technology-based entrepreneurship and encouraged to consider engaging in new ventures.

Whether organic expansion, recruited in, spinoffs, or new starts, some of these new activities will be located in the less populous affected counties. As the core ecosystem grows in density at Panama City, Milton, and Pensacola, it will be easier to support activity in adjacent areas. A greater availability of resources, especially a trained workforce with ties to the community, provides new opportunities for success as the flywheel of concentrated effort in a more densely populated area extends its impact outward.

Specific training in aerospace testing and analysis and advanced manufacturing targets industries of strategic importance to Florida and the region. Notably, advanced manufacturing is adjacent to and likely to be of growing importance for MRO operations, which is key part of aerospace in the affected counties. New start-ups and recruitment for manufacturing in medical device, automotive, and sustainable infrastructure are some of the adjacent markets that will be supported by the expertise and innovation ecosystem InSPIRE creates.

InSPIRE will provide annual assessment and reports on effectiveness of the Teacher Network, including use of regional data and other state information available to LSI.

### Additional Information

Is this an expansion of an existing training program? If yes, describe how the proposed program will enhance or improve the existing program and how the proposal program will supplement but not supplant existing funding sources.

- Yes
- ✓ No

Specific elements of the program are in place, including several engineering majors at FSU and FSU-Panama City, industry-connected training at technical and state college partners, and LSI's statewide STEM partnerships in K-12 (CPALMS). InSPIRE will actively connect these along a line of participation that starts with early elementary and runs through PhDs in science, engineering and other related technical areas. The program will place an emphasis on efficient use of local partner programs, industry-relevant experiential learning that leverages world class facilities, and vertical student engagement to support a community of support across institutional boundaries. Existing programs will be rounded out and connected, including, potentially, support for students needing articulation assistance.

**Indicate how the training will be delivered (e.g., classroom-based, computer based, other). If in-person, identify the location(s) (e.g., city, campus, etc.) where the training will be available. If computer-based, identify the targeted location(s) (e.g., city, county) where the training will be available.**

InSPIRE will create and manage a Teacher Network to serve and connect K-12 schools and state and technical colleges across affected counties. LSI currently supports on-line STEM learning programming for Florida teachers (CPALMS). This experience and delivery platform will be leveraged to create and deliver a combination of on-line and in-person teacher materials specific to the needs of the Panhandle. InSPIRE will train teachers for technical curricula and critical thinking outreach,

## InSPIRE: Becoming the Nation's Aerospace &amp; Advanced Manufacturing Leader

provide materials and experiential learning opportunities specifically aimed at creating and filling a regional workforce learning pipeline, and support student success in entering and completing certificate and degree programs.

**Identify the number of anticipated enrolled students and completers.**

Based on LSI experiences creating and delivering STEM K-12 programs, and using data for the affected counties, InSPIRE will deliver 5,000 teacher certificates to ~ 1,000 teachers serving in the Teacher Network. An estimate for high school graduates seeking STEM careers can also be made, InSPIRE will increase that number 20% using the Teacher Network. This will provide indirect benefit to existing and new certificate and AA/AS degree programs, which are aligned with ongoing partner and Triumph program investments, and allow FSU-PC to fully extend science and engineering programs to the panhandle.

**Timeline of Teacher Participants and Certificates Completed during Program Standup**

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Certificates	65	150	175	300	400	625	790	825	825	900
Participants	25	50	50	75	100	125	150	150	150	150

**Indicate the length of the program (e.g, quarters, semesters, weeks, months, etc.) including anticipated beginning and ending dates.**

Educator Training – 1-2 Days

Advanced Educator Training – 1-2 Weeks

BS – 4 years

MS – 2 years

PhD- 4 years

**Describe the plan to support the sustainability of the proposed program.**

Ongoing support will be provided by supporters and partners committed to STEM educational and workforce development outcomes – FSU, state of Florida, regional industry leaders.

**Identify any certifications, degrees, etc. that will result from the completion of the program.**

Pirmay outcomes are Certifications for Teachers serving in the Teacher Network and accredited BS, MS, and PhD degrees with curriculum content specific to composites manufacturing, advanced manufacturing, mechatronics and controls, aero test and evaluation, machine learning (AI), and modeling and simulation as delivered by FSU.

**Does this project have a local match amount? If yes, please describe the entity providing the match and the amount.**

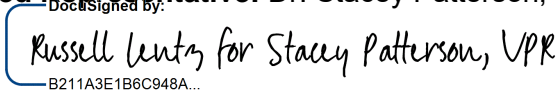
- Yes
- ✓ No

InSPIRE: Becoming the Nation's Aerospace & Advanced Manufacturing Leader

**I, the undersigned, do hereby certify that I have express authority to sign this proposal on my behalf or on behalf of the above-described entity, organization, or governmental entity:**

**Name of Applicant:** Florida State University

**Name and Title of Authorized Representative:** Dr. Stacey Patterson, Vice President for Research

**Representative Signature:**  DocuSigned by:  
B211A3E1B6C948A...

**Signature Date:** 10/20/2023 | 3:12 PM EDT

# FLORIDA STATE UNIVERSITY

ANNUAL REPORT 2021-2022









# Florida State University

## Annual Report 2021–2022

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## MESSAGE FROM THE PRESIDENT

When I became president in August 2021, I outlined a series of goals to advance Florida State University and elevate its national and international prominence, and together we have made tremendous progress on this ambitious agenda. The past fiscal year was one of remarkable achievement as we continued to build on our foundation as a Top 20 public university and pursue a bold vision for the future.

We built a strong leadership team and recruited world-class faculty, staff, and administrators to join our FSU family; invested in academic excellence, student success, and faculty and staff; grew our research portfolio; encouraged student and faculty entrepreneurial endeavors; cultivated relationships with elected officials and community leaders; enhanced fundraising efforts; and promoted athletic success.

We saw our investments in these strategic areas pay off in fiscal year 2022. Our graduation rates and freshman retention rates continued to place among the best in the country, and we were ranked No. 8 among public universities on the list of the nation's Best Value Colleges and the highest among the state universities in Florida. We received record-breaking numbers of first-year student applications, and applications to our graduate programs also were up.

We also focused on providing faculty support and expanding the university's research enterprise. Expenditures of funding from federal, state, and private sources were at an all-time high, allowing our researchers to conduct groundbreaking studies and produce creative works and original scholarship.

In addition, the Florida Legislature appropriated \$125 million to build a new academic health center in Tallahassee to launch the FSU Health initiative — one of the largest and most ambitious projects in Florida State history. This initiative will transform health care delivery, education, and biomedical research in North Florida and is already attracting world-renowned faculty and creating opportunities to significantly increase our funding from the National Institutes of Health. As part of the FSU Health initiative, FSU partnered with St. Joe and Tallahassee Memorial HealthCare to build a medical campus in Panama City Beach that will include a building for primary care physicians, an urgent care facility and a 100-bed hospital.

We also nurtured the entrepreneurial culture at FSU. While faculty members created start-up companies based on new licensed technology, undergraduate students started 100 new businesses in the past year.

When it came to fundraising, we made tremendous headway in expanding our network of alumni and friends and connecting them to areas of the university for which they have a passion. The FSU Foundation alone raised the highest total of gifts and pledges in the past 12 years apart from 2015 when we received a \$100 million gift from Jan Moran and the Jim Moran Foundation.

We continued our storied tradition in athletics, which has played an important role in advancing the mission of the university by keeping our alumni connected and contributing to the national visibility of our brand.

With all this success, I think it's very clear that Florida State University is an academic powerhouse on the rise, and I look to the future with great confidence, excitement, and optimism.

Sincerely,



Richard McCullough, *President*  
*Florida State University*



FLORIDA STATE UNIVERSITY

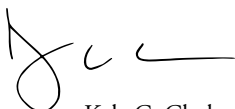
WELDON BUILDING  
NEW HARKINS CENTER

## INTRODUCTION FROM THE SENIOR VICE PRESIDENT FOR FINANCE AND ADMINISTRATION

I am pleased to present the 2021–22 Annual Financial Report for Florida State University. This report provides information about the university, its financial activities during the fiscal year, and its financial condition at fiscal year-end. Below are some of the notable items that took place over the past year:

- The university's Board of Trustees passed a \$2.3 billion operating budget for the fiscal year ending June 30, 2023, which represented the largest budget in FSU's history and included almost \$232 million of new State appropriations.
- Construction was substantially completed on FSU's new Student Union building which will serve as a hub for collaboration and engagement on campus. The nearly 250,000 gross square foot facility draws from the past while rising towards the future and provides much needed space to meet the demands of the student body population, which has grown significantly since its original construction in 1952. The new building space and amenities will offer a variety of high-quality experiences to a diverse range of university constituents, and includes a ballroom, meeting rooms, lounges, offices, student activity venues, dining venues, bookstore, and support/storage space.
- The university has broken ground on the Interdisciplinary Research and Commercialization Building, a new facility that will serve as a collaborative space for researchers from a variety of fields focused on creating and advancing new materials. The 116,000-square-foot building is designed to facilitate interactions in laboratories, core facilities, and strategically placed collaboration spaces. The building is the university's latest addition to the southwest campus, which is intertwined with Innovation Park, and will complement FSU's already existing research buildings in that area, including the FAMU-FSU College of Engineering, the National High Magnetic Field Laboratory, the High-Performance Materials Institute, and the Aero-Propulsion, Mechatronics and Energy Building, among others. The facility is projected to open in 2024.
- Finally, FSU has regularly maintained very high bond ratings and continues to be a strong investment, according to the most recent credit ratings released by S&P Global, Fitch, and Moody's. The university has the highest-rated credit of a public university in the state of Florida, with ratings of AA+, AA+, and Aa1 from S&P, Fitch, and Moody's, respectively. These ratings, as S&P stated, reflect Florida State's "solid market position as a preeminent research university in the state, impressive fundraising capabilities, growing endowment, and steady institutional leadership."

From unprecedented operating investments to transformative capital projects, Florida State University continues to strive more and more toward excellence under the leadership of President McCullough. Our commitment to and pursuit of the bold vision for the university's future laid out by the President will continue to generate positive momentum for FSU as one of the top public universities in the nation.



Kyle C. Clark, *Senior Vice President*  
*Florida State University*

# UNIVERSITY OVERVIEW

## About FSU

Florida State University is a premier, comprehensive, graduate research university offering a broad array of academic and professional programs at all degree levels. Located in Tallahassee, Florida's capital city, and founded in 1851, FSU is the oldest of the twelve public institutions of higher learning in the State University System. The university is fully accredited by the Commission on Colleges of the Southern Association of Colleges and Schools and is officially designated as a preeminent research university in the state by the Florida Legislature.

## Mission and Vision

Florida State University preserves, expands, and disseminates knowledge in the sciences, technology, arts, humanities, and professions, while embracing a philosophy of learning strongly rooted in the traditions of the liberal arts. The university is dedicated to excellence in teaching, research, creative endeavors, and service. The university strives to instill the strength, skill, and character essential for lifelong learning, personal responsibility, and sustained achievement within a community that fosters free inquiry and embraces diversity.

Florida State University will be among the nation's most entrepreneurial and innovative universities, transforming the lives of our students and shaping the future of our state and society through exceptional teaching, research, creative activity, and service. We will amplify these efforts through our distinctive climate—one that places a premium on interdisciplinary inquiry and draws from the rich intellectual and personal diversity of our students, faculty, staff, and alumni. These three forces—entrepreneurship, interdisciplinary, and diversity—deepen FSU's impact and result in a powerful return to our students and the people of Florida for their continued support and trust.





## Academics

Florida State University offers leading undergraduate, graduate, and professional programs, many of which consistently rank among the nation's top twenty-five public universities. Baccalaureate degrees are offered in 103 programs, master's degrees in 107 programs, advanced master's/specialist degrees in six programs, doctorates in 63 programs, and four professional degrees.

## Students

Designated as a Carnegie Research University (designating very high research activity), Florida State awards more than 3,000 graduate and professional degrees each year, and is recognized as a national leader in the number of doctorates awarded to African-American students and in the graduation rate of African-American undergraduates.

During the Fall 2021 semester, there were 59 freshmen and 142 total undergraduate National Merit Scholars enrolled at Florida State University. The middle 50 percent high school GPA for the Fall 2021 freshman class was 4.1-4.5 and middle 50 percent SAT scores were 1230-1360.

With more than 45,000 students enrolled in Fall 2021, the student body was comprised of 74 percent undergraduates, 22 percent graduates, 3 percent professional, and 1 percent unclassified. Our student body is diverse and represents every county in Florida, all 50 states, and 130 countries. Minorities represent 38 percent, and women represent 58 percent of our students.

# UNIVERSITY OVERVIEW





## Faculty

At Florida State University, we are fortunate that our faculty comprises men and women who are widely acknowledged as the finest in their fields. They have distinguished themselves in many disciplines and have gained the high regard of peers around the world. Their academic careers are marked by excellence and the excitement of discovery so important to educating the next generation.

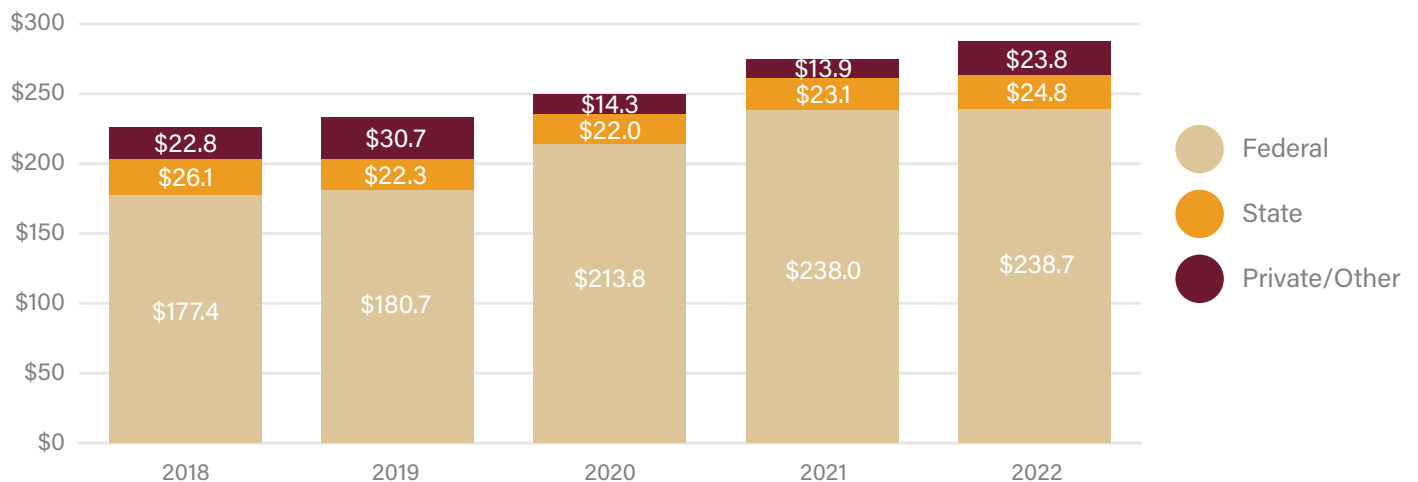
Our faculty members continually strive to build stronger programs in critical areas of technology and science and in the arts and humanities. The result is the expansion of knowledge as well as the discovery of new inventions, products, and processes benefiting the state of Florida, our nation, and the world.

## Research

Research and creative activity is about discovery. It is about having an idea and finding the right environment in which to explore that idea. At FSU, we take great pride in our ability to provide supportive environments for the exploration of all types of ideas; and with approximately \$200 million in research expenditures each year, and more than 50 prominent research centers and institutes calling our campuses home, FSU continues to be one of the top idea-incubators in the nation.

Florida State University is also home to the National High Magnetic Field Laboratory (NHMFL), funded by the National Science Foundation. The only national lab in Florida, the NHMFL holds the most world records for the most powerful magnets on earth. Other research centers, such as the Center for Advanced Power Systems (CAPS), are supported by the U.S. Departments of Defense and Energy. The NHMFL and CAPS, among other labs, place Florida State University at the cutting edge of research and its application to industry.

**SPONSORED PROGRAM AWARDS (\$ IN MILLIONS)**



# UNIVERSITY OVERVIEW

## Diversity

At Florida State University, we recognize that every competitive advantage begins with people. By valuing, celebrating, and leveraging the differences and similarities of our students, faculty, and staff, we inspire an environment of innovation and passion—one that enables us to create a teaching, research, and service environment that better reflects the needs of our students, faculty, staff, customers, constituents, communities, and other key stakeholders.

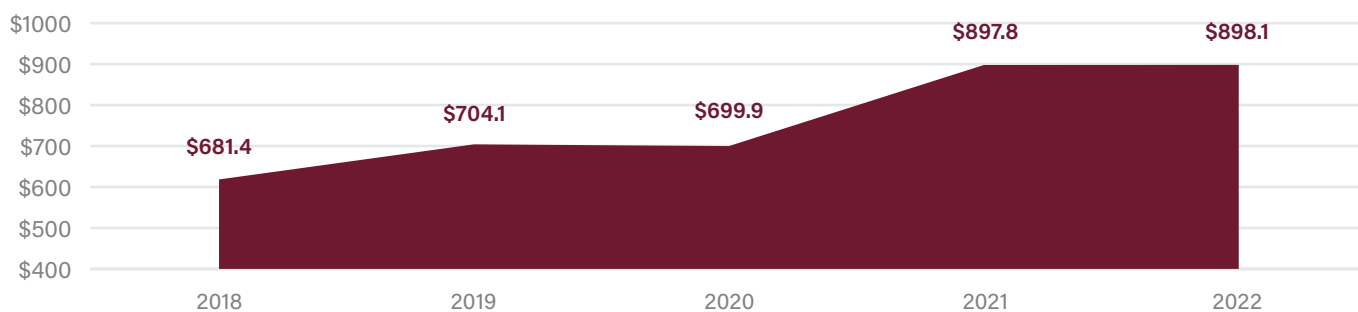
## Veterans

The Florida State University Veterans Alliance represents the University's campus-wide commitment to veteran support and success. The Veterans Alliance encompasses FSU's initiatives that ease the transition from military service to campus life, foster a community of past, present, and future veterans, raise awareness of veterans issues among campus and local communities, and support student veterans through graduation and into rewarding careers and graduate-education programs. It is the goal of the Veterans Alliance that FSU be the most veteran-friendly and veteran-empowering university in the country.

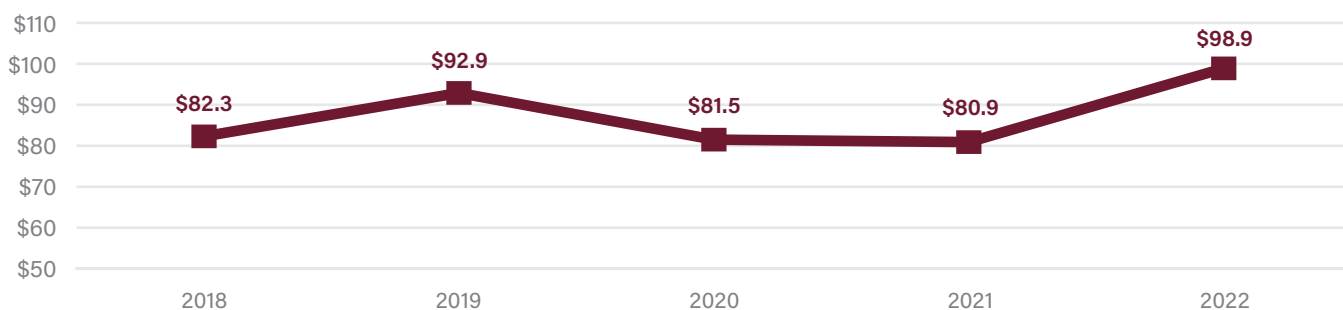
## Endowment

The Total Endowment and Gifts comprises endowments and gifts from the following university direct support organizations: FSU Foundation, Seminole Boosters, FSU Research Foundation, and The John and Mable Ringling Museum of Art Foundation. The FSU Foundation enhances the academic vision and priorities of FSU through its organized fundraising activities and funds management. The Seminole Boosters acts as the fundraising arm of Florida State University Athletics. The FSU Research Foundation promotes and encourages, and provides assistance to, the research and training activities of faculty, staff and students at FSU. The John and Mable Ringling Museum of Art Foundation provides charitable and educational aid to the university's John and Mable Ringling Museum of Art.

### ENDOWMENT FAIR MARKET VALUE (\$ IN MILLIONS)



### TOTAL GIFTS (\$ IN MILLIONS)





### Florida State University in 2021–22

FSU's rankings and achievements during fiscal year 2021–22 include:

- ◆ Florida State University retained its place in the Top 20 among national public universities in the latest *U.S. News & World Report* rankings.
- ◆ FSU had the most first-year student applications of any institution in the State University System of Florida with about 80,000.
- ◆ The university invested additional resources to enhance programming for first-generation students through the Center for Academic Retention and Enhancement, or CARE, allocated funding to double the number of Honors students from 400 to 800, and raised \$15 million in gifts to support and grow the Presidential Scholars Program – FSU's premier undergraduate scholarship.
- ◆ FSU's four-year graduation rate is among the highest in the country at 74%. FSU's six-year graduation rate rose to a record 85 percent, also among the highest in the nation.
- ◆ The Florida Legislature appropriated \$125 million to build a new academic health center in Tallahassee. The project promises to transform health care delivery, education, and biomedical research in the region and make Tallahassee a health care destination.
- ◆ FSU has been named the No. 8 Best Value College in the nation among public colleges and universities according to *U.S. News & World Report's* "Best Colleges 2022-2023" guidebook.
- ◆ Florida State continues to be a strong investment with the highest-rated credit of any public university in the state of Florida with an AA+ rating by S&P and Fitch and an equivalent Aa1 rating by Moody's.
- ◆ FSU was recognized for a seventh consecutive year by *INSIGHT Into Diversity* magazine as a "Diversity Champion" in higher education.
- ◆ Florida State was selected for the top award in international education and study abroad programming by the Association for Public and Land Grant Universities (APLU). FSU also won the 2021 Degree Completion Award from the APLU, recognized as the most prominent award in the country for student success.







Sherrill F. Norman, CPA  
Auditor General

# AUDITOR GENERAL STATE OF FLORIDA

Claude Denson Pepper Building, Suite G74  
111 West Madison Street  
Tallahassee, Florida 32399-1450



Phone: (850) 412-2722  
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The President of the Senate, the Speaker of the  
House of Representatives, and the  
Legislative Auditing Committee

## INDEPENDENT AUDITOR'S REPORT

### Report on the Audit of the Financial Statements

#### ***Opinions***

We have audited the financial statements of Florida State University, a component unit of the State of Florida, and its aggregate discretely presented component units as of and for the fiscal year ended June 30, 2022, and the related notes to the financial statements, which collectively comprise the University's basic financial statements as listed in the table of contents.

In our opinion, based on our audit and the reports of other auditors, the accompanying financial statements referred to above present fairly, in all material respects, the respective financial position of Florida State University and of its aggregate discretely presented component units as of June 30, 2022, and the respective changes in financial position and, where applicable, cash flows thereof for the fiscal year then ended in accordance with accounting principles generally accepted in the United States of America.

We did not audit the financial statements of the aggregate discretely presented component units, which represent 100 percent of the transactions and account balances of the aggregate discretely presented component units columns. Those statements were audited by other auditors whose reports have been furnished to us, and our opinion, insofar as it relates to the amounts included for the aggregate discretely presented component units, is based solely on the reports of the other auditors.

#### ***Basis for Opinions***

We conducted our audit in accordance with auditing standards generally accepted in the United States of America (GAAS) and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Our responsibilities under those standards are further described in the ***Auditor's Responsibilities for the Audit of the Financial Statements*** section of our report. We are required to be independent of the University and to meet our other ethical responsibilities, in accordance with the relevant ethical requirements relating to our audit. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

***Emphasis of Matter***

As discussed in Note 2. to the financial statements, the University adopted new accounting guidance Governmental Accounting Standards Board Statement No. 87, *Leases*, which is a change in accounting principle that addresses accounting and financial reporting for leases. This affects the comparability of amounts reported for the 2021-22 fiscal year with amounts reported for the 2020-21 fiscal year. Our opinion is not modified with respect to this matter.

***Responsibilities of Management for the Financial Statements***

Management is responsible for the preparation and fair presentation of the financial statements in accordance with accounting principles generally accepted in the United States of America, and for the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements, management is required to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the University's ability to continue as a going concern for 12 months beyond the financial statement date, including any currently known information that may raise substantial doubt shortly thereafter.

***Auditor's Responsibilities for the Audit of the Financial Statements***

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinions. Reasonable assurance is a high level of assurance but is not absolute assurance and therefore is not a guarantee that an audit conducted in accordance with GAAS and *Government Auditing Standards* will always detect a material misstatement when it exists. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control. Misstatements are considered material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements.

In performing an audit in accordance with GAAS and *Government Auditing Standards*, we:

- Exercise professional judgment and maintain professional skepticism throughout the audit.
- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, and design and perform audit procedures responsive to those risks. Such procedures include examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the University's internal control. Accordingly, no such opinion is expressed.
- Evaluate the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluate the overall presentation of the financial statements.

- Conclude whether, in our judgment, there are conditions or events, considered in the aggregate, that raise substantial doubt about the University's ability to continue as a going concern for a reasonable period of time.

We are required to communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit, significant audit findings, and certain internal control-related matters that we identified during the audit.

### ***Required Supplementary Information***

Accounting principles generally accepted in the United States of America require that **MANAGEMENT'S DISCUSSION AND ANALYSIS**, the **Schedule of the University's Proportionate Share of the Net Pension Liability – Florida Retirement System Pension Plan**, **Schedule of University Contributions – Florida Retirement System Pension Plan**, **Schedule of the University's Proportionate Share of the Net Pension Liability – Health Insurance Subsidy Pension Plan**, **Schedule of University Contributions – Health Insurance Subsidy Pension Plan**, and **Schedule of the University's Proportionate Share of the Total Other Postemployment Benefits Liability**, be presented to supplement the basic financial statements. Such information is the responsibility of management and, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

### ***Other Information***

Management is responsible for the other information included in this report. The other information comprises the Message from the President, Introduction from the Senior Vice President for Finance and Administration, and University Overview, but does not include the basic financial statements and our auditor's report thereon. Our opinions on the basic financial statements do not cover the other information, and we do not express an opinion or any form of assurance thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and consider whether a material inconsistency exists between the other information and the basic financial statements, or the other information otherwise appears to be materially misstated. If, based on the work performed, we conclude that an uncorrected material misstatement of the other information exists, we are required to describe it in our report.

### ***Other Reporting Required by Government Auditing Standards***

In accordance with *Government Auditing Standards*, we have also issued our report dated February 1, 2023, on our consideration of the Florida State University's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, rules, regulations, contracts,



and grant agreements and other matters included under the heading **INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH GOVERNMENT AUDITING STANDARDS**. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the Florida State University's internal control over financial reporting and compliance.

Respectfully submitted,



Sherrill F. Norman, CPA  
Tallahassee, Florida  
February 1, 2023  
Audit Report No. 2023-111

# MANAGEMENT'S DISCUSSION AND ANALYSIS

Management's discussion and analysis (MD&A) provides an overview of the financial position and activities of the university for the fiscal year ended June 30, 2022, and should be read in conjunction with the financial statements and notes thereto. The MD&A, and financial statements and notes thereto, are the responsibility of university management. The MD&A contains financial activity of the university for the fiscal years ended June 30, 2022, and June 30, 2021.

## OVERVIEW OF FINANCIAL STATEMENTS

Pursuant to GASB Statement No. 35, the university's financial report includes three basic financial statements: the statement of net position; the statement of revenues, expenses, and changes in net position; and the statement of cash flows. The financial statements, and notes thereto, encompass the university and its component units. Based upon the application of the criteria for determining component units, twelve component units are included within the university reporting entity as discretely presented component units. Information regarding these component units, including summaries of the discretely presented component units' separately issued financial statements, is presented in the notes to financial statements. This MD&A focuses on the university, excluding the component units. The component units' MD&A information is included in their separately issued audit reports.

### Statement of Net Position

The statement of net position reflects the assets, deferred outflows of resources, liabilities, and deferred inflows of resources of the university, using the accrual basis of accounting, and presents the financial position of the university at a specified time. Assets, plus deferred outflows of resources, less liabilities, less deferred inflows of resources, equals net position, which is one indicator of the university's current financial condition. The changes in net position that occur over time indicate improvement or deterioration in the university's financial condition.

#### Condensed Statement of Net Position at June 30

(In Thousands)

	2022	2021
<b>Assets</b>		
Current Assets	\$ 1,072,401	\$ 952,858
Capital Assets, Net	2,087,045	2,057,673
Other Noncurrent Assets	159,990	106,938
<b>Total Assets</b>	<b>3,319,436</b>	<b>3,117,469</b>
<b>Deferred Outflows of Resources</b>	<b>149,065</b>	<b>198,649</b>
<b>Liabilities</b>		
Current Liabilities	241,996	188,740
Noncurrent Liabilities	609,433	894,318
<b>Total Liabilities</b>	<b>851,429</b>	<b>1,083,058</b>
<b>Deferred Inflows of Resources</b>	<b>290,947</b>	<b>98,131</b>
<b>Net Position</b>		
Net Investment in Capital Assets	1,873,134	1,845,944
Restricted	363,335	287,318
Unrestricted	89,656	1,667
<b>Total Net Position</b>	<b>\$ 2,326,125</b>	<b>\$ 2,134,929</b>

The university's total assets as of June 30, 2022, increased by \$202 million, or 6.5 percent. Current assets increased by \$119.5 million, or 12.5 percent, driven by a \$65.7 million rise in unrestricted total investments combined with increased capital appropriations due from the State of \$52.1 million related to new allocations for the university's Legacy Hall and Interdisciplinary Research and Commercialization Building (IRCB) projects. The unrestricted investment balance growth was primarily a result of drawdowns of the institutional portion of funds under the Higher Education Emergency Relief Fund (HEERF) grant program which were used to replace auxiliary revenue losses along with the significantly improved cash position of the university's department of intercollegiate athletics (Athletics). Other noncurrent assets increased by \$53.1 million, or 49.6 percent, largely due to an increase in restricted investments of \$45.6 million mainly related to the receipt of capital project funds earmarked for the construction of the IRCB. Net capital assets increased by \$29.4 million, or 1.4 percent.

Total liabilities as of June 30, 2022, decreased by \$231.6 million, or 21.4 percent. Current liabilities grew by \$53.3 million, or 28.2 percent.

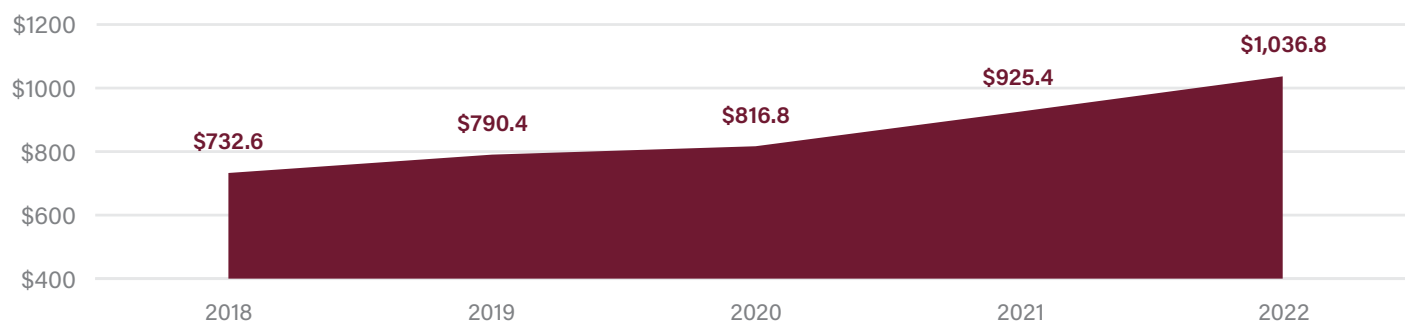
This increase was principally caused by a rise in unearned revenues for State funded capital projects which included \$24.9 million for Legacy Hall, \$19.4 million for the IRCB, and \$6.5 million for the National High Magnetic Field Laboratory Electrical Expansion. Noncurrent liabilities decreased by \$284.9 million, or 31.9 percent, due to decreases in the university's proportional share of the State's net pension liability of \$267.5 million, and a reduction in capital improvement debt payable of \$16.4 million. Pensions, other postemployment benefits, and leases also drove deferred outflows and deferred inflows of resources, which decreased by \$49.6 million and increased by \$192.8 million, respectively.

As a result, the university's overall net position increased by \$191.2 million, or 9 percent.

### Investments

As of June 30, 2022, the university had \$892.6 million of unrestricted investments plus another \$144.2 million of restricted investments, for total investments of over \$1 billion. Over 98 percent of the university's investments are held in the State Treasury Special Purpose Investment Account.

### TOTAL INVESTMENTS (\$ IN MILLIONS)



Additional information about the university's investments is presented in Note 4 to the financial statements.

### Capital Assets

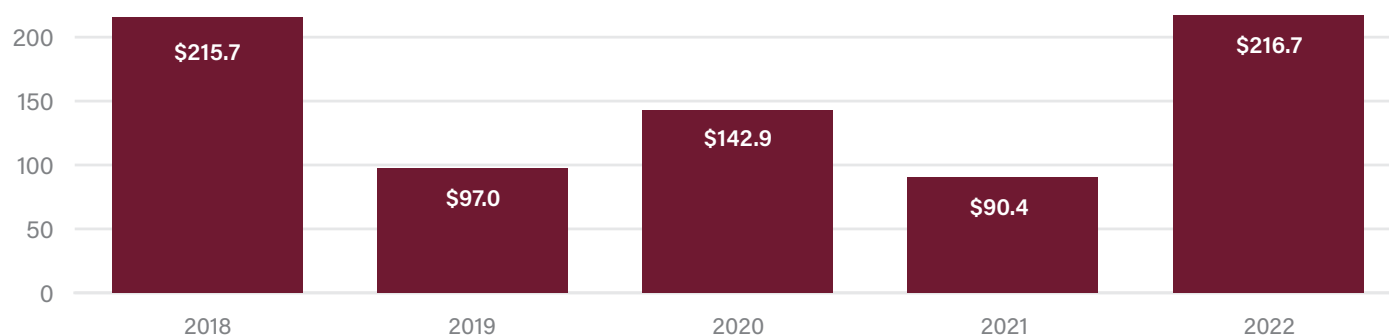
At June 30, 2022, the university had \$3.5 billion in capital assets, less accumulated depreciation of \$1.4 billion, for net capital assets of \$2.1 billion. Depreciation charges for the current fiscal year totaled \$95.6 million. Effective July 1, 2021, the university reclassified capital assets previously reported as property under capital lease to either buildings or equipment, and added right-to-use lease assets, due to the implementation of GASB Statement No. 87, *Leases*.

### Capital Assets, Net at June 30 (In Thousands)

	2022	2021
Land	\$ 95,536	\$ 95,138
Buildings	1,666,508	1,552,238
Infrastructure and Other Improvements	77,465	79,297
Furniture and Equipment	97,130	100,556
Library Resources	36,934	35,974
Property Under Capital Lease	-	5,320
Right-to-Use Lease Assets	6,360	-
Works of Art and Historical Treasures	85,846	85,429
Construction in Progress	21,266	103,721
<b>Capital Assets, Net</b>	<b>\$ 2,087,045</b>	<b>\$ 2,057,673</b>

# MANAGEMENT'S DISCUSSION AND ANALYSIS

## CAPITAL ASSET ADDITIONS (\$ IN MILLIONS)



Capital asset additions includes depreciable and nondepreciable capital asset activity except for construction in progress. Additional information about the university's capital assets is presented in Note 8 to the financial statements.

### Capital Expenses and Commitments

Major capital expenses completed to date on the university's largest ongoing projects included the IRCB (\$4.8 million) as well as Legacy Hall (\$2.7 million). The university's construction commitments are as follows:

#### Major Capital Commitments, at June 30

(In Thousands)

	2022
Total Committed	\$ 761,098
Completed to Date	(21,266)
<b>Balance Committed</b>	<b>\$ 739,832</b>

Additional information about the university's capital commitments is presented in Note 14 to the financial statements.

### Debt Administration

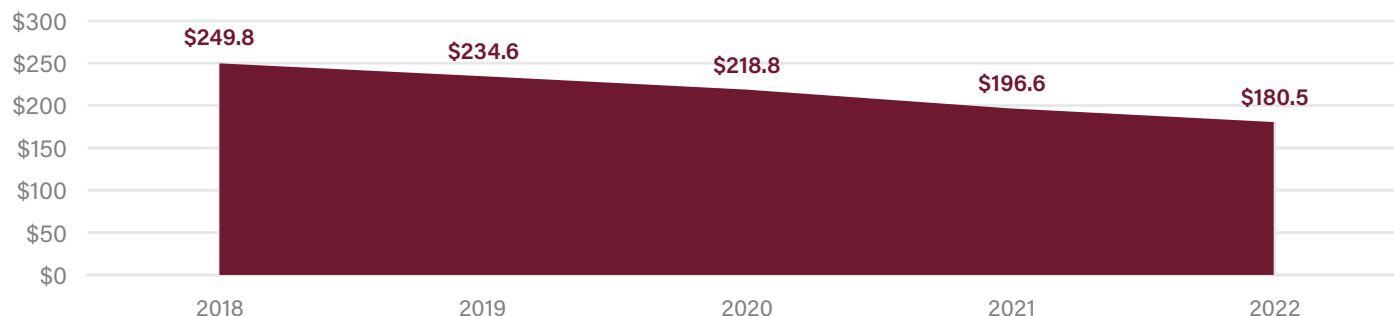
As of June 30, 2022, the university had \$180.5 million in outstanding capital improvement debt payable, representing a decrease of \$16.1 million, or 8.2 percent, from the prior fiscal year. Effective July 1, 2021, the university reclassified long-term debt previously reported as capital leases payable to other noncurrent liabilities, and added leases payable, due to the implementation of GASB Statement No. 87, *Leases*.

#### Long-Term Debt, at June 30

(In Thousands)

	2022	2021
Capital Improvement Debt Payable	\$ 180,473	\$ 196,551
Capital Leases Payable	-	9,147
Leases Payable	6,551	-
Other Noncurrent Liabilities	7,833	-
<b>Total</b>	<b>\$ 194,857</b>	<b>\$ 205,698</b>

### CAPITAL IMPROVEMENT DEBT PAYABLE (\$ IN MILLIONS)



Additional information about the university's long-term debt is presented in Note 10 to the financial statements.

### Statement of Revenues, Expenses, and Changes in Net Position

The statement of revenues, expenses, and changes in net position presents the university's revenue and expense activity, categorized as operating and nonoperating. Revenues and expenses are recognized when earned or incurred, regardless of when cash is received or paid.

#### Condensed Statement of Revenues, Expenses, and Changes in Net Position For the Fiscal Years (In Thousands)

	2021-22	2020-21
Operating Revenues	\$ 798,139	\$ 697,693
Less, Operating Expenses	(1,512,026)	(1,434,270)
<b>Operating Loss</b>	<b>(713,887)</b>	<b>(736,577)</b>
Net Nonoperating Revenues	840,225	735,853
<b>Income (Loss) Before Other Revenues</b>	<b>126,338</b>	<b>(724)</b>
Other Revenues	64,858	19,584
<b>Net Increase in Net Position</b>	<b>191,196</b>	<b>18,860</b>
Net Position, Beginning of Year	2,134,929	2,116,069
<b>Net Position, End of Year</b>	<b>\$ 2,326,125</b>	<b>\$ 2,134,929</b>

### Revenues

#### Revenues (In Thousands)

	2021-22	2020-21
Net Tuition and Fees	\$ 314,240	\$ 280,911
Grants and Contracts	231,025	221,976
Sales and Services of Auxiliary Enterprises	241,966	185,048
Other	10,908	9,758
<b>Operating Revenues</b>	<b>798,139</b>	<b>697,693</b>
State Noncapital Appropriations	519,136	507,295
Federal and State Student Financial Aid	227,680	191,681
Noncapital Grants, Contracts, and Gifts	132,559	59,117
Other	11,546	23,667
<b>Nonoperating Revenues</b>	<b>890,921</b>	<b>781,760</b>
State Capital Appropriations	15,297	6,447
Capital Grants, Contracts, Donations, and Fees	49,561	13,137
<b>Other Revenues</b>	<b>64,858</b>	<b>19,584</b>
<b>Total Revenues</b>	<b>\$ 1,753,918</b>	<b>\$ 1,499,037</b>

# MANAGEMENT'S DISCUSSION AND ANALYSIS

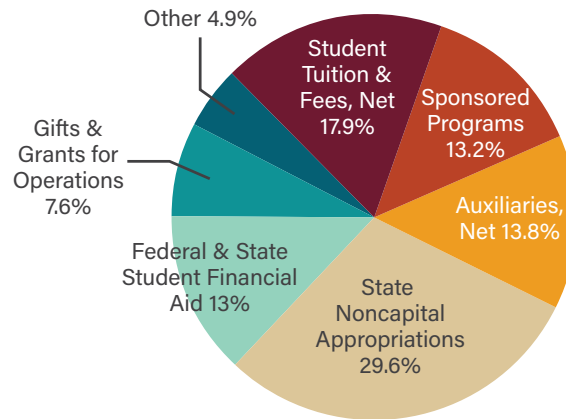
The university's total operating revenues were higher by \$100.4 million, or 14.4 percent, over the 2020-21 fiscal year. Net tuition and fees increased by \$33.3 million predominantly due to a \$15.2 million increase in tuition and fees assessed resulting from the reopening of the university's international study centers and study abroad programs coupled with a slight increase in overall enrollment. Sales and services of auxiliary enterprises increased by \$56.9 million, or 30.8 percent, as the university transitioned into a post-pandemic environment and auxiliaries were fully operational during the fiscal year. The largest drivers of the overall auxiliary revenue increase were Athletics (\$21.9 million) and University Housing (\$16.3 million).

Nonoperating revenues increased by \$109.2 million, or 14 percent, from the 2020-21 fiscal year. State noncapital appropriations increased by \$11.8 million, or 2.3 percent. Federal and State student financial aid increased by \$36 million, 18.8 percent, due to the drawdown of student aid funds under the HEERF grant program. Noncapital grants, contracts, and gifts were higher by \$73.4 million, or 124.2 percent, mainly driven by the drawdown of the institutional portion of funds under the HEERF grant program.

Other revenues, which are comprised of capital appropriations, grants, contracts, donations, and fees, increased by \$45.3 million, or 231.2 percent, primarily due to increases in general revenue appropriations and, capital donations from the university's component units, related to the IRCB.

Generally, the university has a diversified revenue base. The single largest major source generated less than 30 percent of total revenues in fiscal year 2022.

## 2022 REVENUES BY MAJOR SOURCE



While revenues are well diversified, the university's largest source, State noncapital appropriations, have been steadily rising over the past five years. This rise highlights the consistent support the university receives from the State of Florida.

## STATE NONCAPITAL APPROPRIATIONS (\$ IN MILLIONS)



## Expenses

Expenses are categorized as operating or nonoperating. The majority of the university's expenses are operating expenses as defined by GASB Statement No. 35. GASB gives financial reporting entities the choice of reporting operating expenses in the functional or natural classifications. The university has chosen to report the expenses in their natural classification on the statement of revenues, expenses, and changes in net position and has displayed the functional classification in the notes to financial statements.

### Expenses (In Thousands)

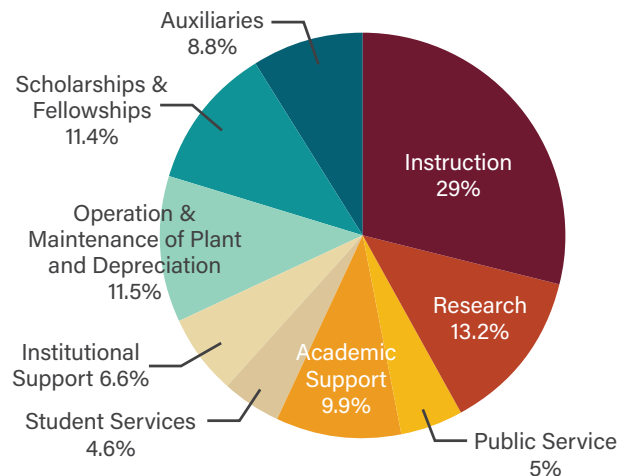
	2021-22	2020-21
Compensation and Employee Benefits	\$ 869,671	\$ 913,731
Services and Supplies	338,689	256,997
Utilities and Communications	35,566	29,748
Scholarships and Fellowships	172,537	141,619
Depreciation	95,563	92,175
<b>Operating Expenses</b>	<b>1,512,026</b>	<b>1,434,270</b>
Net Decrease in the Fair Value of Investments	42,297	33,099
Other Nonoperating Expenses	8,399	12,808
<b>Nonoperating Expenses</b>	<b>50,696</b>	<b>45,907</b>
<b>Total Expenses</b>	<b>\$ 1,562,722</b>	<b>\$ 1,480,177</b>

Operating expenses increased by \$77.8 million, or 5.4 percent, over the 2020-21 fiscal year. Compensation and employee benefits were lower by \$44.1 million, or 4.8 percent, largely due to the university's proportional share of the State's net pension and other postemployment benefit expenses, which saw a \$76.6 million decrease. Excluding this significant reduction, compensation and employee benefits otherwise rose by \$32.5 million due to a combination of salary increases, a one-time bonus payment, and expanded grant and contract activity. Services and supplies expenses grew by \$81.7 million, or 31.8 percent. The change was mostly due to increases in demand for professional services, travel, software maintenance, and materials and supplies as the university transitioned into a post-pandemic environment and was fully operational during the fiscal year. Utilities and communications expenses rose by \$5.8 million, or 19.6 percent, returning to pre-pandemic levels. Scholarships and fellowships were higher by \$30.9 million, or 21.8 percent, primarily driven by the distribution of the student aid portion of funds under the HEERF grant program.

Nonoperating expenses increased by \$4.8 million, or 10.4 percent, mainly due to unrealized losses from the change in the fair value of underlying securities held in the State Treasurer's Investment Pool.

A proportional breakdown of operating expenses by functional classification follows.

### 2022 OPERATING EXPENSES BY FUNCTION



Additional information on the functional distribution of operating expenses is presented in Note 16 to the financial statements.

# MANAGEMENT'S DISCUSSION AND ANALYSIS

## Statement of Cash Flows

The statement of cash flows provides information about the university's financial results by reporting the major sources and uses of cash and cash equivalents. This statement will assist in evaluating the university's ability to generate net cash flows, its ability to meet its financial obligations as they come due, and its need for external financing. Cash flows from operating activities show the net cash used by the operating activities of the university. Cash flows from capital financing activities include all plant funds and related long-term debt activities. Cash flows from investing activities show the net source and use of cash related to purchasing or selling investments and earning income on those investments. Cash flows from noncapital financing activities include those activities not covered in other sections.

### Condensed Statement of Cash Flows

(In Thousands)

	2021-22	2020-21
Cash Provided (Used) by:		
Operating Activities	\$ (621,858)	\$ (577,538)
Noncapital Financing Activities	864,789	797,683
Capital and Related Financing Activities	(91,376)	(92,821)
Investing Activities	(146,779)	(127,823)
<b>Net Increase (Decrease) in Cash and Cash Equivalents</b>	<b>4,776</b>	<b>(499)</b>
Cash and Cash Equivalents, Beginning of Year	12,679	13,178
<b>Cash and Cash Equivalents, End of Year</b>	<b>\$ 17,455</b>	<b>\$ 12,679</b>

Major sources of funds came from State noncapital appropriations (\$518.8 million), net student tuition and fees (\$315.8 million), grants and contracts (\$232.1 million), sales and services of auxiliary enterprises (\$247.3 million), Federal and State student financial aid (\$227.7 million), and noncapital grants, contracts, and gifts (\$132.3 million). Major uses of funds were for payments made to and on behalf of employees (\$893.2 million), payments to suppliers (\$369.3 million), payments to and on behalf of students for scholarships (\$172.5 million), and the purchase or construction of capital assets (\$120.1 million).

## ECONOMIC FACTORS THAT WILL AFFECT THE FUTURE

As a public institution, the condition of the State of Florida's economy is the primary factor impacting the university's future. In July 2022, the Florida Economic Estimating Conference adopted a new forecast for the State's economy. Most economic variables performed slightly better than or as well as expected in Fiscal Year 2021-22; however, many of the growth rates for the short term have been lowered, especially in Fiscal Year 2022-23. A weaker national economic outlook with strong headwinds from inflation, near-record energy prices, and labor shortages colors the new forecast; however, the long-term growth path from the pre-pandemic conference held in December 2019 is generally maintained, and in some cases exceeded. The Conference anticipates that the State's economy will expand only 1 percent this fiscal year as economic imbalances weigh down the economy, but beginning next year (Fiscal Year 2023-24), it will grow at a more characteristic 2 percent per year.

The university's 2022-23 operating budget adopted by the Florida Legislature included total recurring General Revenue and Lottery funding for the University of \$517.2 million, which represented an 11.1 percent increase as compared to the prior fiscal year. The record-breaking budget, the largest in State history, was the primary driver behind the double-digit percentage increase. Also, State Capital Appropriations included \$125 million to build a new academic health center in Tallahassee, \$71.2 million for deferred building maintenance, and \$8.3 million for critical electrical infrastructure at the National High Magnetic Field Laboratory. Overall tuition revenues are expected to rise due to the full reopening of the university's international study centers and study abroad programs. On the other hand, somewhat offsetting the benefits of the overall revenue growth are inflation; student tuition, which has remained unchanged for the ninth consecutive year; and enrollment growth, which is expected to remain unchanged at current levels going forward.

Fueled by a steadfast commitment to student success and academic excellence, Florida State University continued its reign as a Top 20 national public university. FSU is competing at the highest levels with the best universities in the world, and has a continued goal to rise to the Top 15 and beyond.

## REQUESTS FOR INFORMATION

Questions concerning information provided in the MD&A or other required supplemental information, and financial statements and notes thereto, or requests for additional financial information should be addressed to the University Controller's Office, Florida State University, 2200A University Center, Tallahassee, Florida 32306.





**STATEMENT OF NET POSITION**

AS OF JUNE 30, 2022 (in thousands)

	<u>UNIVERSITY</u>	<u>COMPONENT UNITS</u>
<b>ASSETS</b>		
<b>Current Assets:</b>		
Cash and Cash Equivalents	\$ 15,994	\$ 30,112
Investments	892,624	197,770
Accounts Receivable, Net	55,895	19,130
Loans and Notes Receivable, Net	463	-
Leases Receivable	429	-
Due from State	87,925	316
Due from Component Units/University	5,463	41,280
Inventories	2,595	171
Other Current Assets	11,013	12,334
<b>Total Current Assets</b>	<b>1,072,401</b>	<b>301,113</b>
<b>Noncurrent Assets:</b>		
Restricted Cash and Cash Equivalents	1,461	26,792
Restricted Investments	144,168	846,926
Loans and Notes Receivable, Net	2,927	39,762
Leases Receivable	7,693	-
Depreciable Capital Assets, Net	1,884,398	257,040
Nondepreciable Capital Assets	202,647	17,588
Other Noncurrent Assets	3,741	185,109
<b>Total Noncurrent Assets</b>	<b>2,247,035</b>	<b>1,373,217</b>
<b>TOTAL ASSETS</b>	<b>3,319,436</b>	<b>1,674,330</b>
<b>DEFERRED OUTFLOWS OF RESOURCES</b>		
Related to Pensions	93,869	-
Related to Other Postemployment Benefits	55,196	-
Loss on Debt Refunding	-	1,293
<b>LIABILITIES</b>		
<b>Current Liabilities:</b>		
Accounts Payable	\$ 14,628	\$ 13,277
Construction Contracts Payable	11,465	-
Salaries and Wages Payable	18,346	-
Deposits Payable	5,886	55
Due to Component Units/University	42,946	4,481
Unearned Revenue	103,066	10,082
Other Current Liabilities	929	10,022
Long-Term Liabilities - Current Portion:		
Capital Improvement Debt Payable	16,358	-
Bonds Payable	-	6,889
Loans and Notes Payable	-	1,929
Leases Payable	948	681
Compensated Absences Payable	6,484	-
Other Postemployment Benefits Payable	3,543	-
Revenue Received in Advance	2,823	24,717
Net Pension Liability	403	-
Other Noncurrent Liabilities	14,171	-
<b>Total Current Liabilities</b>	<b>241,996</b>	<b>72,133</b>

**STATEMENT OF NET POSITION**

AS OF JUNE 30, 2022 (in thousands)

	<u>UNIVERSITY</u>	<u>COMPONENT UNITS</u>
<b>Noncurrent Liabilities:</b>		
Capital Improvement Debt Payable	164,115	-
Bonds Payable	-	129,646
Loans and Notes Payable	-	89,522
Leases Payable	5,603	3,201
Accrued Self-Insurance Claims	496	-
Compensated Absences Payable	80,119	366
Other Postemployment Benefits Payable	198,952	-
Revenue Received in Advance	20,961	7,071
Net Pension Liability	129,584	-
Other Noncurrent Liabilities	9,603	14,686
<b>Total Noncurrent Liabilities</b>	<b>609,433</b>	<b>244,492</b>
<b>TOTAL LIABILITIES</b>	<b>851,429</b>	<b>316,625</b>
<b>DEFERRED INFLOWS OF RESOURCES</b>		
Related to Pensions	204,866	-
Related to Other Postemployment Benefits	78,107	-
Leases	7,974	3,506
Split-Interest Agreements for Remainder Interests	-	3,095
Trusts Held by Others	-	8,269
Other	-	1,453
<b>NET POSITION</b>		
Net Investment in Capital Assets	\$ 1,873,134	\$ 92,160
Restricted for Nonexpendable, Endowment	-	547,004
Restricted for Expendable:		
Debt Service	217	57,277
Loans	4,101	-
Capital Projects	142,042	52,510
Other	216,975	12,225
Endowment	-	425,276
Unrestricted	89,656	156,223
<b>TOTAL NET POSITION</b>	<b>\$ 2,326,125</b>	<b>\$ 1,342,675</b>

*The accompanying notes to financial statements are an integral part of this statement.*

# STATEMENT OF REVENUES, EXPENSES, AND CHANGES IN NET POSITION

## FOR THE FISCAL YEAR ENDED JUNE 30, 2022 (in thousands)

	UNIVERSITY	COMPONENT UNITS
<b>OPERATING REVENUES</b>		
Student Tuition and Fees, Net of Scholarship Allowances of \$136,566	\$ 314,240	\$ -
Federal Grants and Contracts	192,009	-
State and Local Grants and Contracts	27,340	-
Nongovernmental Grants and Contracts	11,676	-
Sales and Services of Auxiliary Enterprises, Net of Scholarship Allowances of \$18,785	241,966	-
Sales and Services of Component Units	-	35,054
Royalties and Licensing Fees	-	5,290
Gifts and Donations	-	84,518
Interest on Loans and Notes Receivable	459	-
Other Operating Revenues	10,449	18,105
<b>Total Operating Revenues</b>	<b>798,139</b>	<b>142,967</b>
<b>OPERATING EXPENSES</b>		
Compensation and Employee Benefits	869,671	31,782
Services and Supplies	338,689	130,686
Utilities and Communications	35,566	301
Scholarships and Fellowships	172,537	-
Depreciation	95,563	11,611
<b>Total Operating Expenses</b>	<b>1,512,026</b>	<b>174,380</b>
<b>OPERATING LOSS</b>	<b>(713,887)</b>	<b>(31,413)</b>
<b>NONOPERATING REVENUES (EXPENSES)</b>		
State Noncapital Appropriations	519,136	-
Federal and State Student Financial Aid	227,680	-
Noncapital Grants, Contracts, and Gifts	132,559	3,255
Investment Income, Net of Expenses	7,437	61,262
Net Increase (Decrease) in the Fair Value of Investments	(42,297)	(91,038)
Other Nonoperating Revenues	2,058	5,863
Gain (Loss) on Disposal of Capital Assets	2,051	(1,944)
Interest on Capital Asset-Related Debt	(7,959)	(6,444)
Other Nonoperating Expenses	(440)	(1,634)
<b>NET NONOPERATING REVENUES (EXPENSES)</b>	<b>840,225</b>	<b>(30,680)</b>
<b>Income (Loss) Before Other Revenues</b>	<b>126,338</b>	<b>(62,093)</b>
State Capital Appropriations	15,297	-
Capital Grants, Contracts, Donations, and Fees	49,561	10,529
Additions to Permanent Endowments	-	22,329
<b>Increase (Decrease) in Net Position</b>	<b>191,196</b>	<b>(29,235)</b>
Net Position, Beginning of Year	2,134,929	1,371,910
<b>NET POSITION, END OF YEAR</b>	<b>\$ 2,326,125</b>	<b>\$ 1,342,675</b>

The accompanying notes to financial statements are an integral part of this statement.

# STATEMENT OF CASH FLOWS

## FOR THE FISCAL YEAR ENDED JUNE 30, 2022 (in thousands)

	<u>UNIVERSITY</u>
<b>CASH FLOWS FROM OPERATING ACTIVITIES</b>	
Tuition and Fees, Net	\$ 315,798
Grants and Contracts	232,105
Sales and Services of Auxiliary Enterprises	247,258
Interest on Loans and Notes Receivable	459
Other Operating Receipts	16,931
Payments to Employees	(893,240)
Payments to Suppliers for Goods and Services	(369,274)
Payments to Students for Scholarships and Fellowships	(172,537)
Self-Insurance Claims	25
Collections on Loans to Students	617
<b>Net Cash Used by Operating Activities</b>	<u><b>(621,858)</b></u>
<b>CASH FLOWS FROM NONCAPITAL FINANCING ACTIVITIES</b>	
State Noncapital Appropriations	518,849
Noncapital Grants, Contracts, and Gifts	132,309
Federal and State Student Financial Aid	227,680
Federal Direct Loan Program Receipts	160,730
Federal Direct Loan Program Disbursements	(160,771)
Net Change in Funds Held for Others	(3,872)
Other Nonoperating Receipts	1,326
Other Nonoperating Disbursements	(11,462)
<b>Net Cash Provided by Noncapital Financing Activities</b>	<u><b>864,789</b></u>
<b>CASH FLOWS FROM CAPITAL AND RELATED FINANCING ACTIVITIES</b>	
State Capital Appropriations	8,672
Capital Grants, Contracts, Donations, and Fees	49,135
Capital Subsidies and Transfers	(139)
Purchase or Construction of Capital Assets	(120,109)
Principal Paid on Capital Debt and Leases	(19,650)
Interest Paid on Capital Debt and Leases	(9,814)
Principal Received on Leases	357
Interest Received on Leases	172
<b>Net Cash Used by Capital and Related Financing Activities</b>	<u><b>(91,376)</b></u>
<b>CASH FLOWS FROM INVESTING ACTIVITIES</b>	
Proceeds from Sales and Maturities of Investments	995,358
Purchase of Investments	(1,149,458)
Investment Income	7,321
<b>Net Cash Used by Investing Activities</b>	<u><b>(146,779)</b></u>
Net Increase in Cash and Cash Equivalents	4,776
Cash and Cash Equivalents, Beginning of Year	12,679
<b>Cash and Cash Equivalents, End of Year</b>	<u><b>\$ 17,455</b></u>
<b>RECONCILIATION OF OPERATING LOSS TO NET CASH USED BY OPERATING ACTIVITIES</b>	
<b>Operating Loss</b>	\$ (713,887)
<b>Adjustments to Reconcile Operating Loss to Net Cash Used by Operating Activities</b>	
Depreciation Expense	95,563
<b>Change in Assets, Liabilities, Deferred Outflows of Resources, and Deferred Inflows of Resources:</b>	
Other Receivables, Net	8,804
Inventories	(491)
Loans and Notes Receivable, Net	258
Deferred Charges and Other Assets	1,004
Accounts Payable	4,047
Salaries and Wages Payable	3,348
Self-Insurance Claims	25
Deposits Payable	(13)
Compensated Absences Payable	(1,031)
Other Postemployment Benefits Payable	7,602
Unearned Revenue	6,383
Pension Liability	(267,917)
Pension Deferred Outflows	43,491
Pension Deferred Inflows	193,579
Other Postemployment Benefits Deferred Outflows	6,093
Other Postemployment Benefits Deferred Inflows	(8,736)
Other Liabilities	20
<b>NET CASH USED BY OPERATING ACTIVITIES</b>	<u><b>\$ (621,858)</b></u>
<b>SUPPLEMENTAL DISCLOSURE OF NONCASH CAPITAL AND RELATED FINANCING AND INVESTING ACTIVITIES</b>	
The following items were recognized on the statement of revenues, expenses, and changes in net position, but are not cash transactions for the statement of cash flows:	
Unrealized losses on investments	\$ (42,297)
Gains on disposal of capital assets	\$ 2,051

The accompanying notes to financial statements are an integral part of this statement.

# NOTES TO FINANCIAL STATEMENTS

## 1. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

### Reporting Entity

The university is a separate public instrumentality that is part of the State university system of public universities, which is under the general direction and control of the Florida Board of Governors. The university is directly governed by a Board of Trustees (Trustees) consisting of thirteen members. The Governor appoints six citizen members and the Board of Governors appoints five citizen members. These members are confirmed by the Florida Senate and serve staggered terms of five years. The chair of the faculty senate and the president of the student body of the university are also members. The Board of Governors establishes the powers and duties of the Trustees. The Trustees are responsible for setting policies for the university, which provide governance in accordance with State law and Board of Governors' Regulations. The Trustees select the University President. The University President serves as the Executive Officer and the Corporate Secretary of the Trustees and is responsible for administering policies prescribed by the Trustees.

Criteria for defining the reporting entity are identified and described in the Governmental Accounting Standards Board's (GASB) *Codification of Governmental Accounting and Financial Reporting Standards*, Sections 2100 and 2600. These criteria were used to evaluate potential component units for which the primary government is financially accountable and other organizations for which the nature and significance of their relationship with the primary government are such that exclusion would cause the primary government's financial statements to be misleading. Based on the application of these criteria, the university is a component unit of the State of Florida, and its financial balances and activities are reported in the State's Annual Comprehensive Financial Report by discrete presentation.

### Discretely Presented Component Units

Based on the application of the criteria for determining component units, the following organizations met all of the financial accountability criteria necessary for inclusion as discretely presented component units and therefore are included within the university reporting entity, or are included based on the nature and significance of their relationship with the university.

These organizations and their purposes are explained as follows:

- ◆ **The Florida State University Foundation, Inc. (Foundation)** - The university's fundraising and private support programs are accounted for and reported separately by the Foundation. The Foundation revenues include unrestricted and restricted gifts and grants, rental income, and investment income. The Foundation expenses include scholarship distributions to students and departmental faculty, staff development support, various memorials and class projects, departmental research, and administrative costs of the Foundation's development program.
- ◆ **Seminole Boosters, Inc. (Boosters)** - The primary purpose of the Boosters is to stimulate and promote the education, health, and physical welfare of university students by providing financial support from the private sector for the Intercollegiate Athletic Program. Funds raised by the Boosters are utilized for scholarships, recruiting expenses, and authorized travel and entertainment in accordance with the rules and regulations of the National Collegiate Athletic Association. The Boosters' financial information includes the activities of the Florida State University Financial Assistance, Inc., as a blended component unit.
- ◆ **The Florida State University Research Foundation, Inc. (Research Foundation)** - The Research Foundation was established to promote and assist the research and training activities of the university through income from contracts, grants, and other sources, including income derived from the development and commercialization of the university's work products.
- ◆ **Florida State University International Programs Association, Inc. (International Programs Association)** - The purpose of the International Programs Association is to promote intercultural activities among students, educators, and others. It provides teaching, studying, research, and conference opportunities to U.S. students, scholars, and other professionals and community groups through Florida State University Study-Aboard Programs in England, Italy, Costa Rica, and other sites.
- ◆ **Florida State University Schools, Inc. (School)** - The School is a charter school established pursuant to Section 1002.33(5)(a), Florida Statutes. The School provides a setting where university faculty, School faculty, and graduate students can design, demonstrate, and analyze the effectiveness of new instructional materials, technological advances, and strategies under controlled conditions. It also offers an environment for the systematic research, evaluation, and development of commercial or prototype materials and techniques adaptable to other Florida public schools and is supported by School and university researchers or private sector partners.
- ◆ **Florida State University Alumni Association, Inc. (Alumni Association)** - The Alumni Association serves as a connecting link between alumni and the university. The nature and purpose of the Alumni Association is to aid, strengthen, and expand the university and its alumni. The Alumni Association utilizes private gifts, devises, other contributions, and advertising income to publish and exchange information with university alumni, to assist the university's development programs, and to provide public and community service.
- ◆ **The John and Mable Ringling Museum of Art Foundation, Inc. (Ringling Museum Foundation)** - The Ringling Museum Foundation was established to provide charitable and educational aid to the university's John and Mable Ringling Museum of Art.
- ◆ **Florida Medical Practice Plan, Inc. (FMPP)** - FMPP's purpose is to improve and support medical education in the Florida State University College of Medicine.

- ◆ **Florida State University Magnet Research and Development, Inc. (Magnet Research and Development)** - The Magnet Research and Development organization was incorporated to promote, encourage, and assist the research and training activities of faculty, staff, and students of the university and specifically to design, develop, invent, assemble, construct, test, repair, maintain, and fabricate magnets or magnet systems of any type or design.
- ◆ **The Florida State University Real Estate Foundation, Inc. (Real Estate Foundation)** – The Real Estate Foundation was established to receive, hold, manage, lease, develop, or sell real estate, and to make expenditures, grants, and contributions to or for the benefit of the university.
- ◆ **The Florida State University College of Business Student Investment Fund, Inc. (Student Investment Fund)** – The Student Investment Fund was established to support a student managed investment fund and other FSU College of Business programs.
- ◆ **Florida State University Athletics Association, Inc. (Athletics Association)** – The Athletics Association was established to administer varsity collegiate athletics for and on behalf of Florida State University, including oversight, governance, and coordination between the Department of Intercollegiate Athletics and Seminole Boosters, Inc.

An annual audit of each operational organization’s financial statements is conducted by independent certified public accountants. The annual reports are submitted to the Auditor General and the university Board of Trustees. Additional information on the university’s discretely presented component units, including copies of audit reports, is available by contacting the University Controller. Condensed financial statements for the university’s discretely presented component units are disclosed in a subsequent note.

### **Basis of Presentation**

The university’s accounting policies conform with accounting principles generally accepted in the United States of America applicable to public colleges and universities as prescribed by GASB. The National Association of College and University Business Officers (NACUBO) also provides the university with recommendations prescribed in accordance with generally accepted accounting principles promulgated by GASB which allows public universities various reporting options. The university has elected to report as an entity engaged in only business-type activities. This election requires the adoption of the accrual basis of accounting and entity wide reporting including the following components:

- ◆ Management’s Discussion and Analysis
- ◆ Basic Financial Statements:
  - Statement of Net Position
  - Statement of Revenues, Expenses, and Changes in Net Position
  - Statement of Cash Flows
  - Notes to Financial Statements
- ◆ Other Required Supplementary Information

The statement of net position is presented in a classified format to distinguish between current and noncurrent assets and liabilities. The statement of revenues, expenses, and changes in net position is presented by major sources of operating revenues, natural classifications of operating expenses, nonoperating revenues and expenses, and all other activity not otherwise classified. The statement of cash flows is presented using the direct method in compliance with GASB Statement No. 9, *Reporting Cash Flows of Proprietary and Nonexpendable Trust Funds and Governmental Entities That Use Proprietary Fund Accounting*.

### **Measurement Focus and Basis of Accounting**

The university’s and its discretely presented component units’ financial statements are presented using the economic resources measurement focus, which aims to report all inflows, outflows, and balances affecting or reflecting an entity’s net position, and the accrual basis of accounting. Under the accrual basis of accounting, revenues are recognized when earned, and expenses are recorded when an obligation has been incurred. All significant intra-agency transactions have been eliminated.

### **Cash and Cash Equivalents**

Cash and cash equivalents consist of cash on hand and cash in demand accounts. University cash deposits are held in banks qualified as public depositories under Florida law. All such deposits are insured by Federal depository insurance, up to specified limits, or collateralized with securities held in Florida’s multiple financial institution collateral pool required by Chapter 280, Florida Statutes. Cash and cash equivalents that are externally restricted to make debt service payments, maintain sinking or reserve funds, or to purchase or construct capital or other restricted assets, are classified as restricted.

## NOTES TO FINANCIAL STATEMENTS

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### Investments and Fair Value Measurement

The university categorizes its fair value measurements within the fair value hierarchy established by generally accepted accounting principles. The hierarchy is based on the valuation inputs used to measure the fair value of the asset. Level 1 inputs are quoted prices in active markets for identical assets, Level 2 inputs are significant other observable inputs, and Level 3 inputs are significant unobservable inputs.

### Other Current Assets

Other current assets are primarily made up of prepaid items, which represent payments for goods and services that will benefit future periods.

### Capital Assets

University capital assets consist of land, works of art and historical treasures, construction in progress, buildings, infrastructure and other improvements, furniture and equipment, library resources, right-to-use leases, and computer software. Except for right-to-use leases, these assets are capitalized and recorded at cost at the date of acquisition or at acquisition value at the date received in the case of gifts and purchases of State surplus property. Additions, improvements, and other outlays that significantly extend the useful life of an asset are capitalized. Other costs incurred for repairs and maintenance are expensed as incurred. The university has a capitalization threshold of \$5,000 for tangible personal property, \$100,000 for buildings and other improvements, and \$4,000,000 for intangible assets.

Depreciation is computed on the straight-line basis over the following estimated useful lives:

- ◆ Buildings, Infrastructure and Other Improvements – 10 to 50 years
- ◆ Furniture and Equipment – 3 to 20 years
- ◆ Library Resources - 10 years
- ◆ Computer Software – 5 years

### Leases

Leases consist of contracts that convey control of the right to use an underlying asset as specified in the contract for a period of time in an exchange or exchange-like transaction. The university recognizes a lease receivable and deferred inflow of resources when it is the lessor party to a contract, or an intangible right-to-use lease asset and lease liability when it is the lessee party to a contract. The expected receipts or payments are discounted using the interest rate stated in the contract, if available, or are otherwise discounted using an estimated incremental borrowing rate. The university applies a materiality threshold of \$5,000 for equipment and \$100,000 for space based on the present value of expected receipts or payments over the term of the contract. Lease amounts are amortized over the shorter of the contract term or the useful life of the underlying asset.

### Noncurrent Liabilities

Noncurrent liabilities include capital improvement debt payable, leases payable, accrued self-insurance claims, compensated absences payable, other postemployment benefits payable, revenue received in advance, net pension liability, and other noncurrent liabilities that are not scheduled to be paid within the next fiscal year. Capital improvement debt payable is reported net of unamortized premium or discount. The university amortizes debt premiums and discounts over the life of the debt using the straight-line method.

### Compensated Absences

Employees earn vacation and sick leave each pay period and can carryforward unused balances up to certain amounts each calendar year. The university calculates the compensated absences liability based on recorded balances of unused leave as of the end of the fiscal year for which the university expects to compensate employees through paid time off or cash payments at termination. Upon termination of employment, employees are entitled to be paid for any accumulated unused leave up to the maximum allowable amounts.

### Pensions

For the purposes of measuring the net pension liabilities, deferred outflows of resources and deferred inflows of resources related to pensions, and pension expense, information about the fiduciary net positions of the Florida Retirement System (FRS) defined benefit plan and the Health Insurance Subsidy (HIS) defined benefit plan and additions to/deductions from the FRS and HIS fiduciary net positions have been determined on the same basis as they are reported by the FRS and HIS plans. Benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with benefit terms. Investments are reported at fair value.

### Other Postemployment Benefits

For the purposes of measuring the net postemployment benefit liability, deferred outflows of resources and deferred inflows of resources related to postemployment benefits, and benefit expense, information about the fiduciary net positions of the Florida Division of State Group Insurance Other Postemployment Benefits Plan (OPEB Plan) and additions to/deductions from the OPEB Plan fiduciary net positions have been determined on the same basis as they are reported by the OPEB Plan. Benefit payments (including refunds of employee contributions) are recognized when due and payable in accordance with benefit terms. Investments are reported at fair value.



**Net Position**

The university's components of net position are classified as follows:

Net Investment in Capital Assets - Represents the university's total investment in capital assets, net of accumulated depreciation and net of outstanding debt obligations and deferred outflows/inflows of resources related to those capital assets.

Nonexpendable Restricted Net Position – Consists of endowment and similar type funds in which donors or other outside sources have stipulated, as a condition of the gift instrument, that the principal is to be maintained inviolate and in perpetuity, and invested for the purpose of producing present and future income, which may be expendable or added to principal. All endowment and similar type funds are held by the university's component units.

Expendable Restricted Net Position – Includes resources in which the university is legally or contractually obligated to spend resources in accordance with restrictions imposed by external third parties.

Unrestricted Net Position – Represents resources derived from student tuition and fees, State appropriations, and the sales and services of auxiliary enterprises. These resources are used for transactions relating to the educational and general operations of the university and may be used at the discretion of the governing board to meet current expenses for any purpose.

When both restricted and unrestricted resources are available to fund certain programs, generally it is the university's policy to first apply the restricted resources to such programs, followed by the use of the unrestricted resources.

**Operating Revenues and Expenses**

The university's principal operating activities consist of instruction, research, and public service. Operating revenues include activities that have characteristics of exchange transactions, such as student fees, net of scholarship discounts and allowances; sales and services of auxiliary enterprises; and Federal, State, local and nongovernmental grants and contracts.

Operating expenses include scholarships and fellowships for students, operation and maintenance of capital assets, depreciation on capital assets, and all other fiscal transactions directly related to the university's principal operating activities as well as those related to the academic and general administration of the university.

**Scholarship Discounts and Allowances**

Student tuition and fee revenues, and certain other revenue from students, are reported net of scholarship discounts and allowances, which are the differences between the stated charge for goods and services provided by the university and the amount that is actually paid by a student or a third party making payment on behalf of the student. Certain governmental grants, such as Pell grants, and other Federal, State, or nongovernmental programs, such as the Florida Bright Futures Program, are recorded as nonoperating revenues in the university's financial statements. To the extent that revenues from such programs are used to satisfy tuition and fees and other student charges, the university has recorded a scholarship discount and allowance.

The university applied the "Direct Method" as prescribed in NACUBO Advisory Report 2000-05 to determine the reported net scholarship discounts and allowances.

**Nonoperating Revenues and Expenses**

Nonoperating revenues include activities that have characteristics of nonexchange transactions, such as gifts and contributions, and other revenue sources that are defined as nonoperating revenues by GASB Statement No. 9, *Reporting Cash Flows of Proprietary and Nonexpendable Trust Funds and Governmental Entities That Use Proprietary Fund Accounting*, and GASB Statement No. 35, *Basic Financial Statements – and Management's Discussion and Analysis – for Public Colleges and Universities*, as amended by GASB Statements Nos. 37 and 38. Nonoperating revenues include State noncapital appropriations; Federal and State student financial aid; Noncapital grants, contracts, and gifts; and investment income. Nonoperating expenses include interest on capital asset-related debt and losses on the disposal of capital assets.

**2. REPORTING CHANGES**

The university implemented GASB Statement No. 87, *Leases*, which establishes a single model for lease accounting based on the foundational principle that leases are financings of the right to use an underlying asset. Under this statement, a lessee is required to recognize a lease liability and an intangible right-to-use lease asset, and a lessor is required to recognize a lease receivable and a deferred inflow of resources. As a result of implementation, the university reclassified capital assets previously reported as property under capital lease to either buildings or equipment, and reclassified long-term debt previously reported as capital lease payable to other noncurrent liabilities as financed purchases. These changes are reflected in Note 5 Receivables, Note 8 Capital Assets, and Note 10 Long-Term Liabilities. There was no effect to beginning net position.

**NOTES TO FINANCIAL STATEMENTS****3. UNRESTRICTED NET POSITION**

The university had an unrestricted net position of \$89,655,811 at June 30, 2022. This includes the full recognition of long-term liabilities expected to be financed in future years. The effect of these items on the university's unrestricted net position is shown below:

Description	Amount
Total Unrestricted Net Position Before Recognition of Long-Term Liabilities, Deferred Outflows of Resources, and Deferred Inflows of Resources	\$ 642,649,578
Amount Expected to be Financed in Future Years:	
Compensated Absences Payable	86,602,572
Other Postemployment Benefits Payable and Related Deferred Outflows of Resources and Deferred Inflows of Resources	225,406,345
Net Pension Liability and Related Deferred Outflows of Resources and Deferred Inflows of Resources	240,984,850
Total Amount Expected to be Financed in Future Years	(552,993,767)
<b>Total Unrestricted Net Position</b>	<b>\$ 89,655,811</b>

**4. INVESTMENTS**

Section 1011.42(5), Florida Statutes, authorizes universities to invest funds with the State Treasury and State Board of Administration (SBA) and requires that universities comply with the statutory requirements governing investment of public funds by local governments. Accordingly, universities are subject to the requirements of Chapter 218, Part IV, Florida Statutes. The university's Board of Trustees has adopted a written investment policy providing that surplus funds of the university shall be invested in those institutions and instruments permitted under the provisions of Florida Statutes. Pursuant to Section 218.415(16), Florida Statutes, the university is authorized to invest in the Florida PRIME investment pool administered by the SBA; interest-bearing time deposits and savings accounts in qualified public depositories, as defined in Section 280.02, Florida Statutes; direct obligations of the United States Treasury; obligations of Federal agencies and instrumentalities; securities of, or interests in, certain open-end or closed-end management type investment companies; Securities and Exchange Commission registered money market funds with the highest credit quality rating from a nationally recognized rating agency; and other investments approved by the university's Board of Trustees as authorized by law. Investments set aside to make debt service payments, maintain sinking or reserve funds, or to purchase or construct capital assets are classified as restricted.

The university's investments at June 30, 2022, are reported as follows:

Investments by Fair Value Level	Fair Value	Level 1	Level 2	Level 3
External Investment Pool:				
State Treasury Special Purpose Investment Account	\$ 1,017,028,994	\$ -	\$ -	\$ 1,017,028,994
State Board of Administration Debt Service Accounts	16,151	16,151	-	-
Mutual Funds:				
Bonds	7,886,765	7,886,765	-	-
Equities	3,446,668	3,446,668	-	-
Other Investments	8,413,914	-	-	8,413,914
<b>Total Investments by Fair Value Level</b>	<b>\$ 1,036,792,492</b>	<b>\$ 11,349,584</b>	<b>\$ -</b>	<b>\$ 1,025,442,908</b>

Investments held by the university's component units at June 30, 2022, are reported as follows:

<b>Investments by Fair Value Level</b>	<b>Fair Value</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Domestic Stocks	\$ 21,291,190	\$ 21,291,190	\$ -	\$ -
International Stocks	128,600	128,600	-	-
Mutual Funds	178,081,254	178,081,254	-	-
Real Estate Investments	15,103,499	-	-	15,103,499
Other Investments	22,292,320	22,192,320	-	100,000
<b>Total Investments by Fair Value Level</b>	<b>\$ 236,896,863</b>	<b>\$ 221,693,364</b>	<b>\$ -</b>	<b>\$ 15,203,499</b>
<b>Investments Measured at the Net Asset Value (NAV)</b>				
Domestic Bonds and Notes	66,796,324			
Domestic Stocks	146,197,001			
International Stocks	148,040,231			
Real Estate Investments	19,902,649			
Hedge Funds	101,714,151			
Private Equity Funds	227,403,647			
Private Real Estate Funds	57,001,936			
Total Investments Measured at NAV	767,055,939			
<b>Other</b>				
SBA Florida PRIME	39,378,275			
Other Investments	1,364,635			
Total Other Investments	40,742,910			
<b>Total Investments</b>	<b>\$ 1,044,695,712</b>			

The university's component units' investments measured at the net asset value (NAV), as of June 30, 2022, totaled \$767,055,939 as follows:

<b>Investments Measured at the NAV</b>	<b>Fair Value</b>	<b>Unfunded Commitments</b>	<b>Redemption Frequency</b>	<b>Redemption Notice Period</b>
Domestic Bonds and Notes	\$ 66,796,324	\$ 6,431,965	Daily	2 days
Domestic Stocks	146,197,001	-	Daily to semi-annually	2 - 60 days
International Stocks	148,040,231	-	Daily to semi-annually	2 - 60 days
Real Estate Investments	19,902,649	-	Daily	2 days
Hedge Funds	101,714,151	4,734,711	Monthly to every 3 years	10 - 90 days
Private Equity Funds	227,403,647	75,466,098		
Private Real Estate Funds	57,001,936	23,519,612		
<b>Total Investments Measured at NAV</b>	<b>\$ 767,055,939</b>	<b>\$ 110,152,386</b>		

Investments measured at net asset value are comprised of the following categories:

- ◆ Domestic Bonds and Notes – domestic fixed income institutional pooled funds.
- ◆ Domestic Stocks – equity interests in domestic institutional pooled funds.
- ◆ International Stocks – equity interests in global and emerging market institutional pooled funds.
- ◆ Real Estate – equity interests in global real estate institutional pooled funds, and a real estate limited partnership.
- ◆ Hedge Funds – interests in offshore funds that invest both long and short in domestic and international equities as well as absolute return strategy interests in offshore funds that are designed to produce results that are largely independent of, or have low correlation to, the broader markets.
- ◆ Private Equity – interests in several limited partnership funds that invest in private equity, venture capital, and distressed assets.
- ◆ Private Real Estate - interests in several limited partnership funds that invest in real estate and natural resources.

**NOTES TO FINANCIAL STATEMENTS****External Investment Pools**

The university reported investments at fair value totaling \$1,017,028,994 at June 30, 2022, in the State Treasury Special Purpose Investment Account (SPIA) investment pool, representing ownership of a share of the pool, not the underlying securities. Pooled investments with the State Treasury are not registered with the Securities and Exchange Commission. Oversight of the pooled investments with the State Treasury is provided by the Treasury Investment Committee per Section 17.575, Florida Statutes. The authorized investment types are set forth in Section 17.57, Florida Statutes. The SPIA carried a credit rating of AA-f by Standard & Poor's, had an effective duration of 2.66 years, and fair value factor of 0.9479 at June 30, 2022. Participants contribute to the Treasury Pool on a dollar basis. These funds are commingled and a fair value of the pool is determined from the individual values of the securities. The fair value of the securities is summed and a total pool fair value is determined. A fair value factor is calculated by dividing the pool's total fair value by the pool participants' total cash balances. The fair value factor is the ratio used to determine the fair value of an individual participant's pool balance. The university relies on policies developed by the State Treasury for managing interest rate risk or credit risk for this investment pool. Disclosures for the State Treasury investment pool are included in the notes to financial statements of the State's Annual Comprehensive Financial Report.

The Research Foundation and Magnet Research and Development reported investments at fair value totaling \$39,115,427 and \$262,848, respectively, at June 30, 2022, in the Florida PRIME investment pool administered by the SBA pursuant to Section 218.405, Florida Statutes. These investments in the Florida PRIME investment pool, which the SBA indicates is a Securities and Exchange Commission Rule 2a7-like external investment pool, at June 30, 2022, are similar to money market funds in which shares are owned in the fund rather than the underlying investments. The Florida PRIME investment pool carried a credit rating of AAAM by Standard & Poor's and had a weighted average days to maturity (WAM) of 28 days as of June 30, 2022. A portfolio's WAM reflects the average maturity in days, based on final maturity or reset date, in the case of floating rate instruments. WAM measures the sensitivity of the Florida PRIME investment pool to interest rate changes. The investments in the Florida PRIME investment pool are reported at fair value, which is amortized cost.

**State Board of Administration Debt Service Accounts**

The university reported investments at fair value totaling \$16,151 at June 30, 2022, in the SBA Debt Service Accounts. These investments are used to make debt service payments on bonds issued by the State Board of Education for the benefit of the university. The university's investments consist of United States Treasury securities, with maturity dates of six months or less, and are reported at fair value. The university relies on policies developed by the SBA for managing interest rate risk or credit risk for these accounts. Disclosures for the Debt Service Accounts are included in the notes to the financial statements of the State's Annual Comprehensive Financial Report.

**Other Investments**

In addition to external investment pools, the university and its discretely presented component units invested in various debt and equity securities, mutual funds, and real estate funds. The following are required risk disclosures applicable to investments of the university as well as its discretely presented component units.

**Interest Rate Risk:** Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. The university has investments in bond mutual funds that are subject to interest rate risk. Additionally, investments of the university's discretely presented component units in debt securities, bonds and notes, and bond mutual funds are also subject to interest rate risk. These investments and their future maturities at June 30, 2022, are as follows:

	Fair Value	Investment Maturities (in years)		
		Less Than 1	1-10	Greater Than 10
University	\$ 7,886,765	\$ -	\$ 7,886,765	\$ -
Discretely Presented Component Units	\$ 142,430,419	\$ 291,623	\$ 136,886,441	\$ 5,252,355

**Credit Risk:** Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligations. Obligations of the United States government or obligations explicitly guaranteed by the United States government are not considered to have credit risk (by the GASB) and do not require disclosure of credit quality. The university and the university's discretely presented component units held bond mutual funds which have underlying investments with quality ratings by nationally recognized rating agencies at June 30, 2022, as follows:

	Fair Value	United States Government	AAA	AA/Aa	A/Ba	Less Than A/Ba or Not Rated
Discretely Presented Component Units	\$ 142,430,419	\$ 52,812,279	\$ 45,554,249	\$ 5,299,118	\$ 34,996,181	\$ 3,768,592

**Custodial Credit Risk:** Custodial credit risk is the risk that in the event of the failure of the counterparty, the component unit will not be able to recover the value of its investments or collateral securities that are in the possession of an outside party. Exposure to custodial credit risk relates to investment securities that are held by someone other than the component unit and are not registered in the component unit's name. Neither the university nor its discretely presented component units have identified any investments falling into this category as of June 30, 2022.

**Concentration of Credit Risk:** Concentration of credit risk is the risk of loss attributed to the magnitude of the component unit's investment in a single issuer. The university's discretely presented component units manage their concentration of credit risk based on various investment policies, which may be obtained separately from the discretely presented component units.

## 5. RECEIVABLES

### Accounts Receivable

Accounts receivable represent amounts for student tuition and fees, grant and contract reimbursements due from third parties, various sales and services provided to students and third parties, and interest accrued on investments and loans receivable.

As of June 30, 2022, the university reported the following amounts as accounts receivable:

Description	Amount
Student Tuition and Fees	\$ 14,768,180
Grants and Contracts	20,695,621
Sales and Services of Auxiliary Enterprises	21,376,526
Interest	833,001
Other	2,129,909
<b>Total Accounts Receivable</b>	<b>\$ 59,803,237</b>

### Loans and Notes Receivable

Loans and notes receivable represent all amounts owed on promissory notes from debtors, including student loans made under the Federal Perkins Loan Program and other loan programs. Loans and notes receivable totaled \$4,473,596 at June 30, 2022.

### Leases Receivable

The university leases space to external parties for various terms under long-term non-cancelable leases. The leases expire at various dates through 2042. Lease revenue totaling \$506,018 and interest revenue of \$171,750 were recognized during the 2021-22 fiscal year in accordance with GASB Statement No. 87, *Leases*. Future rights to remaining leases receivable as of June 30, 2022, are as follows:

For the Year Ending June 30,	Principal	Interest	Total
2023	\$ 429,255	\$ 209,234	\$ 638,489
2024	448,479	198,780	647,259
2025	471,584	188,864	660,448
2026	413,960	175,188	589,148
2027	444,500	169,170	613,670
2028-2032	2,570,292	670,974	3,241,266
2033-2037	2,051,135	328,787	2,379,922
2038-2042	1,293,409	106,400	1,399,809
<b>Total Leases Receivable</b>	<b>\$ 8,122,614</b>	<b>\$ 2,047,397</b>	<b>\$ 10,170,011</b>

### Allowance for Doubtful Receivables

Allowances for doubtful accounts and loans and notes receivable are reported based on management's best estimate as of fiscal year end considering type, age, collection history, and other factors considered appropriate. Accounts receivable and loans and notes receivable are reported net of allowances of \$3,908,426 and \$1,084,163, respectively, at June 30, 2022. No allowance has been accrued for grants and contracts receivable or leases receivable as university management considers these to be fully collectible.

## 6. DUE FROM STATE

This amount consists of \$20,136,073 of Public Education Capital Outlay, \$64,502,587 of General Revenue, \$1,537,853 of State Student Financial Aid, and \$1,748,474 of Capital Improvement Fee Trust Fund allocations due from the State to the university for construction of facilities.

## NOTES TO FINANCIAL STATEMENTS

## 7. DUE FROM AND TO COMPONENT UNITS/UNIVERSITY

The university's financial statements are reported for the fiscal year ended June 30, 2022. The university's component units' financial statements are reported as of the most recent fiscal year for which an audit report is available. One component unit has a fiscal year other than June 30. Accordingly, amounts reported by the university as due from and to component units on the statement of net position do not agree with amounts reported by the component units as due from and to the university.

## 8. CAPITAL ASSETS

Capital assets activity for the fiscal year ended June 30, 2022, is shown below:

Description	Beginning Balance	Additions	Reductions	Ending Balance
<b>Nondepreciable Capital Assets:</b>				
Land	\$ 95,137,577	\$ 616,677	\$ 218,700	\$ 95,535,554
Works of Art and Historical Treasures	85,429,487	416,393	-	85,845,880
Construction in Progress	103,720,580	103,915,006	186,369,932	21,265,654
<b>Total Nondepreciable Capital Assets</b>	<b>\$ 284,287,644</b>	<b>\$ 104,948,076</b>	<b>\$ 186,588,632</b>	<b>\$ 202,647,088</b>
<b>Depreciable Capital Assets:</b>				
Buildings	\$ 2,303,710,177	\$ 175,900,960	\$ 9,146,070	\$ 2,470,465,067
Infrastructure and Other Improvements	168,054,746	2,377,670	48,300	170,384,116
Furniture and Equipment	384,408,056	21,258,128	14,723,555	390,942,629
Library Resources	179,942,409	8,704,401	4,951,540	183,695,270
Property Under Capital Lease (1)	6,069,484	-	6,069,484	-
Right-to-Use Lease Assets (2)	-	7,384,540	-	7,384,540
Computer Software	49,174,492	-	-	49,174,492
<b>Total Depreciable Capital Assets</b>	<b>3,091,359,364</b>	<b>215,625,699</b>	<b>34,938,949</b>	<b>3,272,046,114</b>
<b>Less, Accumulated Depreciation:</b>				
Buildings	751,472,067	61,597,270	9,112,691	803,956,646
Infrastructure and Other Improvements	88,757,681	4,161,675	-	92,919,356
Furniture and Equipment	283,851,694	21,785,591	11,824,508	293,812,777
Library Resources	143,968,111	7,744,137	4,951,539	146,760,709
Property Under Capital Lease (1)	750,213	-	750,213	-
Right-to-Use Lease Assets (2)	-	1,024,615	-	1,024,615
Computer Software	49,174,492	-	-	49,174,492
<b>Total Accumulated Depreciation</b>	<b>1,317,974,258</b>	<b>96,313,288</b>	<b>26,638,951</b>	<b>1,387,648,595</b>
<b>Total Depreciable Capital Assets, Net</b>	<b>\$ 1,773,385,106</b>	<b>\$ 119,312,411</b>	<b>\$ 8,299,998</b>	<b>\$ 1,884,397,519</b>

(1) Property under capital lease was reclassified to building and equipment due to implementation of GASB Statement No. 87. Beginning balance was not restated.

(2) Right-to-use lease assets were added due to implementation of GASB Statement No. 87. Beginning balance was not restated.

## 9. UNEARNED REVENUE

Unearned revenue includes capital appropriations for which the university had not yet received approval from the Florida Department of Education, as of June 30, 2022, to spend the funds, as well as grants and contracts, and auxiliary sales and services received prior to fiscal year end related to the subsequent accounting period.

As of June 30, 2022, the university reported the following amounts as unearned revenue:

Description	Amount
State Capital Appropriations	\$ 73,166,710
Grants and Contracts	9,363,475
Sales and Services of Auxiliary Enterprises	20,295,603
Other	240,414
<b>Total Unearned Revenue</b>	<b>\$ 103,066,202</b>

## 10. LONG-TERM LIABILITIES

Long-term liabilities of the university at June 30, 2022, include capital improvement debt payable, leases payable, accrued self-insurance claims, compensated absences payable, other postemployment benefits payable, revenue received in advance, net pension liability, and other noncurrent liabilities.

Long-term liabilities activity for the fiscal year ended June 30, 2022, is shown in the following table:

Description	Beginning Balance	Additions	Reductions	Ending Balance	Current Portion
Capital Improvement Debt Payable	\$ 196,551,040	\$ -	\$ 16,077,892	\$ 180,473,148	\$ 16,357,892
Capital Leases Payable (1)	9,146,603	-	9,146,603	-	-
Leases Payable (2)	-	7,384,540	833,830	6,550,710	947,903
Accrued Self-Insurance Claims	470,389	31,766	6,553	495,602	-
Compensated Absences Payable	87,654,088	6,588,387	7,639,903	86,602,572	6,483,959
Other Postemployment Benefits Payable	194,892,613	146,933,327	139,330,891	202,495,049	3,542,887
Revenue Received in Advance	22,303,776	3,516,856	2,036,646	23,783,986	2,823,448
Net Pension Liability	397,904,694	68,893,698	336,810,898	129,987,494	403,155
Other Noncurrent Liabilities	27,737,749	9,009,823	12,974,036	23,773,536	14,170,596
<b>Total Long-Term Liabilities</b>	<b>\$ 936,660,952</b>	<b>\$ 242,358,397</b>	<b>\$ 524,857,252</b>	<b>\$ 654,162,097</b>	<b>\$ 44,729,840</b>

(1) Capital Leases Payable were reclassified as Other Noncurrent Liabilities due to implementation of GASB Statement No. 87. Beginning balance was not restated.

(2) Leases Payable were added due to implementation of GASB Statement No. 87. Beginning balance was not restated.

### Capital Improvement Debt Payable

The university had the following capital improvement debt payable outstanding at June 30, 2022:

Capital Improvement Debt Type and Series	Amount of Original Issue	Principal Amount Outstanding	Unamortized Amount Outstanding (1)	Net Amount Outstanding	Interest Rates (Percent)	Maturity Date To
Auxiliary Revenue Debt:						
2013A Housing	\$ 42,495,000	\$ 30,040,000	\$ 1,655,139	\$ 31,695,139	4.0 - 5.0	2033
2014A Housing	46,085,000	28,020,000	3,951,402	31,971,402	3.25 - 5.0	2031
2015A Housing	59,575,000	47,925,000	3,523,487	51,448,487	3.0 - 5.0	2035
2021A Housing	24,780,000	23,370,000	4,414,241	27,784,241	2.0 - 5.0	2040
<b>Total Student Housing Debt</b>	<b>172,935,000</b>	<b>129,355,000</b>	<b>13,544,269</b>	<b>142,899,269</b>		
2014A Parking	13,485,000	3,120,000	641,617	3,761,617	5.0	2025
2021A Parking	11,850,000	10,035,000	50,120	10,085,120	5.0	2031
<b>Total Student Parking Debt</b>	<b>25,335,000</b>	<b>13,155,000</b>	<b>691,737</b>	<b>13,846,737</b>		
2005A Dining	10,000,000	2,225,000	-	2,225,000	3.58	2025
2021A Wellness Center	12,330,000	11,260,000	2,934,774	14,194,774	5.0	2030
<b>Total Auxiliary Debt</b>	<b>220,600,000</b>	<b>155,995,000</b>	<b>17,170,780</b>	<b>173,165,780</b>		
2012 Research Foundation Revenue Debt	11,920,000	6,715,000	592,368	7,307,368	3.0 - 4.0	2031
<b>Total Capital Improvement Debt</b>	<b>\$ 232,520,000</b>	<b>\$ 162,710,000</b>	<b>\$ 17,763,148</b>	<b>\$ 180,473,148</b>		

(1) Unamortized amounts include bond discounts, premiums, and/or gains/losses on bond refundings.

**NOTES TO FINANCIAL STATEMENTS**

The university has pledged a portion of future housing rental revenues, traffic and parking fees, food service revenues, and assessed student transportation and student health fees based on credit hours to repay \$220.6 million in capital improvement (housing, parking, etc.) revenue bonds issued by the Florida Board of Governors on behalf of the university. Proceeds from the bonds provided financing to construct student parking garages, student housing facilities, a health center, and other student service facilities. The bonds are payable solely from housing rental income, traffic and parking fees, food service revenues, and assessed student transportation and student health fees, and are payable through 2040. The university has committed to appropriate each year from the housing rental income, traffic and parking fees, food service revenues, and assessed student transportation and student health fees amounts sufficient to cover the principal and interest requirements on the debt. Total principal and interest remaining on the debt is \$199 million and principal and interest paid for the current year totaled \$22.3 million.

<u>Revenue Pledged</u>	<u>Amount</u>
Housing Rental Income	\$49,425,586
Traffic, Parking and Transportation Fees	12,457,624
Food Service Revenues	2,845,082
Student Health Fees	15,318,836

Annual requirements to amortize all capital improvement debt outstanding as of June 30, 2022, are as follows:

<u>Fiscal Year Ending June 30</u>	<u>General</u>		<u>Direct Placement</u>		<u>Total</u>
	<u>Principal</u>	<u>Interest</u>	<u>Principal</u>	<u>Interest</u>	
2023	\$ 13,895,000	\$ 7,023,557	\$ 705,000	\$ 80,761	\$ 21,704,318
2024	13,090,000	6,335,206	740,000	55,323	20,220,529
2025	13,725,000	5,687,406	780,000	28,312	20,220,718
2026	13,635,000	5,008,106	-	-	18,643,106
2027	12,725,000	4,333,556	-	-	17,058,556
2028-2032	64,655,000	12,999,156	-	-	77,654,156
2033-2037	26,420,000	2,121,825	-	-	28,541,825
2038-2040	2,340,000	94,200	-	-	2,434,200
<b>Subtotal</b>	<b>160,485,000</b>	<b>43,603,012</b>	<b>2,225,000</b>	<b>164,396</b>	<b>206,477,408</b>
Plus: Unamortized Premiums and (Discounts), Net	17,763,148	-	-	-	17,763,148
<b>Total</b>	<b>\$ 178,248,148</b>	<b>\$ 43,603,012</b>	<b>\$ 2,225,000</b>	<b>\$ 164,396</b>	<b>\$ 224,240,556</b>

Direct placements are defined by GASB as debt obligations that have terms negotiated directly with an investor and are not offered for public sale. The 2005A Dining issue is the only direct placement of the university's capital improvement debt payable. All the remaining issues were offered for public sale.

**Leases Payable**

The university follows GASB Statement No. 87, *Leases*. Space is leased from external parties for various terms under long-term, non-cancelable leases. The leases expire at various dates through 2036. Payments are made in monthly installments ranging from \$3,221 to \$36,268, and quarterly installments of \$50,000, with an implicit interest rate of 3 percent. The university does not have any leases featuring payments tied to an index or market rate, or any leases subject to a residual value guarantee. Future obligations for remaining leases payable as of June 30, 2022, are as follows:

<u>Fiscal Year Ending June 30</u>	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
2023	\$ 947,903	\$ 463,949	\$ 1,411,852
2024	982,720	427,093	1,409,813
2025	999,563	387,546	1,387,109
2026	922,429	236,724	1,159,153
2027	546,243	197,087	743,330
2028-2032	1,342,088	568,715	1,910,803
2033-2036	809,764	155,506	965,270
<b>Total Leases Payable</b>	<b>\$ 6,550,710</b>	<b>\$ 2,436,620</b>	<b>\$ 8,987,330</b>



### Compensated Absences Payable

Employees earn the right to be compensated during absences for annual leave (vacation) and sick leave earned pursuant to Board of Governors' Regulations, university regulations, and bargaining agreements. Leave earned is accrued to the credit of the employee and records are kept on each employee's unpaid (unused) leave balance. The university reports a liability for the accrued leave; however, State noncapital appropriations fund only the portion of accrued leave that is used or paid in the current fiscal year. Although the university expects the liability to be funded primarily from future appropriations, generally accepted accounting principles do not permit the recording of a receivable in anticipation of future appropriations. At June 30, 2022, the estimated liability for compensated absences, which includes the university's share of the Florida Retirement System and FICA contributions, totaled \$86,602,572. The current portion of the compensated absences liability, \$6,483,959, is the amount expected to be paid in the coming fiscal year and represents a historical percentage of leave used applied to total accrued leave liability.

### Other Postemployment Benefits Payable

As a participating employer in the State Employees' Group Health Insurance Plan, the university recognizes its proportionate share of the collective other postemployment benefits liability of the multiple-employer defined benefit health plan. As of June 30, 2022, the university's proportionate share of the total OPEB liability totaled \$202,495,049.

### Revenue Received in Advance

Long-term revenue received in advance represents funds received but not yet earned under the terms and conditions of auxiliary services contracts. Total long-term revenue received in advance at June 30, 2022, amounted to \$23,783,986, with \$2,823,448 expected to be earned during the 2022-23 fiscal year.

### Net Pension Liability

As a participating employer in the Florida Retirement System, the university recognizes its proportionate share of the collective net pension liabilities of the FRS cost-sharing multiple-employer defined benefit plans. As of June 30, 2022, the university's proportionate share of the net pension liabilities totaled \$129,987,494.

### Other Noncurrent Liabilities

Other noncurrent liabilities mainly consist of the Federal Capital Contribution (advance) provided to fund the university's Federal Perkins Loan Program, the university's share of Social Security taxes deferred under the Federal CARES Act enacted during the 2019-20 fiscal year, and financed purchase agreements. The advance amount totaling \$3,704,525 will ultimately be returned to the Federal Government should the university cease making Federal Perkins Loans or if the university has excess cash in the loan program. The balance of the deferred employer taxes, \$10,252,009, is due by December 31, 2022. The university has financed purchases related to direct borrowing agreements entered into for equipment totaling \$7,833,485 with stated interest rates ranging from zero to 3.295 percent. Direct borrowings are defined by GASB as debt obligations that have terms negotiated directly with a lender and are not offered for public sale. Future minimum payments under the agreements and the present value of the minimum payments as of June 30, 2022, are as follows:

Fiscal Year Ending June 30	Amount
2023	\$ 1,524,849
2024	1,483,704
2025	1,360,272
2026	1,360,272
2027	1,360,272
2028-2029	1,397,430
Total Minimum Payments	8,486,799
Less, Amount Representing Interest	653,314
<b>Present Value of Minimum Payments</b>	<b>\$ 7,833,485</b>

## 11. OTHER POSTEMPLOYMENT BENEFITS

### General Information about Other Postemployment Benefits

The university follows GASB Statement No. 75, *Accounting and Financial Reporting for Postemployment Benefits Other Than Pensions*, for certain postemployment healthcare benefits administered by the Florida Department of Management Services, Division of State Group Insurance.

### Other Postemployment Benefits Plan

*Plan Description* – The State Employees' Group Health Insurance Plan for other postemployment benefits is a multiple-employer defined benefit health plan (OPEB Plan). Pursuant to the provisions of Section 112.0801, Florida Statutes, all employees who retire from the university are eligible to participate in the OPEB Plan. Retirees and their eligible dependents shall be offered the same health and hospitalization insurance coverage as is offered to active employees at a premium cost of no more than the premium cost applicable to active employees. A retiree means

## NOTES TO FINANCIAL STATEMENTS

any officer or employee who retires under a State retirement system or State optional annuity or retirement program or is placed on disability retirement and who begins receiving retirement benefits immediately after retirement from employment. In addition, any officer or employee who retires under the Florida Retirement System Investment Plan is considered a “retiree” if he or she meets the age and service requirements to qualify for normal retirement or has attained the age of 59.5 years and has the years of service required for vesting. The university subsidizes the premium rates paid by retirees by allowing them to participate in the OPEB Plan at reduced or blended group (implicitly subsidized) premium rates for both active and retired employees. These rates provide an implicit subsidy for retirees because retiree healthcare costs are generally greater than active employee healthcare costs. No assets are accumulated in a trust that meet the criteria in paragraph 4 of GASB Statement No. 75. The OPEB Plan contribution requirements and benefit terms necessary for funding the OPEB Plan each year is on a pay-as-you-go basis as established by the Governor’s recommended budget and the General Appropriations Act. Retirees are required to enroll in the Federal Medicare program for their primary coverage as soon as they are eligible.

*Benefits Provided* – The OPEB Plan provides healthcare benefits for retirees and their dependents. The OPEB Plan only provides an implicit subsidy as described above.

### Proportionate Share of the Total OPEB Liability

The university’s proportionate share of the total OPEB liability of \$202.5 million was measured as of June 30, 2021, and was determined by an actuarial valuation as of July 1, 2020. At June 30, 2022, the university’s proportionate share, determined by its proportion of total benefit payments made, was 1.92 percent, which was an increase of 0.03 percent from its proportionate share reported as of June 30, 2021.

*Actuarial Assumptions and Other Inputs* – The total OPEB liability was determined using the following actuarial assumptions and other inputs, applied to all periods included in the measurement, unless otherwise specified:

- ◆ Inflation 2.60 percent
- ◆ Salary Increases Varies by FRS class
- ◆ Discount Rate 2.18 percent

Healthcare cost trend rates for the Preferred Provider Option (PPO) Plan and Health Maintenance Organization (HMO) Plan, respectively, are 7.95 and 6.02 percent for the 2021-22 fiscal year, increasing to a maximum rate of 8.19 and 6.02 percent in the 2023-24 fiscal year, and gradually decreasing to 4.04 percent after the 2074-75 fiscal year.

Retiree premium trend rates for both the PPO and HMO plans are 7.0 percent for the 2021-22 fiscal year, increasing to a maximum of 7.1 percent for 2023-24 fiscal year, and gradually decreasing to 4.0 percent for the 2075-76 and later fiscal years.

The discount rate was based on the 20-year Standard & Poor’s Municipal Bond Rate Index.

Mortality rates were based on the Pub-2010 mortality tables with fully generational improvement using Scale MP-2018.

The demographic actuarial assumptions for retirement, disability incidence, withdrawal, and salary scale used in the July 1, 2020, valuation were based on the 2019 Experience Study prepared by Milliman.

The remaining actuarial assumptions (e.g., initial per capita costs, health care cost trends, rate of plan participation, rates of plan election, etc.) used in the July 1, 2020, valuation were based on a review of recent plan experience done concurrently with the July 1, 2020, valuation.

The following changes have been made since the prior valuation:

- ◆ The discount rate was updated to utilize the mandated discount rate based on a 20-year Standard & Poor’s Municipal Bond Rate Index as of the measurement date, as required under GASB 75. The discount rate decreased from 2.66 percent to 2.18 percent.
- ◆ Retirement rates were updated based on those used in the actuarial valuation of the Florida Retirement System (FRS) conducted by Milliman as of July 1, 2019, with certain adjustments made to reflect the difference in the underlying populations. 60 percent of DSGI employees are assumed to become eligible for the Deferred Retirement Option Program (DROP), while the remaining 40 percent are assumed to participate in plans which do not offer DROP benefits. Rates were previously those used in Milliman’s actuarial valuation of FRS as of July 1, 2015. This change decreased the total OPEB liability by about 7 percent as of the valuation date.
- ◆ Termination rates were updated to those used in the actuarial valuation of the Florida Retirement System (FRS) conducted by Milliman as of July 1, 2019. Previously, rates were those used in Milliman’s actuarial valuation of FRS as of July 1, 2015. This change increased total OPEB liability by about 3 percent as of the valuation date.
- ◆ Disability rates were updated to those used in the actuarial valuation of the Florida Retirement System (FRS) conducted by Milliman as of July 1, 2019. Previously, rates were those used in Milliman’s actuarial valuation of FRS as of July 1, 2015. This change increased the total OPEB liability by about 0.5 percent as of the valuation date.
- ◆ Salary increase rates were updated to those used in the actuarial valuation of the Florida Retirement System (FRS) conducted by Milliman as of July 1, 2019. Previously, rates were those used in Milliman’s actuarial valuation of FRS as of July 1, 2015. This change increased the total OPEB liability by about 0.2 percent as of the valuation date.

- ◆ Most actively employed participants in the Plan are health plan subscribers. Those participants are assumed to continue their current health coverage into retirement at a rate of 47 percent. For those who are not currently covered under the health plan, 3.7 percent are assumed to elect medical coverage in retirement. The resulting overall participation rate is 43 percent. Previously, the overall participation rate was 50 percent. This assumption is based on guidance provided by the DSGI on June 23, 2021. This change resulted in an 8 percent decrease in the total OPEB liability as of the valuation date.

*Sensitivity of the University's Proportionate Share of the Total OPEB Liability to Changes in the Discount Rate* – The following table presents the university's proportionate share of the total OPEB liability, as well as what the university's proportionate share of the total OPEB liability would be if it were calculated using a discount rate that is 1 percentage-point lower (1.18 percent) or 1 percentage-point higher (3.18 percent) than the current rate:

	1% Decrease (1.18%)	Current Discount Rate (2.18%)	1% Increase (3.18%)
University's proportionate share of the total OPEB liability	\$ 242,712,496	\$ 202,495,049	\$ 171,343,971

*Sensitivity to the University's Proportionate Share of the Total OPEB Liability to Changes in the Healthcare Cost Trend Rates* – The following table presents the university's proportionate share of the total OPEB liability, as well as what the university's proportionate share of the total OPEB liability would be if it were calculated using healthcare cost trend rates that are 1 percentage-point lower or 1 percentage-point higher than the current healthcare cost trend rates:

	1% Decrease	Current Healthcare Cost Trend Rates	1% Increase
University's proportionate share of the total OPEB liability	\$ 163,943,028	\$ 202,495,049	\$ 253,889,173

#### **OPEB Expense and Deferred Outflows of Resources and Deferred Inflows of Resources Related to OPEB**

For the fiscal year ended June 30, 2022, the university recognized OPEB expense of \$8,572,556. At June 30, 2022, the university reported deferred outflows of resources and deferred inflows of resources related to OPEB from the following sources:

<b>Description</b>	<b>Deferred Outflows of Resources</b>	<b>Deferred Inflows of Resources</b>
Differences between expected and actual experience	\$ -	\$ 9,624,959
Changes of assumptions or other inputs	21,778,400	67,063,751
Changes in proportion and differences between university benefit payments and proportionate share of benefit payments	29,803,759	1,418,441
Transactions subsequent to the measurement date	3,613,695	-
<b>Total</b>	<b>\$ 55,195,854</b>	<b>\$ 78,107,151</b>

Of the total amount reported as deferred outflows of resources related to OPEB, \$3,613,695 resulting from transactions (e.g. benefit payments) subsequent to the measurement date and before the end of the fiscal year will be included as a reduction of the total OPEB liability and included in OPEB expense in the year ended June 30, 2023. Other amounts reported as deferred outflows of resources and deferred inflows of resources related to OPEB will be recognized in OPEB expense as follows:

<b>Fiscal Year Ending June 30</b>	<b>Amount</b>
2023	\$ (7,784,044)
2024	(7,784,044)
2025	(7,784,044)
2026	(4,062,025)
2027	(2,093,908)
Thereafter	2,983,073
<b>Total</b>	<b>\$ (26,524,992)</b>

## NOTES TO FINANCIAL STATEMENTS

**12. RETIREMENT PLANS - DEFINED BENEFIT PENSION PLANS****General Information about the Florida Retirement System**

The Florida Retirement System was created in Chapter 121, Florida Statutes, in order to provide a defined benefit pension plan for participating public employees. The FRS was amended in 1998 to add the Deferred Retirement Option Program (DROP) under the defined benefit plan and amended in 2000 to provide a defined contribution plan alternative to the defined benefit plan for FRS members effective July 1, 2002. This integrated defined contribution pension plan is the FRS Investment Plan. Chapter 121, Florida Statutes, also provides for nonintegrated, optional retirement programs in lieu of the FRS to certain members of the Senior Management Service Class (SMSC) employed by the State and faculty and specified employees in the State university system. Chapter 112, Florida Statutes, established the Retiree Health Insurance Subsidy (HIS) Program, a cost-sharing multiple-employer defined benefit pension plan to assist retired members of any State-administered retirement system in paying the costs of health insurance.

Essentially all regular employees of the university are eligible to enroll as members of the State-administered FRS. Provisions relating to the FRS are established by Chapters 121 and 122, Florida Statutes; Chapter 112, Part IV, Florida Statutes; Chapter 238, Florida Statutes; and Florida Retirement System Rules, Chapter 60S, Florida Administrative Code; wherein eligibility, contributions, and benefits are defined and described in detail. Such provisions may be amended at any time by further action from the Florida Legislature. The FRS is a single retirement system administered by the Florida Department of Management Services, Division of Retirement, and consists of two cost-sharing, multiple-employer defined benefit plans and other nonintegrated programs. An annual comprehensive financial report of the FRS, which includes its financial statements, required supplementary information, actuarial report, and other relevant information, is available from the Florida Department of Management Services website ([dms.myflorida.com](http://dms.myflorida.com)).

The university's pension expense for the FRS and HIS cost-sharing multiple-employer defined benefit plans totaled \$4,276,894 for the 2021-22 fiscal year.

**FRS Pension Plan**

*Plan Description* - The FRS Pension Plan (Plan) is a cost-sharing multiple-employer defined benefit pension plan, with a DROP for eligible employees. The general classes of membership are as follows:

- ◆ *Regular Class* – Members of the FRS who do not qualify for membership in the other classes.
- ◆ *Senior Management Service Class (SMSC)* – Members in senior management level positions.
- ◆ *Special Risk Class* – Members who are employed as law enforcement officers and meet the criteria to qualify for this class.

Employees enrolled in the Plan prior to July 1, 2011, vest at six years of creditable service and employees enrolled in the Plan on or after July 1, 2011, vest at eight years of creditable service. All vested members, enrolled prior to July 1, 2011, are eligible for normal retirement benefits at age 62 or at any age after 30 years of creditable service, except for members classified as special risk who are eligible for normal retirement benefits at age 55 or at any age after 25 years of creditable service. All members enrolled in the Plan on or after July 1, 2011, once vested, are eligible for normal retirement benefits at age 65 or any time after 33 years of creditable service, except for members classified as special risk who are eligible for normal retirement benefits at age 60 or at any age after 30 years of creditable service. Members of the Plan may include up to 4 years of credit for military service toward creditable service. The Plan also includes an early retirement provision; however, there is a benefit reduction for each year a member retires before his or her normal retirement date. The Plan provides retirement, disability, death benefits, and annual cost-of-living adjustments to eligible participants.

The Deferred Retirement Option Program, subject to provisions of Section 121.091, Florida Statutes, permits employees eligible for normal retirement under the Plan to defer receipt of monthly benefit payments while continuing employment with an FRS-participating employer. An employee may participate in DROP for a period not to exceed 60 months after electing to participate. During the period of DROP participation, deferred monthly benefits are held in the FRS Trust Fund and accrue interest. The net pension liability does not include amounts for DROP participants, as these members are considered retired and are not accruing additional pension benefits.

*Benefits Provided* - Benefits under the Plan are computed on the basis of age, and/or years of service, average final compensation, and credit service. Credit for each year of service is expressed as a percentage of the average final compensation. For members initially enrolled before July 1, 2011, the average final compensation is the average of the five highest fiscal years' earnings; for members initially enrolled on or after July 1, 2011, the average final compensation is the average of the eight highest fiscal years' earnings. The total percentage value of the benefit received is determined by calculating the total value of all service, which is based on retirement plan and/or the class to which the member belonged when the service credit was earned. Members are eligible for in-line-of-duty or regular disability and survivors' benefits. The following table shows the percentage value for each year of service credit earned:

<b>Class, Initial Enrollment, and Retirement Age/Years of Service</b>	<b>% Value</b>
<b>Regular Class members initially enrolled before July 1, 2011</b>	
Retirement up to age 62 or up to 30 years of service	1.60
Retirement at age 63 or with 31 years of service	1.63
Retirement at age 64 or with 32 years of service	1.65
Retirement at age 65 or with 33 years of service or more	1.68
<b>Regular Class members initially enrolled on or after July 1, 2011</b>	
Retirement up to age 65 or up to 33 years of service	1.60
Retirement at age 66 or with 34 years of service	1.63
Retirement at age 67 or with 35 years of service	1.65
Retirement at age 68 or with 36 or more years of service	1.68
<b>Senior Management Service Class</b>	2.00
<b>Special Risk Class</b>	3.00

As provided in Section 121.101, Florida Statutes, if the member was initially enrolled in the Plan before July 1, 2011, and all service credit was accrued before July 1, 2011, the annual cost-of-living adjustment is 3 percent per year. If the member was initially enrolled before July 1, 2011, and has service credit on or after July 1, 2011, there is an individually calculated cost-of-living adjustment. The annual cost-of-living adjustment is a proportion of 3 percent determined by dividing the sum of the pre-July 2011 service credit by the total service credit at retirement multiplied by 3 percent. Plan members initially enrolled on or after July 1, 2011, will not have a cost-of-living adjustment after retirement.

*Contributions* - The Florida Legislature establishes contribution rates for participating employers and employees. Contribution rates during the 2021-22 fiscal year were as follows:

<b>Class or Plan</b>	<b>Percent of Gross Salary</b>	
	<b>Employee</b>	<b>Employer (1)</b>
Florida Retirement System, Regular	3.00	10.82
Florida Retirement System, Senior Management Service	3.00	29.01
Florida Retirement System, Special Risk	3.00	25.89
Teachers' Retirement System, Plan E	6.25	13.56
Deferred Retirement Option Program - Applicable to		
Members from All of the Above Classes or Plan	0.00	18.34
Florida Retirement System, Reemployed Retiree	(2)	(2)

(1) Employer rates include 1.66 percent for the postemployment health insurance subsidy. Also, employer rates, other than for DROP participants, include .06 percent for administrative costs of the Investment Plan.

(2) Contribution rates are dependent upon retirement class in which reemployed.

The university's contributions to the Plan totaled \$31,477,108 for the fiscal year ended June 30, 2022.

*Pension Liabilities, Pension Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions* - At June 30, 2022, the university reported a liability of \$54,350,905 for its proportionate share of the net pension liability. The net pension liability was measured as of June 30, 2021, and the total pension liability used to calculate the net pension liability was determined by an actuarial valuation as of July 1, 2021. The university's proportionate share of the net pension liability was based on the university's 2020-21 fiscal year contributions relative to the total 2020-21 fiscal year contributions of all participating members. At June 30, 2021, the university's proportion was 0.72 percent, which was a decrease of 0.02 from its proportionate share measured as of June 30, 2020.

**NOTES TO FINANCIAL STATEMENTS**

For the fiscal year ended June 30, 2022, the university recognized a credit adjustment to pension expense of \$695,969. In addition, the university reported deferred outflows of resources and deferred inflows of resources related to pensions from the following sources:

Description	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$ 9,315,832	\$ -
Changes of assumptions	37,189,584	-
Net difference between projected and actual earnings on pension plan investments	-	189,616,646
Changes in proportion and differences between university contributions and proportionate share of contributions	3,406,670	8,780,886
University contributions subsequent to the measurement date	31,477,108	-
<b>Total</b>	<b>\$ 81,389,194</b>	<b>\$ 198,397,532</b>

The deferred outflows of resources totaling \$31,477,108, resulting from university contributions subsequent to the measurement date, will be recognized as a reduction of the net pension liability in the fiscal year ending June 30, 2023. Other amounts reported as deferred outflows of resources and deferred inflows of resources related to pensions will be recognized in pension expense as follows:

Fiscal Year Ending June 30	Amount
2023	\$ (26,017,150)
2024	(30,170,719)
2025	(40,201,712)
2026	(51,646,097)
2027	(449,768)
Thereafter	-
<b>Total</b>	<b>\$ (148,485,446)</b>

*Actuarial Assumptions* - The total pension liability in the July 1, 2021 actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

- ◆ Inflation 2.40 percent
- ◆ Salary Increases 3.25 percent, average, including inflation
- ◆ Investment Rate of Return 6.80 percent, net of Plan investment expense, including inflation

Mortality rates were based on the PUB-2010 base table, projected generationally with Scale MP-2018.

The actuarial assumptions used in the July 1, 2021 valuation were based on the results of an actuarial experience study for the period July 1, 2013, through June 30, 2018.

The long-term expected rate of return on Plan investments was not based on historical returns, but instead is based on a forward-looking capital market economic model. The allocation policy's description of each asset class was used to map the target allocation to the asset classes shown below. Each asset class assumption is based on a consistent set of underlying assumptions, and includes an adjustment for the inflation assumption. The target allocation and best estimates of arithmetic and geometric real rates of return for each major asset class are summarized in the following table:

Asset Class	Target Allocation (1)	Annual Arithmetic Return	Annual Geometric Return	Standard Deviation
Cash	1.0%	2.1%	2.1%	1.1%
Fixed Income	20.0%	3.8%	3.7%	3.3%
Global Equity	54.2%	8.2%	6.7%	17.8%
Real Estate (Property)	10.3%	7.1%	6.2%	13.8%
Private Equity	10.8%	11.7%	8.5%	26.4%
Strategic Investments	3.7%	5.7%	5.4%	8.4%
<b>Total</b>	<b>100.0%</b>			
Assumed Inflation - Mean			2.4%	1.2%

(1) As outlined in the Plan's investment policy

*Discount Rate* - The discount rate used to measure the total pension liability was 6.80 percent. The Plan's fiduciary net position was projected to be available to make all projected future benefit payments of current active and inactive employees. Therefore, the discount rate for calculating the total pension liability is equal to the long-term expected rate of return. The discount rate used in the 2021 valuation remained unchanged from the prior valuation.

*Sensitivity of the University's Proportionate Share of the Net Pension Liability to Changes in the Discount Rate* - The following presents the university's proportionate share of the net pension liability calculated using the discount rate of 6.80 percent, as well as what the university's proportionate share of the net pension liability would be if it were calculated using a discount rate that is 1 percentage-point lower (5.80 percent) or 1 percentage-point higher (7.80 percent) than the current rate:

	1% Decrease (5.80%)	Current Discount Rate (6.80%)	1% Increase (7.80%)
University's proportionate share of the net pension liability	\$ 243,060,889	\$ 54,350,905	\$ (103,389,482)

*Pension Plan Fiduciary Net Position* - Detailed information about the Plan's fiduciary net position is available in the separately issued FRS Pension Plan and Other State Administered Systems Annual Comprehensive Financial Report.

### HIS Pension Plan

*Plan Description* - The HIS Pension Plan (HIS Plan) is a cost-sharing multiple-employer defined benefit pension plan established under Section 112.363, Florida Statutes, and may be amended by the Florida Legislature at any time. The benefit is a monthly payment to assist retirees of State-administered retirement systems in paying their health insurance costs and is administered by the Florida Department of Management Services, Division of Retirement.

*Benefits Provided* - For the fiscal year ended June 30, 2022, eligible retirees and beneficiaries received a monthly HIS payment of \$5 for each year of creditable service completed at the time of retirement with a minimum HIS payment of \$30 and a maximum HIS payment of \$150 per month, pursuant to Section 112.363, Florida Statutes. To be eligible to receive a HIS Plan benefit, a retiree under a State-administered retirement system must provide proof of health insurance coverage, which can include Medicare.

*Contributions* - The HIS Plan is funded by required contributions from FRS participating employers as set by the Florida Legislature. Employer contributions are a percentage of gross compensation for all active FRS members. For the fiscal year ended June 30, 2022, the contribution rate was 1.66 percent of payroll pursuant to section 112.363, Florida Statutes. The university contributed 100 percent of its statutorily required contributions for the current and preceding three years. HIS Plan contributions are deposited in a separate trust fund from which HIS payments are authorized. HIS Plan benefits are not guaranteed and are subject to annual legislative appropriation. In the event the legislative appropriation or available funds fail to provide full subsidy benefits to all participants, benefits may be reduced or canceled.

The university's contributions to the HIS Plan totaled \$3,646,684 for the fiscal year ended June 30, 2022.

*Pension Liabilities, Pension Expense, and Deferred Outflows of Resources and Deferred Inflows of Resources Related to Pensions* - At June 30, 2022, the university reported a liability of \$75,636,589 for its proportionate share of the net pension liability. The current portion of the net pension liability is the university's proportionate share of benefit payments expected to be paid within one year, net of the university's proportionate share of the HIS Plan's fiduciary net position available to pay that amount. The net pension liability was measured as of June 30, 2021, and the total pension liability used to calculate the net pension liability was determined by an actuarial valuation as of July 1, 2020. The university's proportionate share of the net pension liability was based on the university's 2020-21 fiscal year contributions relative to the total 2020-21 fiscal year contributions of all participating members. At June 30, 2021, the university's proportion was 0.62 percent, which was a decrease of 0.01 from its proportionate share measured as of June 30, 2020.

For the fiscal year ended June 30, 2022, the university recognized pension expense of \$4,972,863. In addition, the university reported deferred outflows of resources and deferred inflow of resources related to pensions from the following sources:

Description	Deferred Outflows of Resources	Deferred Inflows of Resources
Differences between expected and actual experience	\$ 2,530,991	\$ 31,680
Changes of assumptions	5,943,343	3,116,420
Net difference between projected and actual earnings on HIS Plan investments	78,849	-
Changes in proportion and differences between university contributions and proportionate share of contributions	279,665	3,320,450
University contributions subsequent to the measurement date	3,646,684	-
<b>Total</b>	<b>\$ 12,479,532</b>	<b>\$ 6,468,550</b>

**NOTES TO FINANCIAL STATEMENTS**

The deferred outflows of resources totaling \$3,646,684 was related to pensions resulting from university contributions subsequent to the measurement date and will be recognized as a reduction of the net pension liability in the fiscal year ending June 30, 2023. Other amounts reported as deferred outflows and deferred inflows of resources of resources related to pensions will be recognized in pension expense as follows:

Fiscal Year Ending June 30	Amount
2023	\$ 927,097
2024	(166,325)
2025	375,013
2026	775,842
2027	431,730
Thereafter	20,941
<b>Total</b>	<b>\$ 2,364,298</b>

*Actuarial Assumptions* - The total pension liability in the July 1, 2020 actuarial valuation was determined using the following actuarial assumptions, applied to all periods included in the measurement:

- ◆ Inflation 2.40 percent
- ◆ Salary Increases 3.25 percent, average, including inflation
- ◆ Municipal Bond Rate 2.16 percent

Mortality rates were based on the PUB-2010 base table, projected generationally with Scale MP-2018.

While an experience study had not been completed for the HIS Plan, the actuarial assumptions that determined the total pension liability for the HIS Plan were based on certain results of the most recent experience study for the FRS Plan.

*Discount Rate* - The discount rate used to measure the total pension liability was 2.16 percent. In general, the discount rate for calculating the total pension liability is equal to the single rate equivalent to discounting at the long-term expected rate of return for benefit payments prior to the projected depletion date. Because the HIS benefit is essentially funded on a pay-as-you-go basis, the depletion date is considered to be immediate, and the single equivalent discount rate is equal to the municipal bond rate selected by the plan sponsor. The Bond Buyer General Obligation 20-Bond Municipal Bond Index was adopted as the applicable municipal bond index. The discount rate used in the 2021 valuation was updated from 2.21 percent to 2.16 percent.

*Sensitivity of the University's Proportionate Share of the Net Pension Liability to Changes in the Discount Rate* - The following presents the university's proportionate share of the net pension liability calculated using the discount rate of 2.16 percent, as well as what the university's proportionate share of the net pension liability would be if it were calculated using a discount rate that is 1 percentage-point lower (1.16 percent) or 1 percentage-point higher (3.16 percent) than the current rate:

	1% Decrease (1.16%)	Current Discount Rate (2.16%)	1% Increase (3.16%)
University's proportionate share of the net pension liability	\$ 87,443,223	\$ 75,636,589	\$ 65,963,692

*Pension Plan Fiduciary Net Position* - Detailed information about the HIS Plan's fiduciary net position is available in the separately issued FRS Pension Plan and Other State Administered Annual Comprehensive Financial Report.



### 13. RETIREMENT PLANS - DEFINED CONTRIBUTION PENSION PLANS

#### FRS Investment Plan

The SBA administers the defined contribution plan officially titled the FRS Investment Plan (Investment Plan). The Investment Plan is reported in the SBA's annual financial statements and in the State's Annual Comprehensive Financial Report.

As provided in Section 121.4501, Florida Statutes, eligible FRS members may elect to participate in the Investment Plan in lieu of the FRS defined benefit plan. University employees already participating in the State University System Optional Retirement Program or DROP are not eligible to participate in this program. Employer and employee contributions are defined by law, but the ultimate benefit depends in part on the performance of investment funds. Service retirement benefits are based upon the value of the member's account upon retirement. Benefit terms, including contribution requirements, are established and may be amended by the Florida Legislature. The Investment Plan is funded with the same employer and employee contributions, that are based on salary and membership class (Regular Class, Senior Management Service Class, etc.), as the FRS defined benefit plan. Contributions are directed to individual member accounts, and the individual members allocate contributions and account balances among various approved investment choices. Costs of administering the Investment Plan, including the FRS Financial Guidance Program, are funded through an employer contribution of 0.06 percent of payroll and by forfeited benefits of Investment Plan members. Allocations to the Investment Plan member accounts during the 2021-22 fiscal year were as follows:

Class or Plan	Percent of Gross Compensation
Florida Retirement System, Regular	6.30
Florida Retirement System, Senior Management Service	7.67
Florida Retirement System, Special Risk	14.00

For all membership classes, employees are immediately vested in their own contributions and are vested after one year of service for employer contributions and investment earnings regardless of membership class. If an accumulated benefit obligation for service credit originally earned under the FRS Pension Plan is transferred to the FRS Investment Plan, the member must have the years of service required for FRS Pension Plan vesting (including the service credit represented by the transferred funds) to be vested for these funds and the earnings on the funds. Nonvested employer contributions are placed in a suspense account for up to five years. If the employee returns to FRS-covered employment within the five-year period, the employee will regain control over their account. If the employee does not return within the five-year period, the employee will forfeit the accumulated account balance. For the fiscal year ended June 30, 2022, the information for the amount of forfeitures was unavailable from the SBA; however, management believes that these amounts, if any, would be immaterial to the university.

After termination and applying to receive benefits, the member may roll over vested funds to another qualified plan, structure a periodic payment under the Investment Plan, receive a lump-sum distribution, leave the funds invested for future distribution, or any combination of these options. Disability coverage is provided in which the member may either transfer the account balance to the FRS Pension Plan when approved for disability retirement to receive guaranteed lifetime monthly benefits under the FRS Pension Plan, or remain in the Investment Plan and rely upon that account balance for retirement income.

The university's contributions to the Investment Plan totaled \$6,220,137 and employee contributions totaled \$1,693,497 for the 2021-22 fiscal year.

#### State University System Optional Retirement Program

Section 121.35, Florida Statutes, provides for an Optional Retirement Program (ORP) for eligible university instructors and administrators. The ORP is designed to aid State universities in recruiting employees by offering more portability to employees not expected to remain in the FRS for eight or more years.

The ORP is a defined contribution plan, which provides full and immediate vesting of all contributions submitted to the participating companies on behalf of the participant. Employees in eligible positions can make an irrevocable election to participate in the ORP, rather than the FRS, and purchase retirement and death benefits through contracts provided by certain insurance carriers. The employing university contributes 5.14 percent of the participant's salary to the participant's account, 4.19 percent to cover the unfunded actuarial liability of the FRS pension plan, and 0.01 percent to cover administrative costs, for a total of 9.34 percent, and employees contribute 3 percent of the employee's salary. Additionally, the employee may contribute, by payroll deduction, an amount not to exceed the percentage contributed by the university to the participant's annuity account. The contributions are invested in the company or companies selected by the participant to create a fund for the purchase of annuities at retirement.

The university's contributions to the ORP totaled \$26,446,812 and employee contributions totaled \$13,812,870 for the 2021-22 fiscal year.

**NOTES TO FINANCIAL STATEMENTS****14. CONSTRUCTION COMMITMENTS**

The university's construction commitments at June 30, 2022, were as follows:

<b>Project Description</b>	<b>Total Commitment</b>	<b>Completed to Date</b>	<b>Committed Balance</b>
Legacy Hall, College of Business	\$ 134,000,000	\$ 2,729,248	\$ 131,270,752
Interdisciplinary Research Commercialization Building	130,000,000	4,792,504	125,207,496
Academic Health Center	125,000,000	-	125,000,000
Kellogg Building	57,450,000	-	57,450,000
Doak Campbell Structural Improvements	20,000,000	-	20,000,000
Tucker Center Deferred Maintenance	20,000,000	-	20,000,000
National High Magnetic Field Lab Electrical Expansion	16,440,017	146,871	16,293,146
Student Union Finalization	16,138,105	-	16,138,105
Biology Unit I Research Facility	15,813,247	-	15,813,247
Doak Campbell DAS Installation	11,000,000	-	11,000,000
Other (1)	215,256,293	13,597,031	201,659,262
<b>Total</b>	<b>\$ 761,097,662</b>	<b>\$ 21,265,654</b>	<b>\$ 739,832,008</b>

(1) All other projects with committed balances less than \$5 million.

**15. RISK MANAGEMENT PROGRAMS**

The university is exposed to various risks of loss related to torts; theft of, damage to, and destruction of assets; errors and omissions; injuries to employees; and natural disasters. Pursuant to Section 1001.72(2), Florida Statutes, the university participates in State self-insurance programs providing insurance for property and casualty, workers' compensation, general liability, fleet automotive liability, Federal Civil Rights, and employment discrimination liability. During the 2021-22 fiscal year, for property losses, the State retained the first \$2 million per occurrence for all perils except named windstorm and flood. The State retained the first \$2 million per occurrence with an annual aggregate retention of \$40 million for named windstorm and flood losses. After the annual aggregate retention, losses in excess of \$2 million per occurrence were commercially insured up to \$57.5 million for named windstorm and flood through February 14, 2022, and decreased to \$56.3 million starting February 15, 2022. For perils other than named windstorm and flood, losses in excess of \$2 million per occurrence were commercially insured up to \$167.5 million through February 14, 2022, and increased to \$168.7 million beginning February 15, 2022; and losses exceeding those amounts were retained by the State. No excess insurance coverage is provided for workers' compensation, general and automotive liability, Federal Civil Rights and employment action coverage; all losses in these categories are completely self-insured by the State through the State Risk Management Trust Fund established pursuant to Chapter 284, Florida Statutes. Payments on tort claims are limited to \$200,000 per person, and \$300,000 per occurrence as set by Section 768.28(5), Florida Statutes. Calculation of premiums considers the cash needs of the program and the amount of risk exposure for each participant. Settlements have not exceeded insurance coverage during the past three fiscal years.

Pursuant to Section 110.123, Florida Statutes, university employees may obtain healthcare services through participation in the State group health insurance plan or through membership in a health maintenance organization plan under contract with the State. The State's risk financing activities associated with State group health insurance, such as risk of loss related to medical and prescription drug claims, are administered through the State Employees Group Health Insurance Trust Fund. It is the practice of the State not to purchase commercial coverage for the risk of loss covered by this Fund. Additional information on the State's group health insurance plan, including the actuarial report, is available from the Florida Department of Management Services, Division of State Group Insurance.

**University Self-Insurance Program**

The Florida State University College of Medicine Self-Insurance Program was established pursuant to Section 1004.24, Florida Statutes on July 1, 2006. The Self-Insurance Program provides professional and general liability protection for the Florida State University Board of Trustees for claims and actions arising from the clinical activities of the College of Medicine faculty, staff and resident physicians. This includes the faculty and staff of the College of Nursing, effective July 1, 2009, and the faculty and staff of the Student Health Center, effective July 1, 2010. Liability protection is afforded to the students of each college. The Self-Insurance Program provides legislative claims bill protection.

The university is protected for losses that are subject to Section 768.28, Florida Statutes, to the extent of the waiver of sovereign immunity as described in Section 768.28(5), Florida Statutes. The Self-Insurance Program also provides \$1,000,000 per legislative claims bills inclusive of payments made pursuant to Section 768.28, Florida Statutes; \$250,000 per occurrence of protection for the participants that are not subject to the provisions of Section 768.28, Florida Statutes; \$250,000 per claim protection for participants who engage in approved community service and act as Good Samaritans; and student protections of \$200,000 for a claim arising from an occurrence for any one person, \$300,000 for all claims arising from an occurrence and professional liability required by a hospital or other healthcare facility for educational purposes not to exceed a per occurrence limit of \$1,000,000.

The Self-Insurance Program's estimated liability for unpaid claims at fiscal year-end is the result of management and actuarial analysis and includes an amount for claims that have been incurred but not reported. Changes in the balances of claims liability for the Self-Insurance Program during the 2021-22 fiscal year are presented in the following table:

<b>Fiscal Year</b>	<b>Claims Liabilities Beginning of Year</b>	<b>Current Claims/ Changes in Estimates</b>	<b>Claims Payments</b>	<b>Claims Liabilities End of Year</b>
2020-21	\$ 435,055	\$ 35,334	\$ -	\$ 470,389
2021-22	470,389	31,766	(6,553)	495,602

## 16. FUNCTIONAL DISTRIBUTION OF OPERATING EXPENSES

The functional classification of an operating expense (instruction, research, etc.) is assigned to a department based on the nature of the activity, which represents the material portion of the activity attributable to the department. For example, activities of academic departments for which the primary departmental function is instruction may include some activities other than direct instruction such as research and public service. However, when the primary mission of the department consists of instructional program elements, all expenses of the department are reported under the instruction classification. The operating expenses on the statement of revenues, expenses, and changes in net position are presented by natural classifications. The following are those same expenses presented in functional classifications as recommended by NACUBO:

<b>Functional Classification</b>	<b>Amount</b>
Instruction	\$ 438,262,692
Research	199,716,820
Public Service	75,220,087
Academic Support	149,934,773
Student Services	69,387,672
Institutional Support	99,779,055
Operation and Maintenance of Plant	78,230,985
Scholarships and Fellowships	172,536,961
Depreciation	95,563,076
Auxiliary Enterprises	133,393,849
<b>Total Operating Expenses</b>	<b>\$ 1,512,025,970</b>

## NOTES TO FINANCIAL STATEMENTS

## 17. SEGMENT INFORMATION

A segment is defined as an identifiable activity (or grouping of activities) that has one or more bonds or other debt instruments outstanding with a revenue stream pledged in support of that debt. In addition, the activity's related revenues, expenses, gains, losses, assets, and liabilities are required to be accounted for separately. The following financial information for the university's Parking and Housing facilities represents identifiable activities for which one or more bonds are outstanding:

**Condensed Statement of Net Position**

	<u>Parking Facility</u>	<u>Housing Facility</u>
<b>Assets</b>		
Current Assets	\$ 10,432,255	\$ 74,269,479
Capital Assets, Net	61,697,057	264,694,681
Other Noncurrent Assets	3,551,207	13,565,237
<b>Total Assets</b>	<b>75,680,519</b>	<b>352,529,397</b>
<b>Liabilities</b>		
Current Liabilities	3,439,150	14,940,869
Noncurrent Liabilities	10,723,448	133,388,316
<b>Total Liabilities</b>	<b>14,162,598</b>	<b>148,329,185</b>
<b>Net Position</b>		
Net Investment in Capital Assets	47,850,320	121,795,412
Restricted - Expendable	3,544,035	12,560,728
Unrestricted	10,123,566	69,844,072
<b>Total Net Position</b>	<b>\$ 61,517,921</b>	<b>\$ 204,200,212</b>

**Condensed Statement of Revenues, Expenses, and Changes in Net Position**

Operating Revenues	\$ 12,457,624	\$ 49,425,586
Depreciation Expense	(1,944,106)	(8,509,752)
Other Operating Expenses	(7,771,230)	(23,122,334)
Operating Income	2,742,288	17,793,500
Net Nonoperating Revenues (Expenses)	606,879	(8,950,477)
Increase (Decrease) in Net Position	3,349,167	8,843,023
Net Position, Beginning of Year	58,168,754	195,357,189
<b>Net Position, End of Year</b>	<b>\$ 61,517,921</b>	<b>\$ 204,200,212</b>

**Condensed Statement of Cash Flows**

Net Cash Provided (Used) by:		
Operating Activities	\$ 4,553,671	\$ 26,845,931
Noncapital Financing Activities	8,280	100,000
Capital and Related Financing Activities	(4,373,361)	(15,660,875)
Investing Activities	(199,061)	(10,837,008)
<b>Net Increase (Decrease) in Cash and Cash Equivalents</b>	<b>(10,471)</b>	<b>448,048</b>
Cash and Cash Equivalents, Beginning of Year	45,108	97,370
<b>Cash and Cash Equivalents, End of Year</b>	<b>\$ 34,637</b>	<b>\$ 545,418</b>

## 18. DISCRETELY PRESENTED COMPONENT UNITS

The university has twelve component units as discussed in note 1. These component units comprise 100 percent of the transactions and account balances of the aggregate discretely presented component units' columns of the financial statements.

	Foundation 6/30/22	Boosters 6/30/22	Research Foundation 6/30/22	International Programs Association 9/30/21	Florida State University Schools 6/30/22	Other Component Units 6/30/22	Total
<b>Condensed Statement of Net Position</b>							
<b>Assets:</b>							
Current Assets	\$ 51,201,198	\$ 36,996,178	\$ 161,278,109	\$ 11,471,641	\$ 16,732,684	\$ 23,433,636	\$ 301,113,446
Capital Assets, Net	5,238,616	178,752,552	13,215,315	32,184,430	33,157,716	12,078,868	274,627,497
Other Noncurrent Assets	884,478,737	140,532,929	63,716,961	440,131	-	9,420,029	1,098,588,787
<b>Total Assets</b>	<b>940,918,551</b>	<b>356,281,659</b>	<b>238,210,385</b>	<b>44,096,202</b>	<b>49,890,400</b>	<b>44,932,533</b>	<b>1,674,329,730</b>
<b>Deferred Outflows of Resources</b>	<b>-</b>	<b>1,292,798</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1,292,798</b>
<b>Liabilities:</b>							
Current Liabilities	2,906,327	37,331,906	20,419,078	2,390,107	1,126,424	7,959,259	72,133,101
Noncurrent Liabilities	7,500,007	164,039,689	49,339,495	366,432	5,611,625	17,635,112	244,492,360
<b>Total Liabilities</b>	<b>10,406,334</b>	<b>201,371,595</b>	<b>69,758,573</b>	<b>2,756,539</b>	<b>6,738,049</b>	<b>25,594,371</b>	<b>316,625,461</b>
<b>Deferred Inflows of Resources</b>	<b>11,363,423</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>4,959,098</b>	<b>16,322,521</b>
<b>Net Position:</b>							
Net Investment in Capital Assets	2,588,513	21,897,825	7,382,415	32,184,430	27,689,401	417,088	92,159,672
Restricted, Nonexpendable	494,548,528	50,534,802	-	-	-	1,920,889	547,004,219
Restricted, Expendable	394,729,946	95,888,725	48,482,500	-	6,547,685	1,639,277	547,288,133
Unrestricted	27,281,807	(12,118,490)	112,586,897	9,155,233	8,915,265	10,401,810	156,222,522
<b>Total Net Position</b>	<b>\$ 919,148,794</b>	<b>\$ 156,202,862</b>	<b>\$ 168,451,812</b>	<b>\$ 41,339,663</b>	<b>\$ 43,152,351</b>	<b>\$ 14,379,064</b>	<b>\$ 1,342,674,546</b>
<b>Condensed Statement of Revenues, Expenses, and Changes in Net Position</b>							
Operating Revenues	\$ 34,373,529	\$ 45,854,894	\$ 15,063,750	\$ 14,070,553	\$ 19,512,321	\$ 14,092,147	\$ 142,967,194
Operating Expenses	55,758,404	61,773,290	14,115,979	13,227,248	14,056,741	15,448,647	174,380,309
Operating Income (Loss)	(21,384,875)	(15,918,396)	947,771	843,305	5,455,580	(1,356,500)	(31,413,115)
Net Nonoperating Revenues (Expenses)	(12,418,265)	(6,923,826)	(14,558,719)	328,085	(600,102)	3,492,131	(30,680,696)
Other Revenues, Expenses, Gains, and Losses	22,721,199	10,137,204	-	-	-	-	32,858,403
<b>Increase (Decrease) in Net Position</b>	<b>(11,081,941)</b>	<b>(12,705,018)</b>	<b>(13,610,948)</b>	<b>1,171,390</b>	<b>4,855,478</b>	<b>2,135,631</b>	<b>(29,235,408)</b>
Net Position, Beginning of Year	930,230,735	168,907,880	182,062,760	40,168,273	38,296,873	12,243,433	1,371,909,954
<b>Net Position, End of Year</b>	<b>\$ 919,148,794</b>	<b>\$ 156,202,862</b>	<b>\$ 168,451,812</b>	<b>\$ 41,339,663</b>	<b>\$ 43,152,351</b>	<b>\$ 14,379,064</b>	<b>\$ 1,342,674,546</b>

## 19. SUBSEQUENT EVENTS

On September 27, 2022, the university received a \$47,653,519 distribution from the sale of Florida State University Mandatory Student Facility Fee Revenue Bonds, Series 2022A with a par value of \$44,695,000. The proceeds from this debt will be used to finance a portion of the cost of constructing the new student union on the main campus of the university and the demolition of the prior student union which was located on the site. The Revenue Bonds are secured by a pledge of the university's student facilities fee revenue.

# OTHER REQUIRED SUPPLEMENTARY INFORMATION

## SCHEDULE OF THE UNIVERSITY'S PROPORTIONATE SHARE OF THE NET PENSION LIABILITY - FLORIDA RETIREMENT SYSTEM PENSION PLAN

Description	2021 (1)	2020 (1)
University's proportion of the FRS net pension liability	0.72%	0.74%
University's proportionate share of the FRS net pension liability	\$ 54,350,905	\$ 320,415,160
University's covered payroll (2)	\$ 495,343,167	\$ 503,662,186
University's proportion of the FRS net pension liability as a percentage of its covered payroll	10.97%	63.62%
FRS Plan fiduciary net position as a percentage of the FRS total pension liability	96.40%	78.85%

## SCHEDULE OF UNIVERSITY CONTRIBUTIONS - FLORIDA RETIREMENT SYSTEM PENSION PLAN

Description	2022 (1)	2021 (1)
Contractually required FRS contribution	\$ 31,477,108	\$ 27,410,274
FRS contributions in relation to the contractually required FRS contribution	(31,477,108)	(27,410,274)
Contribution deficiency (excess)	\$ -	\$ -
University's covered payroll (2)	\$ 499,362,101	\$ 495,343,167
FRS contributions as a percentage of covered payroll	6.30%	5.53%

*Changes of assumptions* - In 2021, the maximum amortization period was decreased to 20 years for all current and future amortization bases.

## SCHEDULE OF THE UNIVERSITY'S PROPORTIONATE SHARE OF THE NET PENSION LIABILITY - HEALTH INSURANCE SUBSIDY PENSION PLAN

Description	2021 (1)	2020 (1)
University's proportion of the HIS net pension liability	0.62%	0.63%
University's proportionate share of the HIS net pension liability	\$ 75,636,589	\$ 77,489,534
University's covered payroll (3)	\$ 217,109,222	\$ 218,367,106
University's proportion of the HIS net pension liability as a percentage of its covered payroll	34.84%	35.49%
HIS Plan fiduciary net position as a percentage of the HIS total pension liability	3.56%	3.00%

## SCHEDULE OF UNIVERSITY CONTRIBUTIONS - HEALTH INSURANCE SUBSIDY PENSION PLAN

Description	2022 (1)	2021 (1)
Contractually required HIS contribution	\$ 3,646,684	\$ 3,624,444
HIS contributions in relation to the contractually required HIS contribution	(3,646,684)	(3,624,444)
Contribution deficiency (excess)	\$ -	\$ -
University's covered payroll (3)	\$ 216,243,489	\$ 217,109,222
HIS contributions as a percentage of covered payroll	1.69%	1.67%

*Changes of assumptions* - The 20-year municipal bond rate used to determine total pension liability decreased from 2.21 percent to 2.16 percent.

## SCHEDULE OF THE UNIVERSITY'S PROPORTIONATE SHARE OF THE TOTAL OTHER POSTEMPLOYMENT BENEFITS LIABILITY

Description	2021 (1)	2020 (1)
University's proportion of the total other postemployment benefits liability	1.92%	1.89%
University's proportionate share of the total other postemployment benefits liability	\$ 202,495,049	\$ 194,892,613
University's covered payroll	\$ 495,343,167	\$ 503,662,186
University's proportionate share of the total other postemployment benefits liability as a percentage of its covered payroll	40.88%	38.70%

No assets are accumulated in a trust that meet the criteria in paragraph 4 of GASB Statement No. 75 to pay related benefits. The university's June 30, 2022 proportionate share of the total OPEB liability increased from the prior fiscal year as a result of changes to assumptions as discussed below:

*Changes of assumptions* - In 2022, amounts reported as changes of assumptions resulted from adjustments to the discount rate which is based on the 20-year municipal bond rate as of June 30, 2021, as well as updated retirement, termination, disability and salary scale increase rates and an updated retiree medical election percentage. The municipal bond rate used to determine OPEB liability decreased from 2.66 percent to 2.18 percent.

Notes: (1) The amounts presented for each fiscal year were determined as of June 30.

(2) Covered payroll includes defined benefit plan actives, investment plan members, State University System optional retirement program members, and members in DROP because total employer contributions are determined on a uniform basis (blended rate) as required by Part III of Chapter 121, Florida Statutes.

(3) Covered payroll includes defined benefit plan actives, investment plan members, and members in DROP.

	2019 (1)	2018 (1)	2017 (1)	2016 (1)	2015 (1)	2014 (1)	2013 (1)
	0.76%	0.75%	0.72%	0.72%	0.72%	0.70%	0.55%
\$	262,063,652	\$ 225,130,592	\$ 212,443,411	\$ 181,310,252	\$ 93,262,711	\$ 42,528,294	\$ 94,644,224
\$	482,527,134	\$ 455,890,734	\$ 438,212,856	\$ 423,172,345	\$ 407,099,915	\$ 389,854,458	\$ 368,648,639
	54.31%	49.38%	48.48%	42.85%	22.91%	10.91%	25.67%
	82.61%	84.26%	83.89%	84.88%	92.00%	96.09%	88.54%

	2020 (1)	2019 (1)	2018 (1)	2017 (1)	2016 (1)	2015 (1)	2014 (1)
\$	24,563,022	\$ 23,595,217	\$ 21,301,230	\$ 18,696,925	\$ 17,510,994	\$ 17,604,243	\$ 15,267,633
	(24,563,022)	(23,595,217)	(21,301,230)	(18,696,925)	(17,510,994)	(17,604,243)	(15,267,633)
\$	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$	503,662,186	\$ 482,527,134	\$ 455,890,734	\$ 438,212,856	\$ 423,172,345	\$ 407,099,915	\$ 389,854,458
	4.88%	4.89%	4.67%	4.27%	4.14%	4.32%	3.92%

	2019 (1)	2018 (1)	2017 (1)	2016 (1)	2015 (1)	2014 (1)	2013 (1)
	0.65%	0.65%	0.65%	0.66%	0.65%	0.64%	0.62%
\$	72,784,363	\$ 68,540,176	\$ 69,890,112	\$ 76,700,313	\$ 66,652,215	\$ 59,936,732	\$ 54,347,452
\$	216,222,787	\$ 209,298,557	\$ 206,288,311	\$ 201,302,795	\$ 196,319,296	\$ 188,768,602	\$ 179,775,016
	33.66%	32.75%	33.88%	38.10%	33.95%	31.75%	30.23%
	2.63%	2.15%	1.64%	0.97%	0.50%	0.99%	1.78%

	2020 (1)	2019 (1)	2018 (1)	2017 (1)	2016 (1)	2015 (1)	2014 (1)
\$	3,657,181	\$ 3,612,160	\$ 3,511,821	\$ 3,459,247	\$ 3,373,247	\$ 2,498,290	\$ 2,195,911
	(3,657,181)	(3,612,160)	(3,511,821)	(3,459,247)	(3,373,247)	(2,498,290)	(2,195,911)
\$	-	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
\$	218,367,106	\$ 216,222,787	\$ 209,298,557	\$ 206,288,311	\$ 201,302,795	\$ 196,319,296	\$ 188,768,602
	1.67%	1.67%	1.68%	1.68%	1.68%	1.27%	1.16%

	2019 (1)	2018 (1)	2017 (1)
	1.63%	1.65%	1.65%
\$	206,091,438	\$ 174,101,000	\$ 178,386,000
\$	482,527,134	\$ 455,890,734	\$ 438,212,856
	42.71%	38.19%	40.71%



Sherrill F. Norman, CPA  
Auditor General

# AUDITOR GENERAL STATE OF FLORIDA

Claude Denson Pepper Building, Suite G74  
111 West Madison Street  
Tallahassee, Florida 32399-1450



Phone: (850) 412-2722  
Fax: (850) 488-6975

The President of the Senate, the Speaker of the  
House of Representatives, and the  
Legislative Auditing Committee

## **INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS***

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of Florida State University, a component unit of the State of Florida, and its aggregate discretely presented component units as of and for the fiscal year ended June 30, 2022, and the related notes to the financial statements, which collectively comprise the University's basic financial statements, and have issued our report thereon dated February 1, 2023, included under the heading **INDEPENDENT AUDITOR'S REPORT**. Our report includes a reference to other auditors who audited the financial statements of the aggregate discretely presented component units, as described in our report on the University's financial statements. This report does not include the results of the other auditors' testing of internal control over financial reporting or compliance and other matters that are reported on separately by those auditors.

### **Report on Internal Control Over Financial Reporting**

In planning and performing our audit of the financial statements, we considered the University's internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the University's internal control. Accordingly, we do not express an opinion on the effectiveness of the University's internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the University's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control



that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies. Given these limitations, during our audit we did not identify any deficiencies in internal control that we consider to be material weaknesses. However, material weaknesses or significant deficiencies may exist that were not identified.

### **Report on Compliance and Other Matters**

As part of obtaining reasonable assurance about whether the University's financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, rules, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the financial statements. However, providing an opinion on compliance with those provisions was not an objective of our audit and, accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

### **Purpose of this Report**

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the University's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the University's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Respectfully submitted,



Sherrill F. Norman, CPA  
Tallahassee, Florida  
February 1, 2023  
Audit Report No. 2023-111

## **FLORIDA STATE UNIVERSITY BOARD OF TRUSTEES**

Peter Collins, Chair  
Maximo “Max” Alvarez  
Kathryn Ballard  
Vivian de las Cuevas-Diaz  
Jorge Gonzalez  
Jim W. Henderson  
Justin Roth  
Deborah Sargeant  
Bob Sasser  
John Thiel  
Drew Weatherford  
Eric Chicken, Faculty Senate President  
Nimna Gabadage, Student Body President

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Jim Clark, Provost and Executive Vice President for Academic Affairs  
Kyle C. Clark, Senior Vice President for Finance and Administration  
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Michael Alford, Athletics Director  
Marissa Langston, Chief of Staff  
Carolyn Egan, General Counsel

## **PRINCIPAL FINANCE AND ACCOUNTING OFFICIALS**

Michael S. Williams, Associate Vice President for Finance and Administration  
Judd Enfinger, University Controller  
Kimberly McMurray, Senior Associate Controller for Accounting Services  
Luanne Brown, Director of Payroll Services  
Carla Daniels, Associate Controller of Disbursement Services  
Betsy Miller, Director of Financial Systems and Compliance  
Gilman Page, Director of Student Business Services  
Mary Ann Parks, Associate Controller of Cash Management  
Peter Walker, Associate Controller of Accounting and Reporting Services

## **EDITOR**

Karen Welling, CPA

## **GRAPHIC DESIGN**

University Communications, Creative Services

## **OFFICE OF INSTITUTIONAL RESEARCH**

James Hunt  
Andrew Brady





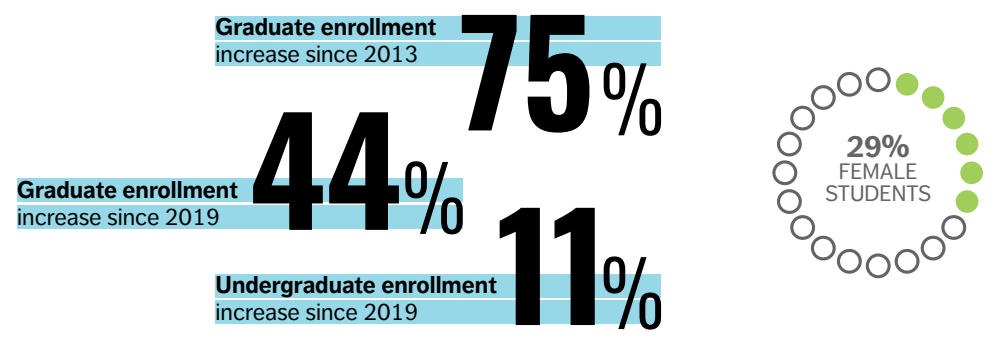
FLORIDA STATE UNIVERSITY  
**ANNUAL REPORT 2021-2022**

# Appendix B1



## Our Students

DEGREES AWARDED IN 21-22		STUDENT POPULATION 2022	
BS	415	Total students	2,919
MS	90	Undergraduates	2,449
PhD	35	Graduate students	470



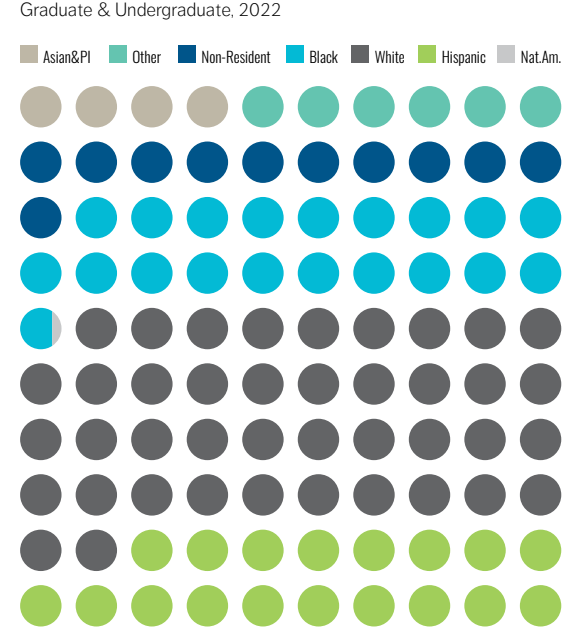
### UNDERGRADUATE PROGRAM

- > FAMU-FSU College of Engineering has **29% female** students (total), versus the 24.6% national average.
- > The college has **20% Black** students, compared to the national average of 5.4%.

### GRADUATE PROGRAM

- > **40%** of PhD graduates in 2022 were female.
- > Domestic URM represented **55%** of 2021-2022 PhD graduates.

### STUDENT POPULATION BY RACE



FAMU-FSU Engineering  
2525 Pottsdamer Street  
Tallahassee FL 32310

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THE JOINT COLLEGE OF ENGINEERING FOR  
FLORIDA A&M AND FLORIDA STATE UNIVERSITIES



One college,  
two universities,  
unlimited opportunity.

The FAMU-FSU College of Engineering is the joint engineering institution for Florida A&M and Florida State universities, the only such shared college in the nation. We are located less than three miles from each campus. After satisfying prerequisites at their home university, students learn together at the central engineering campus with its adjacent, nationally-renowned associated research centers and a national laboratory.

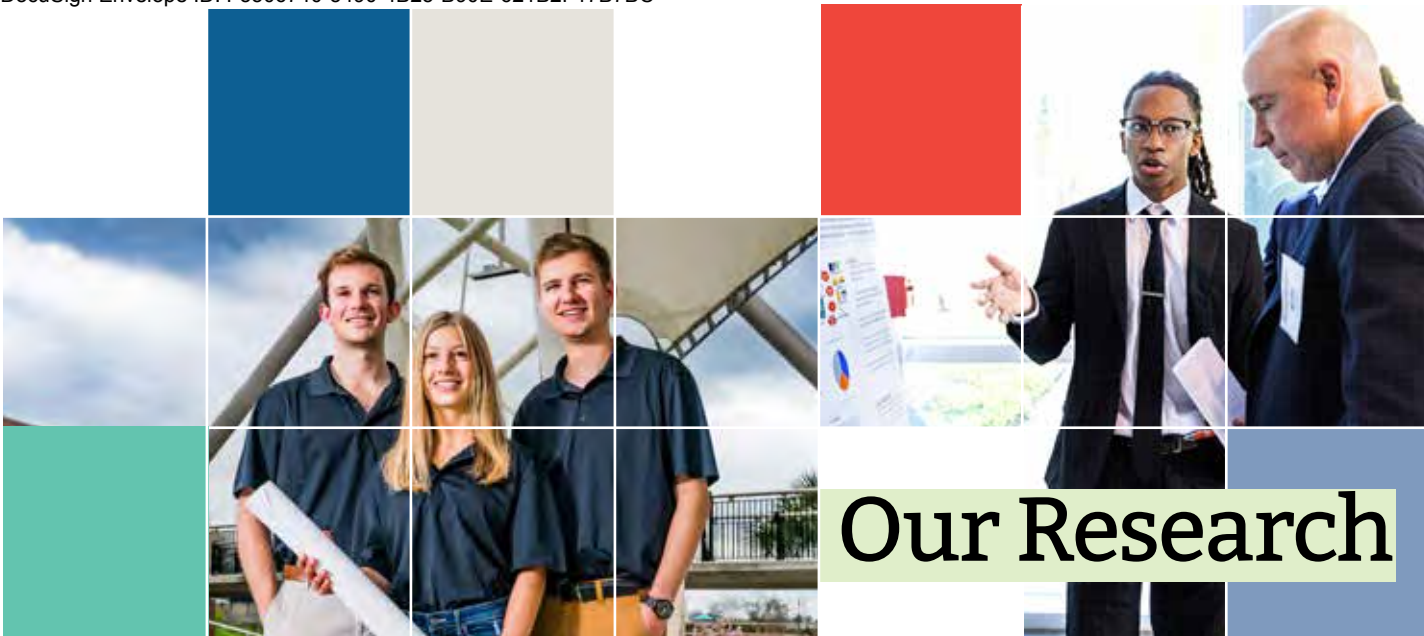
Leading Future Engineers with DIVERSITY | SERVICE | TRADITION | RESEARCH



THE JOINT COLLEGE OF ENGINEERING FOR  
FLORIDA A&M AND FLORIDA STATE UNIVERSITIES



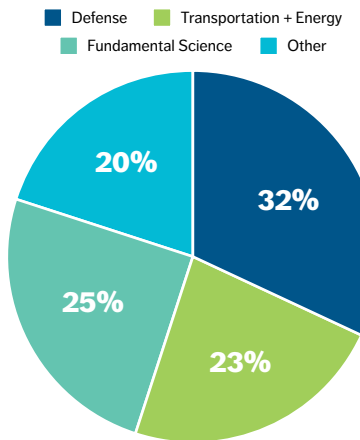
2525 Pottsdamer Street  
Tallahassee FL 32310  
**famufsu.engineer**  
**@famufsucoe**



# Our Research

## RESEARCH AREAS

By type, FY2022, reported to ASEE



Sixteen research centers and labs operate via the joint college, including:

### AERO-PROPULSION, MECHATRONICS, AND ENERGY CENTER (AME)

The AME Center serves as an incubator for cross-disciplinary research involving researchers in the three core research areas, as well as faculty and scientists from mechanical engineering, electrical and computer engineering, civil and environmental engineering, and other STEM disciplines.

### APPLIED SUPERCONDUCTIVITY CENTER (ASC)

ASC advances the science and technology of superconducting magnets, working from atomic scale fundamentals, through complex conductors to construction of the highest field superconducting magnets yet made. ASC has comprehensive laboratories for superconductor fabrication, superconducting property and microstructural evaluations, and magnet construction and testing.

### CENTER FOR ADVANCED POWER SYSTEMS (CAPS)

CAPS is a multidisciplinary research center organized to perform basic and applied research to advance the field of power systems technology with emphasis on application to electric utility, defense and transportation. Its core competencies are power systems modeling, analysis and control in the context of real-time digital simulators, power electronics, electrical machines and drive systems, superconductivity and thermal systems analysis.

### HIGH-PERFORMANCE MATERIALS INSTITUTE (HPMI)

The multidisciplinary High-Performance Materials Institute (HPMI) performs research for emerging advanced composites, nanomaterials, multifunctional materials and devices, and advanced manufacturing. The center has four primary technology areas: high-performance composite and nanomaterials, structural health monitoring, multifunctional nanomaterials, advanced manufacturing and process modeling.

### NATIONAL HIGH MAGNETIC FIELD LABORATORY (MAG LAB)

The Mag Lab generates the world's highest DC magnetic fields. Engineering researchers in the Mag Lab have projects involving very low temperature science and technology, cooling superconducting magnets, materials science, chemical and biomedical engineering research involving highly-powerful magnetic imaging techniques.

### RESILIENT INFRASTRUCTURE & DISASTER RESPONSE CENTER (RIDER)

The RIDER Center promotes all-inclusive and equitable disaster resilience for vulnerable populations and probes the underlying causes of disaster vulnerability in communities. This is done while accounting for infrastructure characteristics and social needs using computational methods such as machine learning, causality, and regression models.

>> We also host multiple **NSF HBCU** programs, including CREST, TIP, EIR (7) and MRI.

## Message from the Dean



It's been an exhilarating five months at the college. I have learned a lot about the research, education and service we perform. In this year's Engineering Dean's Report, I wanted to share some facts and figures for the year in retrospect. What the numbers fail to capture is the strength of the community here and the palpable sense of optimism. We are about to take the next bold step in our relatively short but remarkable history as the only joint college of engineering in the country shared by two haloed institutions of public higher education. I hope you enjoy the report.

Wishing you all the best in 2023!

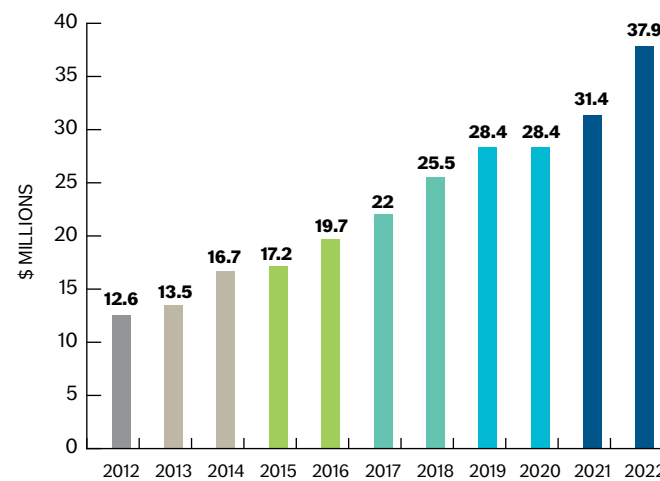
*Suvranu De*

**Suvranu De, Sc.D.**

Dean, FAMU-FSU College of Engineering

## RESEARCH EXPENDITURES

In millions of dollars, FY2022, reported to ASEE



## DEPARTMENTS & CHAIRS

### Chemical & Biomedical Engineering

Bruce Locke, Ph.D.

### Civil & Environmental Engineering

Lisa Spainhour, Ph.D., P.E.

### Electrical & Computer Engineering

Sastry Pamidi, Ph.D., M.B.A.

### Industrial & Manufacturing Engineering

Changchun "Chad" Zeng, Ph.D.

### Mechanical Engineering

William Oates, Ph.D., P.E.

## FAMU-FSU ENGINEERING AT A GLANCE

> **Founded** in 1982 as the engineering research/education college for FAMU and FSU

> **Student population:** More than 2900 in Fall 2022, including 2449 undergraduates and 470 graduate students

> **Faculty:** 132 total faculty, including tenured, teaching and research engineers

> **Academic departments:** 5

> **Alumni:** More than 9,800

> **Research** centers & labs: 16



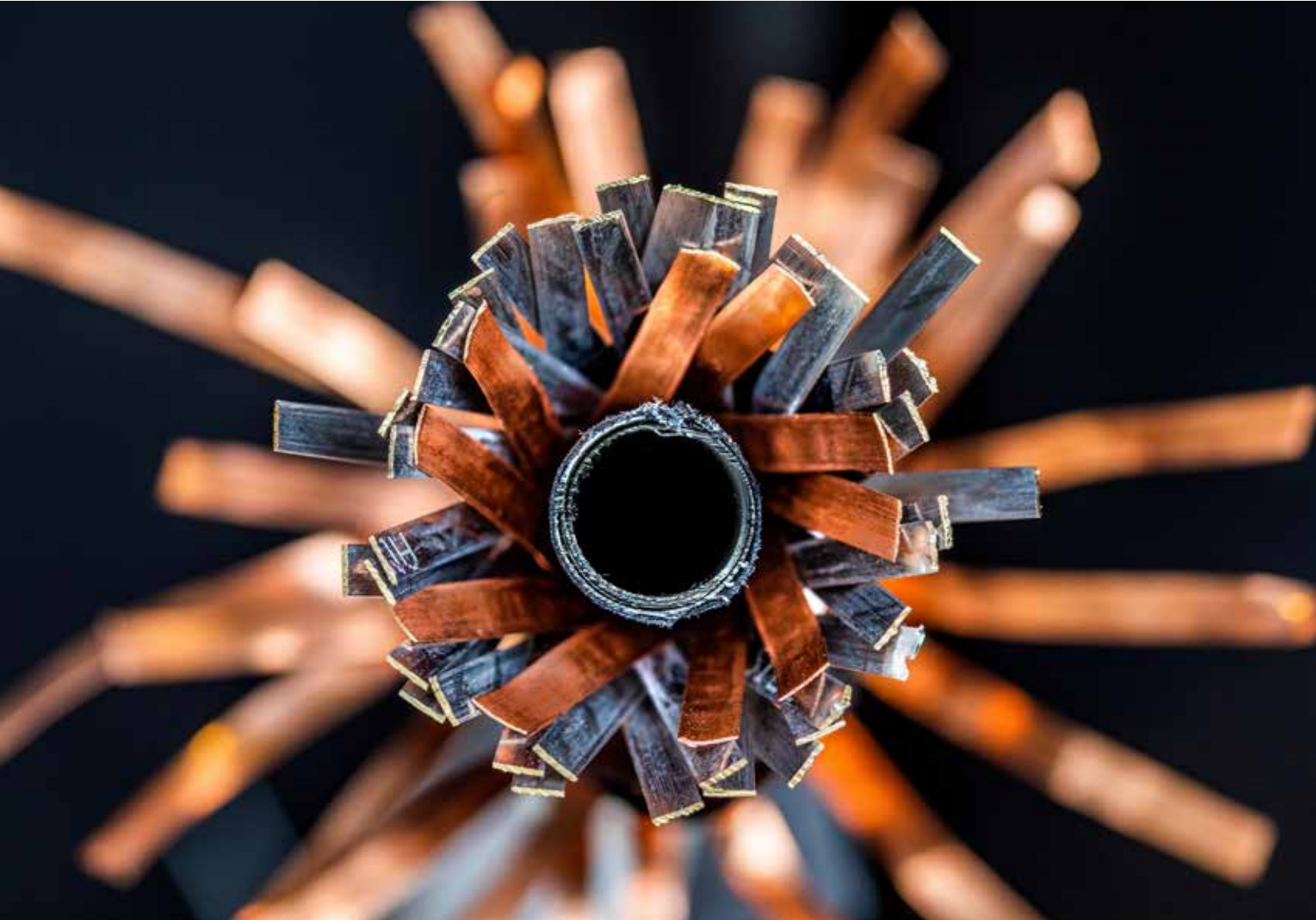
FAMU-FSU  
College of Engineering



# Appendix B2



FAMU-FSU  
College of Engineering



# 2021 – 2022 **ANNUAL** ENGINEERING RESEARCH **REPORT**



Associate Professor Shonda Bernadin



Abiola Temidayo Oloye, left, a doctoral candidate with Fumitake Kametani, associate professor of mechanical engineering.

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# Diversity is in our DNA



## Unique collaboration of a top HBCU and an R-1 university

The FAMU-FSU College of Engineering is the joint engineering institution for Florida A&M and Florida State universities, the only such shared college in the nation. We are located less than three miles from each campus. After satisfying prerequisites at their home university, students learn and research together at the central engineering campus with its eight adjacent, associated research centers and a national laboratory.

This unique collaboration between the nation's top Historically Black University and a Top-20, Tier-1 research institution make the FAMU-FSU College of Engineering

a place to hone cutting-edge engineering skills. Our researchers and graduate students benefit from the rich intellectual heritage of both universities. They also enjoy access to both nationally recognized institutions' assets and capabilities to enrich their work.

The college's racial, ethnic and gender diversity exemplifies the future engineering and high-tech workforce to a degree not found at most other engineering schools. Employers value our graduates for not only their engineering skill set, but also the soft skills that make them better employees to work in culturally diverse, modern teams.

# Leveraging tradition and research to build a sustainable and better world

DEAN'S MESSAGE

## WELCOME TO OUR ANNUAL RESEARCH REPORT.

We are delighted that despite COVID we have substantially increased our external funding and our graduate student enrollment. Since 2016 our external expenditures have grown by almost a half, and our graduate student enrollment by one third. Thanks for this dramatic growth goes to all our faculty and staff, but especially to Senior Associate Dean for Research and Graduate Studies, Prof. Farrukh Alvi, and his staff who have facilitated the faculty's growing success.

We are fortunate to be in a period of continuing growth, which can be attributed to the unique partnership that is at the core of our college, between Florida A&M University (the #1 public HBCU according to US News), and Florida State University (#19 amongst all public universities in the nation according to US News). The college is ranked in the top 100 for graduate engineering schools, and has moved up 25 points in four years.

We have identified strategic areas where we are strengthening our **unique capabilities:** hypersonics, power systems, cryogenics and magnetism, resilience and disaster recovery, high-performance materials manufacturing and sustainable polymers.

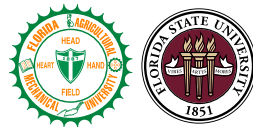
The collaboration intrinsic to our college is an "unfair advantage" since all our faculty have full rights at both universities (with the exception of tenure, which is granted at only one institution) and can leverage the research strength of FSU with the social mobility of FAMU graduates (#13 in the nation by this very important metric). As a result, we are the only top-ranked college in the nation whose student body has a racial and ethnic diversity resembling that of the United States, and we are the #4 producer of engineering doctorates to African-Americans amongst all engineering schools. Since we have doubled our Ph.D. enrollment at FAMU in the last few years, we are aiming to be #1 in this last metric within this decade.



**J. Murray Gibson**  
Dean, FAMU-FSU Engineering

Like all top schools of engineering, while we cover all the major engineering disciplines in research and education, we have identified strategic areas where we are strengthening our unique capabilities. These include hypersonics, power systems, cryogenics and magnetism, resilience and disaster recovery, high-performance materials manufacturing and sustainable polymers. You will find examples of research highlights from these in the pages of this report.

One thing that particularly excites me as dean is the increasing degree of research collaboration with the sciences, and especially with the social sciences and humanities. Only by understanding the societal dimensions of challenges can engineers build a sustainable and better world.



# FAMU-FSU College of Engineering

\*\*Numbers are approximate as of 9/21/21; FY 2021: July 1, 2020 – June 30, 2021

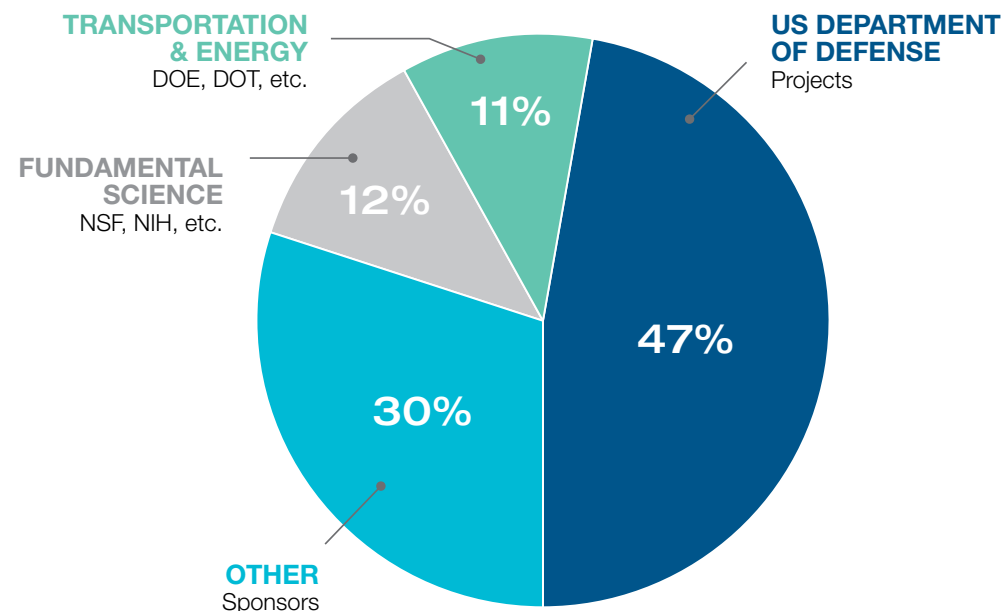
Generated **2/3** of all patent applications filed by Florida State University in FY2021

**50%** increase in GRADUATE enrollment since 2019

## Some of Our Most Generous Corporate Sponsors 2017-2021

- Aerosonic
- Baidu USA
- Bruker Biospin AG
- CERN
- Cummins Inc.
- Curtiss-Wright Electro-Mechanical Corp.
- Cytac Engineered Materials
- Danfoss Turbocor Compressors
- DOW
- Duke Energy
- Environmental Research and Education
- EPRI
- ExxonMobil Chemical Company
- Ford Motor Company
- Geosyntec Consultants
- General Atomics Electromagnetics
- Infineum USA
- Korea Basic Science Institute
- L3Harris Technologies
- L-3 Maritime System
- LG Chem
- Lockheed Martin Corporation
- Major Tool and Machine
- Mitsubishi Heavy Industries
- Nikon Instruments
- Northrop Grumman Systems Corporation
- OMICS
- Reliance Industries Limited, India
- Rolls-Royce
- SentiMetal Journey
- SGRI North America
- Texas Instruments
- Total Raffinage Chimie

## FY 2021 Sponsored Research Expenditures \$31.4M\*\*

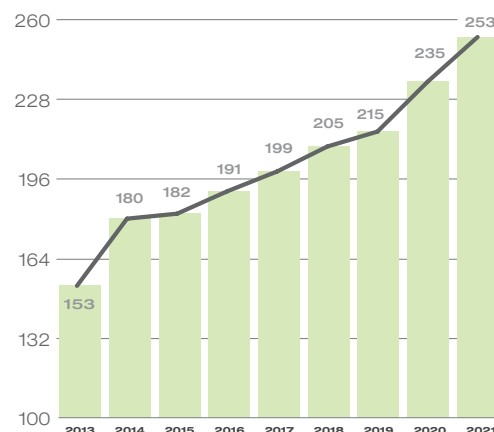


**Junior faculty awards**  
19 TOTAL  
9 ACTIVE  
• 8 NSF CAREER  
• 1 DARPA YIP\*  
\*Young Investigator Program

## RESEARCH TOTALS '20-'21

**153** RESEARCH AWARDS (received)  
**\$29.9M** TOTAL AWARDS VALUE  
**228** PROPOSALS SUBMITTED  
**67** RESEARCH LABS & CENTERS  
**31** PATENTS ISSUED

## PhD Enrollment

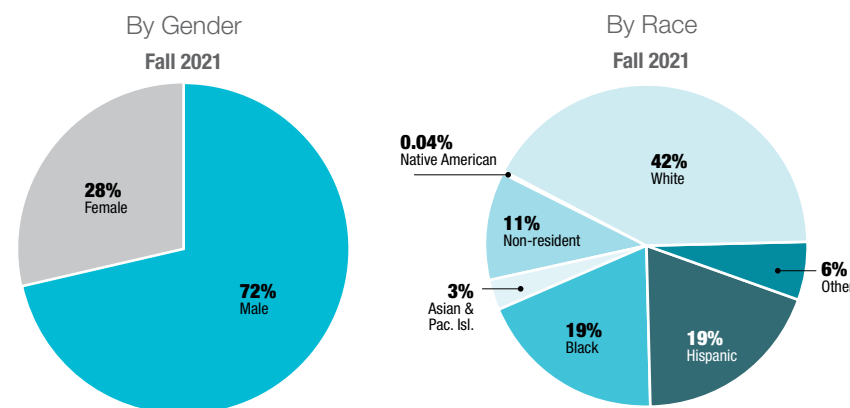


## STUDENT POPULATION

**2,831** students  
2,377 undergraduate  
454 graduate

TOTAL ENGINEERING DEGREES AWARDED 2020-21  
BS **376** GRADUATE **110**

## GRADUATE & UNDERGRADUATE STUDENT POPULATION



## Graduate Student Fellowship Awards 2020-2021

2020-2021

- DoD Science Mathematics & Research for Transformation Scholarship
- NSF Graduate Research Fellowship Program
- McKnight Doctoral Fellowship
- NIH Predoctoral Fellowship
- Department of Energy Office of Science Graduate Student Research Award
- FSU Legacy Fellowship
- GEM Intel Fellow

**FAMU (HBCU)** doctorate enrollment up **81%** since 2016



2019 Exemplar

**#4** producer of African-American PhDs in engineering nationwide  
**#1** in percentage of African-American engineering faculty at an R-1 university





Professor **Rufina Alamo**

# New polymer research may revolutionize how plastics are processed

CHEMICAL

## IN A SERIES OF NEW ARTICLES, RESEARCHERS

described new discoveries on the effects of temperature on sustainable polymers. Their findings may help the industry to produce plastics that are more sustainable and better for the environment.

“Plastics made from petroleum, a non-renewable resource, remain too long in our land and water when discarded,” Rufina Alamo, chemical engineering professor, says. “We are researching how sustainable polymers are heated and cooled so we may produce more ‘environmentally friendly’ plastics.”

Alamo and doctoral candidate Xiaoshi Zhang, now a postdoctoral research fellow at Penn State, recently published the work in a series of papers that focus on the crystallization of “green” polymers. The latest paper appears as the cover article in issue 18 (2020) of *Macromolecules*, a leading journal for polymer science.

“There is a worldwide motivation to transform how the largest volume of plastics are made,” Alamo says. “Polymer chemists and physicists are working hard to produce substitute materials to end problematic plastic waste.”

According to Alamo, replacing inexpensive polymers made from petroleum with economically viable, sustainable polymers is only the first step in the process. Determining the correct temperature for processing is key to producing better materials.

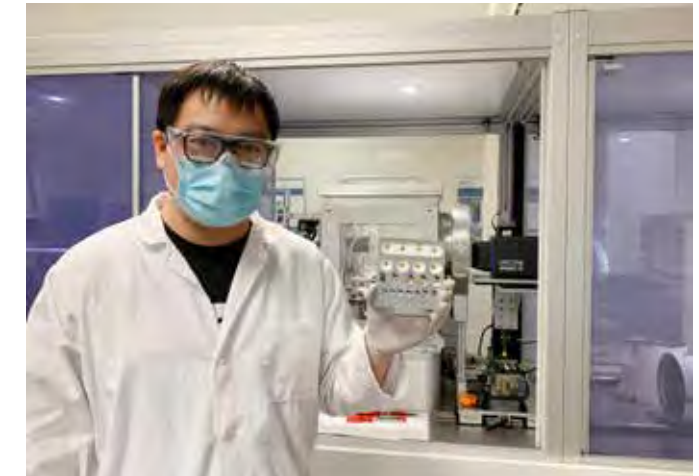
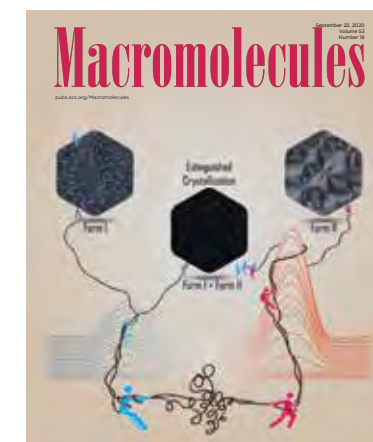
“How the polymer is melted and cooled to make the desired shape is important,” Alamo explains. “We are trying to understand the intricacies of crystallization to further understand the transformation process.”

The team is studying a type of polymer called “long-spaced polyacetals,” which are used in plastics. Synthesized in a laboratory at the University of Konstanz in Germany, the long-spaced polyacetals Alamo’s team use come from sustainable biomass. They contain a polyethylene backbone decorated with the acetal groups at a precise equal distance. The structure combines the toughness

of polyethylene with the hydrolytic degradability of the acetal group. This type of polymer is strong, but breaks apart more easily with water than traditional polymers.

“What we discovered is these types of polymers crystallize in an unusual way when cooled after melting,” Alamo said.

During the cooling process, spaghetti-type molecules in melted plastics disentangle to form crystals and are responsible for the toughness of final material. Alamo’s group showed that polymer crystallization is controlled by molecular events that take place at



Study co-author **Xiaoshi Zhang** was a doctoral candidate when he performed this polymer research with Dr. Alamo. Now he’s a postdoctoral research fellow at Penn State.

the crystal growth front.

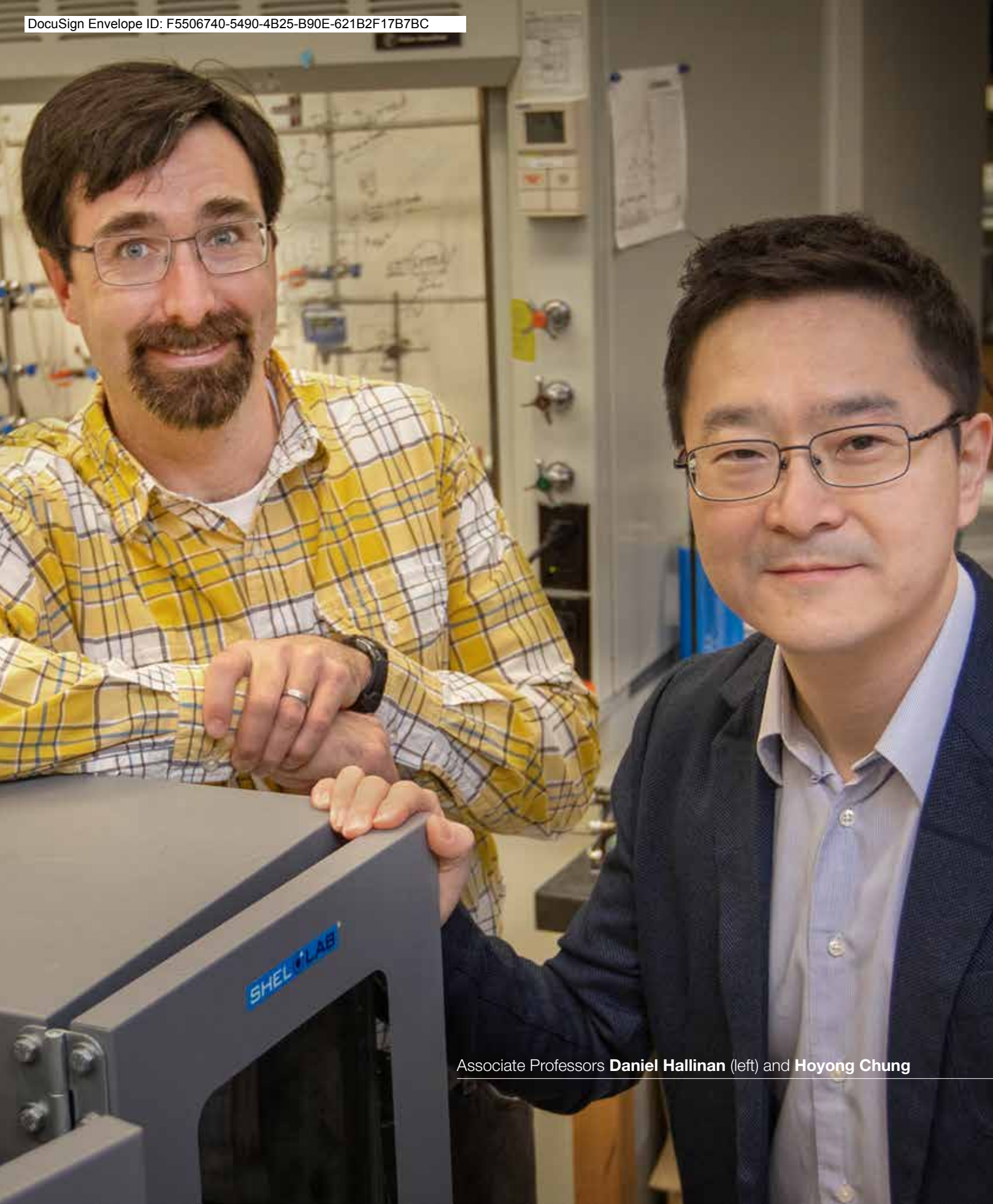
The researchers found that when cooled rapidly, these polyacetals become tough and crystalline and the molecules self-assemble in a type of crystal termed “Form I.” When cooled slowly, the material is also very crystalline, but the crystals formed are quite different and dubbed “Form II.” When cooled at intermediate temperatures, the material does not solidify at all. This phenomenon has never been observed in any other crystalline polymers, according to the researchers.

“For crystals to be formed, an energy barrier first needs to be surmounted,” Alamo said. “At low temperatures, crystals are easily formed. At high temperatures, crystals are more stable and at intermediate temperatures, the crystals compete to form and the material can’t solidify.”

“This is a significant discovery because it is an important key to understanding how the plastics we use become solids,” Alamo said. “We want to provide the industry with the best transformation processes possible. We want sustainable plastics that don’t warp or have difficulty solidifying.”

The research may provide new ways of manufacturing plastics that will be more economical to produce and sustainable.

Alamo’s research is supported by a grant from the National Science Foundation. Stephanie Marxsen, Patrick Ortmann, Stefan Mecking and Xiaobing Zuo contributed to the study. Undergraduate students Sidney Cameron and Michael Parkhurst collected experimental data for the project.



Associate Professors **Daniel Hallinan** (left) and **Hoyong Chung**

# Researchers develop battery component that uses compound from plants

CHEMICAL

**A TEAM OF ENGINEERING RESEARCHERS RECENTLY** developed a way to use a material found in plants to help create safer batteries.

Using the organic polymer lignin — a compound in the cell walls of plants that makes them rigid — the team was able to create battery electrolytes. Their research was published as the cover article in the journal *Macromolecular Rapid Communications*.

“The main battle in battery science is in new materials,” said Hoyong Chung, an associate professor of chemical and biomedical engineering and the study’s corresponding author. “Depending on what kind of material we use, we can improve the capacity of the battery and the safety of the battery substantially.”

To create their new type of solid electrolyte, the team combined lignin with the synthetic polymer polyethylene glycol.

Electrolytes are a battery part that separate the negative and positive terminals of a battery. They conduct ions, which match the flow of electrons moving from a negative to positive terminal and through whatever the battery is meant to power.

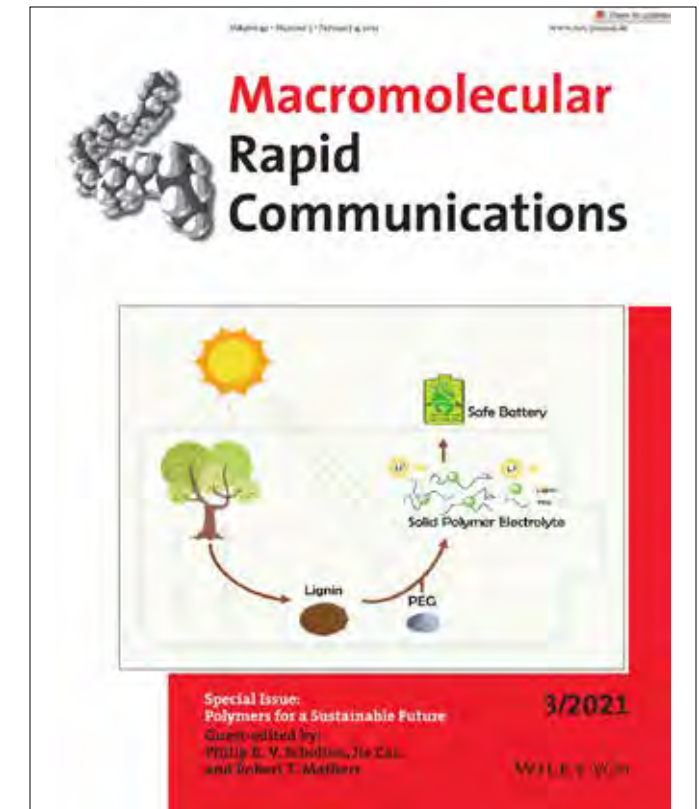
Electrolytes can be either liquid or solid, and each type has its strengths and weaknesses. Liquid electrolytes are good conductors of ions, but solid electrolytes are typically safer, stronger and can be used at higher temperatures than liquid versions.

Polyethylene glycol is a popular candidate for solid electrolytes because of its electrochemical stability, but it doesn’t conduct well at room temperature, which limits the abilities of batteries using that material to power something or to rapidly charge.

That’s where lignin comes in.

Lignin’s chemical structure contains high concentrations of derivatives from the molecule benzene, which makes it a strong material. By using **lignin** as an electrolyte component, the battery keeps the **strength** and **safety** that comes with a typical solid electrolyte but gains the ability to **function** well at room temperature.

Lignin’s chemical structure contains high concentrations of derivatives from a compound called benzene, which makes it a strong material. By using lignin as an electrolyte component, the battery keeps the strength and safety that comes with a typical solid electrolyte but gains the ability to function well at room temperature.



Along with increasing the range of temperatures at which a solid electrolyte battery is feasible, using lignin is a way to make batteries more sustainable.

Lignin is cheap and abundant. About 50 million tons are produced each year globally, and most of that is a waste product from the paper industry. Unlike other biomass materials, it’s not a human food, so it couldn’t be otherwise used to feed people.

“This is a way to improve battery performance and to do so in a sustainable way,” Chung said. “Batteries will be even more important in the future, so improving their technology is crucial.”

Daniel Hallinan Jr., associate professor and co-author; former graduate student Hailing Liu; and former graduate assistant Logan Mulderrig contributed to this work.

# Chemical engineers receive over \$1 million in NSF grants for multi-institutional bacteria research

**AN ENGINEERING RESEARCHER, COLLABORATING** with a colleague from Howard University, is investigating bacteria-related dynamics in one of two new projects supported by the National Science Foundation (NSF).

The NSF has awarded over \$1 million for two research grants for bacteria related investigations that have the potential to impact societal health by supporting new diagnosis and treatment methods for diseases. One award is through Florida A&M University (FAMU) and the other through Howard University, both historically Black colleges and universities (HBCUs) in a multi-institutional partnership with the FAMU-FSU College of Engineering and the National High Magnetic Field Laboratory.

Jamel Ali, a Howard alumnus and assistant professor in chemical and biomedical engineering, is working with Patrick Ymele-Leki, interim-chair and associate professor in chemical engineering at Howard University. The research project aims to determine the role fluid flow has on the development and evolution of bacterial communities.

“Antimicrobial-resistant (AMR) strains of bacteria are increasing and if we want to develop new antibiotics and diagnostic tools to effectively identify and control their spread, we need to better understand what physical forces drive their drug resistance,” Ali said.

In the first investigation, Ali and Ymele-Leki will look at how various forms of fluid flow impact the process by which bacteria attach to each other to form complex communities. Findings could lead to new methods to control biofilm formation.

Biofilms are aggregates of bacteria that can attach themselves to surfaces. Examples include the dental plaque that forms on teeth or the slimy substance that builds up in the lungs of cystic fibrosis patients. In the medical field, biofilms play an important role in the development of antibiotic-resistant microorganisms that can cause severe infection.

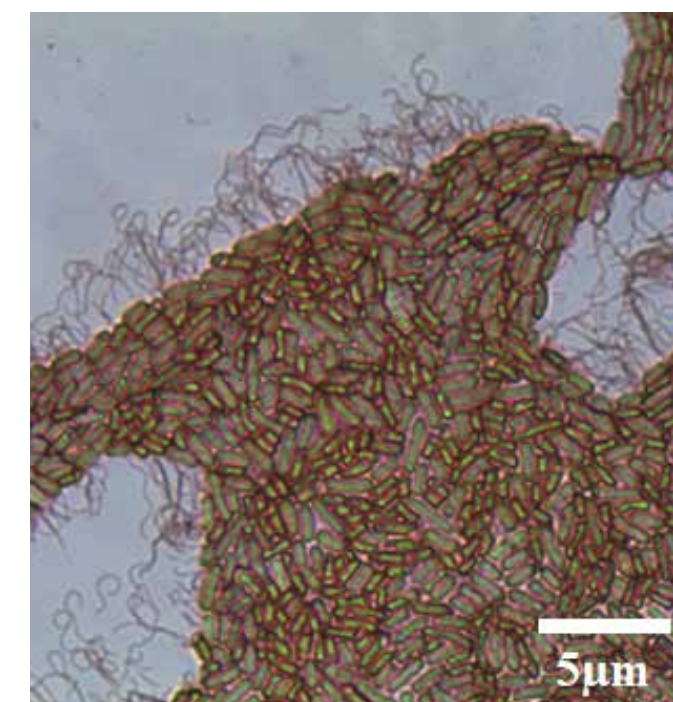
Biofilms typically form in wet environments; however, little is known about how initial single and multi-cell interactions and fluid flow influences their growth and structure. The researchers hope the outcome of their work will provide a better understanding of how they develop and will lead to new diagnosis and treatment methods for problems caused by biofilms.

In the second NSF-funded project, Ali will develop novel biological sensors using bacteria’s flagella, which are long, hairy external structures that help the organisms move. He hopes to create nanoscale sensors capable of detecting very small changes in biological environments. By identifying the changes in local cellular regions within human cells, Ali hopes treatment options will be better identified.

“In both projects, for the first time we will be using a set of specialized tools at both institutions that allow us, in real-time, to look not only at bacteria but also at their subcellular components and how they interact with their surroundings,” Ali said.

“Antimicrobial-resistant (AMR) strains of bacteria are increasing and if we want to **develop** new antibiotics and diagnostic tools to effectively identify and control their spread, we need to better understand what **physical forces** drive their drug resistance.”

— ASSISTANT PROFESSOR JAMEL ALI



Brightfield image of stained biofilm with visible flagella (Scale bar is 5  $\mu\text{m}$ ). (Courtesy Ali)



Assistant Professor **Jamel Ali** with students he mentors at the college.



## Professor will teach robots the concept of risk with Toyota Grant

### FOR ENGINEERING ASSISTANT PROFESSOR

**CHRISTIAN HUBICKI**, robots aren't just a tool for the future. They're a way to understand everything around us.

Hubicki, a faculty member in mechanical engineering, will continue that quest thanks to a \$750,000 Young Faculty Researcher grant from the Toyota Research Institute (TRI). The grant is part of a larger initiative from TRI that will distribute \$75 million to 16 institutions around the country.

"I'm really excited about this because if we crack this nut — and we have, I think, a very promising approach — then that means robots will be able to reason in a way that is really impressive in real-life situations, as opposed to being very rigid in their thinking, or some might say, robotic," Hubicki said. "If we succeed in this, the way that a robot might think is a lot more adaptive and fluid than you might have otherwise thought a robot was."

Hubicki's project is focused on teaching robots the concept of risk.

"I really think that risk is a fundamental unifying concept for anything we want to do in our lives," he said.

A visit to a farm inspired him to explore how robots could learn the idea. At the farm, chickens were running around, pecking at their food when Hubicki came along. He tried to pet some of the chickens. They suddenly had a choice to make. They wanted the food. They also wanted to avoid this strange new creature in their space.

"They had to somehow balance the risk of not eating with the risk of this scary-looking human being too close to them," he said. "They had to move dynamically and rapidly assess the situation, see what a risk is and try to navigate that in a way where they still did what they needed to do."

People do the same thing every day, he said. Consider something as simple as a trip to the mailbox, where one might have to contend with unstable terrain, reckless bike riders and weather.

For a robot, risk is anything that compromises its ability to complete the task it has been programmed to do. That could be slipping on the ground or being knocked over by a pedestrian. It could be something like losing power from a battery or overheating by putting too much electricity through its motor. The challenge for engineers is to create the algorithms that allow a robot to constantly evaluate risk in a changing environment.

"How do we take all these very different sources of failures and put them into one equation for the robot to understand?" Hubicki said. "That's what this project is all about."

Understanding risk is an important part of giving robots the ability to be more flexible in how they complete the tasks humans ask them to do within the parameters we give them.

The Young Faculty Researcher grant Hubicki received from TRI is specifically designed to support promising tenure stream faculty members, enabling them to explore broadly, inquire deeply and address higher-risk, higher-payoff ideas. In YFR projects, TRI invests in the researcher and provides them the freedom and flexibility to pivot from one direction to another.

"Our first five-year program pushed the boundaries of exploratory research across multiple fields, generating 69 patent

applications and nearly 650 papers," said Eric Krotkov, TRI chief science officer, who leads the university research program. "Our next five years are about pushing even further and doing so with a broader, more diverse set of stakeholders. To get to the best ideas, collaboration is critical. Our aim is to build a pipeline of new ideas from different perspectives and underrepresented voices that share our vision of using AI for human amplification and societal good."



(Above) Hubicki and his bipedal research robot, Tallahassee Cassie. (Right) a visual representation of some of the work Hubicki is doing with risk and robotics.



Assistant Professor **Christian Hubicki** talks robotics with local high school students

# Combining theoretical, experimental and computational aerodynamics into one dynamic locale

**IN A REGION OF THE UNITED STATES THAT IS HOME** to 20 major military installations and a defense business presence worth \$95 billion annually, the FAMU-FSU College of Engineering is uniquely situated for high-impact aerospace research and testing.

Florida hosts two (of only four) deep-water naval ports with adjacent airfields, the Joint Gulf Range Complex in the Gulf of Mexico, the military's only east coast space launch facility and several critical Department of Defense (DoD) research, development, training and evaluation (RDT&E) centers. Of those, the majority are located in the northwest region of the state, within a short distance of the college.

This backdrop provides a rich atmosphere for commercial aerospace and defense-related engineering research to thrive. In addition to close contacts with key defense stakeholders in the research frame, the college also enjoys collaborative research efforts with defense-industry public and private businesses including Boeing, Lockheed Martin, BAE Systems and Raytheon.

For a college and mechanical engineering department with its sights set on becoming a nationally-recognized hub for aerospace research, there is likely no better place than Tallahassee and Leon County's Innovation Park, adjacent to the campus.

FAMU-FSU Engineering is already surging ahead in the field, with the Florida Center for Advanced Aero-Propulsion (FCAAP), a state-recognized and supported Center of Excellence whose research has had a major impact on the space and aerospace industry in Florida and beyond. With its trio of high-tech (and high-speed) wind tunnels, high-temperature jet and short take-off/vertical landing aircraft (STOVL) facilities, FCAAP is the site for mission-critical engineering test model research by mechanical engineering faculty such as Louis Cattafesta and Rajan Kumar.

A relatively new area for the college is computational fluid dynamics (CFD), brought to the department by junior faculty members emerging in their field as highly creative and prolific researchers. Assistant Professor of Mechanical Engineering Unnikrishnan Sasidharan Nair joined the faculty alongside his colleagues Neda Yaghoobian and Kouros Shoele, both also assistant professors in mechanical engineering focused on advanced, multi-physics CFD.

## From Algorithm to the Field

Historically, the faculty at FCAAP and other college-associated centers have focused on materials science and experimental aerodynamics, leveraging our advanced wind tunnels and other test facilities.

These recently-hired mechanical engineering researchers are interested in advanced computational fluid sciences, which is an area that includes simulations, mathematical models and other research methods fine-tuned to the study of fluid-thermal systems, including aerodynamics.

Using algorithms and computer models to solve equations that predict fluid flow, for example, researchers develop simulations which offer low-cost pre-test environments for defense-related concepts. Once a design is established, computational research can

The college is already **surging ahead** in the field, with the Florida Center for Advanced Aero-Propulsion (FCAAP) a state-recognized and supported Center of Excellence whose research has had a **major impact** on the **space** and **aerospace** industry in Florida and beyond.

develop algorithms and apply advanced mathematics to evaluate critical performance parameters before a model is built out and ready for the wind tunnel.

"In one study, we are simulating air flow in the context of high-speed aircraft," Sasidharan Nair explains. "This can help define the size of the wings and other parts of an aircraft (before they enter the costly design and test phase)."

In a series of recent grants totaling \$1.4 million, Sasidharan Nair is pushing forward on computational aero-sciences as a new research thrust at the college, complementing his colleagues' work in similar engineering areas.

As a mechanical and aerospace engineer in the aerodynamics field, Sasidharan Nair is specifically interested in the design of aircraft components that move through the air at very high speeds. How does air behave as a compressible-fluid as it flows over the aircraft? What principles of fluid dynamics apply and how can they be harnessed to mitigate environmental, health and physical impacts of these machines on crews and communities?

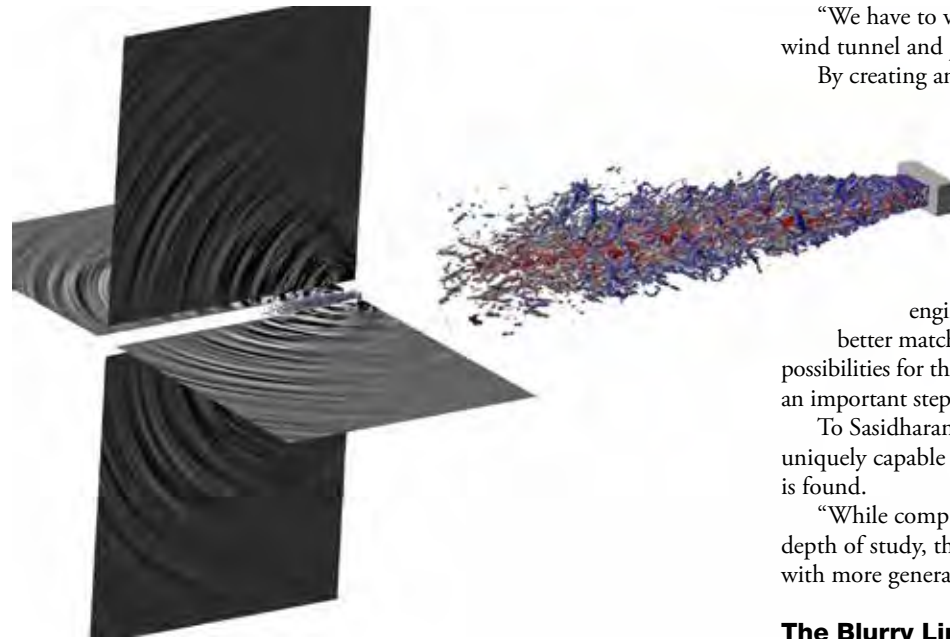
## Mitigating the Boom

Aero-acoustics refers to the study of sound and associated fluid dynamics, and is a key discipline utilized to evaluate the noise emitted by military aircraft as they soar through the air. In one study for the U.S. Navy, Sasidharan Nair and his team are determining how the acoustical properties of those aircraft behave differently at supersonic speeds and in different atmospheric conditions likely encountered at high altitudes.

While common to communities in Northwest Florida, the traditional "sonic boom" emitted from military jets as they break the sound barrier at supersonic speeds can negatively affect humans and wildlife.

According to JSTOR Daily, sonic booms aren't just loud; they can also cause physical damage, breaking glass, cracking plaster and shaking objects off shelves. A boom from a single fighter aircraft in 1966 dislodged tons of rock, crushing archaeological sites in the famous Canyon de Chelly National Monument. In addition,

Assistant Professor **Unnikrishnan Sasidharan Nair**



Right: Simulation of the turbulent plume ejected by a supersonic jet. Left: A zoomed-out image of the jet highlighting its acoustic emissions. (Courtesy Sasidharan Nair)

the U.S. military acknowledges that the shock waves cause ear and hollow cavity damage to human bodies.

Because of its deleterious effects, the U.S. military is interested in ways to mitigate the boom itself—perhaps by designing aircraft that create smaller “booms” during supersonic travel. A key milestone in advancing civil aviation in the near future will be the reintroduction of supersonic flight—similar to the Concorde, but in a more environment friendly and sustainable manner. For supersonic commercial aircraft to be practical they must be able to fly at supersonic speeds overland, something the Concorde could not due to its very loud sonic boom. Hence the challenge is in how to design efficient commercial supersonic aircraft where the aerodynamic and propulsive design is boom-constrained.

To better control the sound emissions from aircraft, Sasidharan Nair is looking at the noise-sources involved in the traditional sonic boom, as well as the “shock-dominated jets” that often accompany them as the high-temperature, high-velocity exhaust from jet engines create differences in pressure that are mismatched with the surrounding atmosphere. These characteristic “shock cells” in these jets create sound signatures in addition to the sonic boom. Their extremely high temperatures and pressures make it very difficult to predict their behavior and their acoustic impact on ground crew. For U.S. Navy aircraft carriers where humans and jet engines are always in close proximity, understanding and mitigating these impacts is a priority.

To attack this problem, Sasidharan Nair has developed algorithmic tools to exactly predict how much sound is generated from this complex flow system of military plane exhaust. His model includes some of the most advanced algorithms available and is part of the reason he was chosen for the study.

Sasidharan Nair’s work on simulating the complex dynamics of shock cells and characterizing the acoustics of military tactical aircraft, particularly Naval aircrafts, dovetails nicely with the state-of-the-art experimental high-speed jet aero-acoustics research performed steps away at FCAAP.

“We have to validate our algorithms and calculations against wind tunnel and jet-rig test data,” he says.

By creating and testing a model component in the Mach-5 polysonic wind tunnel, the team is able to validate or fine-tune their algorithms for the military.

Creating techniques to control sound emissions is ripe with possibilities, including using actuators in the system. Active control, as it’s known, excites the engine exhaust to achieve a lower acoustic impact and better match the atmospheric conditions. There are multiple possibilities for the future of acoustic mitigation, and these studies are an important step in that direction.

To Sasidharan Nair’s mind, having FCAAP and highly and uniquely capable facilities he needs so close is where the real nexus is found.

“While computational aerodynamics and acoustics provides the depth of study, the jet noise anechoic chamber provides actual data with more generalizable details,” he says.

### The Blurry Line of Hypersonics

While the term “hypersonic” is a bit hard to define—there’s no sharp boundary between super- and hypersonic regimes—for aerospace research it’s generally accepted as any craft traveling 5 times the speed of sound (Mach 5) or faster. Currently the realm of unmanned concept vehicles including rockets and missiles, sustained hypersonic flight has great potential and many challenges. At speeds this fast, materials burn up and the air begins to act more like a reacting plasma than an unreactive gas. Despite challenges, the U.S. military and commercial aviation industries have their sights set on even faster speeds—above Mach 6.

In a 4-year collaboration with The Ohio State University, Sasidharan Nair and his team are working to computationally mitigate the distortion of boundary layer profiles (of velocity), a major challenge in designing hypersonic aircraft. This boundary layer is the region on an aircraft wing where air “sticks” as it flows over the surface, causing internal friction in the air to heat the surface. Much like the turbulent flow of water from a faucet that causes it to spray out from its downward stream, irregularities in the surface of aircraft systems can affect the boundary layer, causing it to transition from a laminar to a turbulent state. For example, when the faucet water is a smooth column flowing outward, it is considered laminar. However, once the water “catches” on a scratch inside the faucet fixture, it results in a turbulent zone that produces a scattered “spray” at the end of the flow.

In aircraft systems, the heat and drag loads are manageable and limited when the flow is laminar. However, these exceed safe thresholds when the flow transitions and becomes turbulent, resulting in surface damage. To realize safe, manned, hypersonic aircraft, this laminar to turbulent transition must be managed. With his collaborators, Sasidharan Nair aims to help identify materials or mechanisms to mitigate surface damage due to transition at hypersonic speeds.

Sasidharan Nair’s computational models seek to help understand—and describe—the mechanics of the transition. Then, they can better define the optimal shape, design and materials for aircraft components where these flows are encountered.

“We want to avoid the dangerous transition to turbulence or at least move it further down the vehicle,” he explains.

### Tweaking Geometry for Better Design

In another computational-to-test collaboration, Sasidharan Nair and Rajan Kumar, associate professor in mechanical engineering



The anechoic test chamber at the Florida Center for Advanced Aero-Propulsion.

and FCAAP director, are studying the optimal design for a supersonic jet engine inlet. The co-PIs believe the research could help end disastrous engine failure events.

In traditional subsonic aircraft, turbines compress the air prior to combustion inside the engine. In supersonic aircraft, however, the inside surface of the air intake conduit “bends” the high-speed air to create shocks that compress the air flow in a highly efficient process that super-concentrates air-density to a level required by the engine. While this is one of the innovations of jet design, the sometimes-violent breakdown of this compressed air stream into the engine results in a deadly “unstart,” or engine failure event.

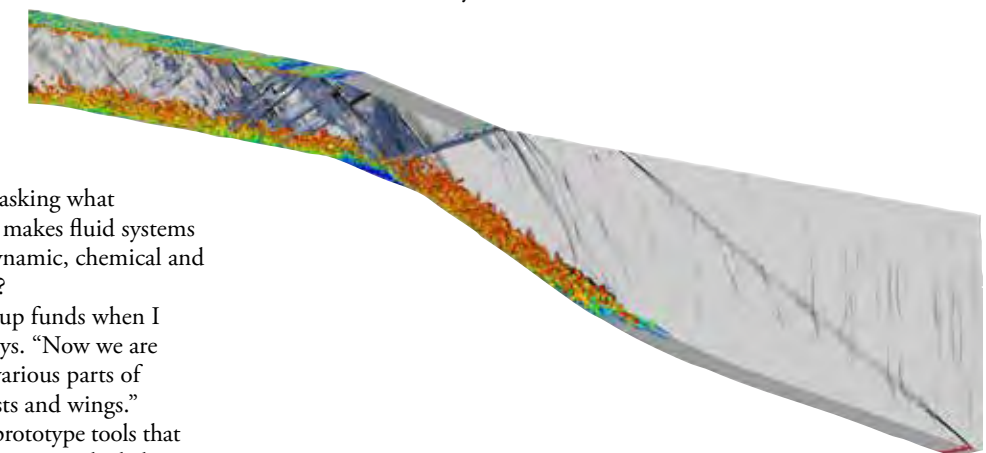
“If we can tweak the geometry of the inlet’s internal design,” Sasidharan Nair says, “we can produce a more robust inlet shock train that will mitigate these back-pressure variations, making them less sensitive to disturbances.”

### Back to Basics

In addition to these military applications, Sasidharan Nair’s computational approaches and FCAAP’s aerodynamics research facilities are being used for work on fundamental fluid dynamics. In a research and development project, Sasidharan Nair is looking at fundamental questions involving hydrodynamic stability and the aerothermal chemistry of fluid dynamics. He’s asking what causes instability in fluid flows, as well as what makes fluid systems challenging to predict; and what are the aerodynamic, chemical and thermodynamic properties of high-speed flows?

“I had the opportunity to leverage my startup funds when I joined the college in 2019,” Sasidharan Nair says. “Now we are working on grants that will affect and inform various parts of aircraft design for the future, like inlets, exhausts and wings.”

With the funds, he created the algorithmic prototype tools that were the basis for these military and R&D grants. It was, he believes, his contribution to the burgeoning computational aerodynamics and aerospace research center that will soon be a reality.



Simulation of the air flow inside an inlet of a supersonic aircraft. (Courtesy Sasidharan Nair)

“We are not as big as some others but we are very **efficient** for our size. This work is a big step toward our goal to become the **leading center** that addresses high-speed aerodynamics for commercial and defense applications.”

— FARRUKH ALVI, SENIOR ASSOCIATE DEAN

Farrukh Alvi, senior associate dean for research and graduate studies and mechanical engineering professor, agrees.

“Unni’s work complements and leverages our current work in high-speed aerodynamics and jet aero-acoustics, and our strong computational skills in the field,” he says. The computational and experimental team in mechanical engineering now routinely tackles multi-scale, multi-physics projects.

The dream is still to become a computational center of excellence, but that’s for others to bestow. FAMU-FSU Engineering is already in the top 10 nationally for high-speed experiential aerospace research with its FCAAP facilities, and Sasidharan Nair’s work is a great complement and extension to that.

“We are not as big as some others but we are very efficient for our size,” Alvi contends. “This work is a big step toward our goal to become the leading center that addresses high-speed aerodynamics for commercial and defense applications.”

With the rich groundwork laid by Kumar, Cattafesta, Shoele, Yaghoobian and a host of others in the mechanical engineering department, the opportunities seem endless for collaboration and innovation in the aerospace sector.

“Our work college-wide in these areas, combined with our advanced materials capability, make us holistically suited for tackling more realistic and complex problems, now and in the future,” Alvi says.



# Researchers enhance quantum machine learning algorithms

QUANTUM

**WILLIAM OATES, THE CUMMINS INC. PROFESSOR AND CHAIR** of the department of mechanical engineering, and postdoctoral researcher Guanglei Xu found a way to automatically infer parameters used in an important quantum Boltzmann machine algorithm for machine learning applications.

Their findings were published in *Scientific Reports*, a multidisciplinary journal from the publishers of Nature.

The work could help build artificial neural networks to be used for training computers to solve complicated, interconnected problems like image recognition, drug discovery and the creation of new materials.

“There’s a belief that quantum computing, as it comes online and grows in computational power, can provide you with some new tools, but figuring out how to program it and how to apply it in certain applications is a big question,” Oates said.

Quantum bits, unlike binary bits in a standard computer, can exist in more than one state at a time, a concept known as superposition. Measuring the state of a quantum bit — or qubit — causes it to lose that special state, so quantum computers work by calculating the probability of a qubit’s state before it is observed.

Specialized quantum computers known as quantum annealers are one tool for doing this type of computing. They work by representing each state of a qubit as an energy level. The lowest energy state among its qubits gives the solution to a problem. The result is a machine that could handle complicated, interconnected systems that would take a regular computer a very long time to calculate — like building a neural network.

One way to build neural networks is by using a restricted Boltzmann machine, an algorithm that uses probability to learn based on inputs given to the network. Oates and Xu found a way to automatically calculate an important parameter associated with effective temperature that is used in that algorithm. Restricted Boltzmann machines typically guess at that parameter instead, which requires testing to confirm and can change whenever the computer is asked to investigate a new problem.

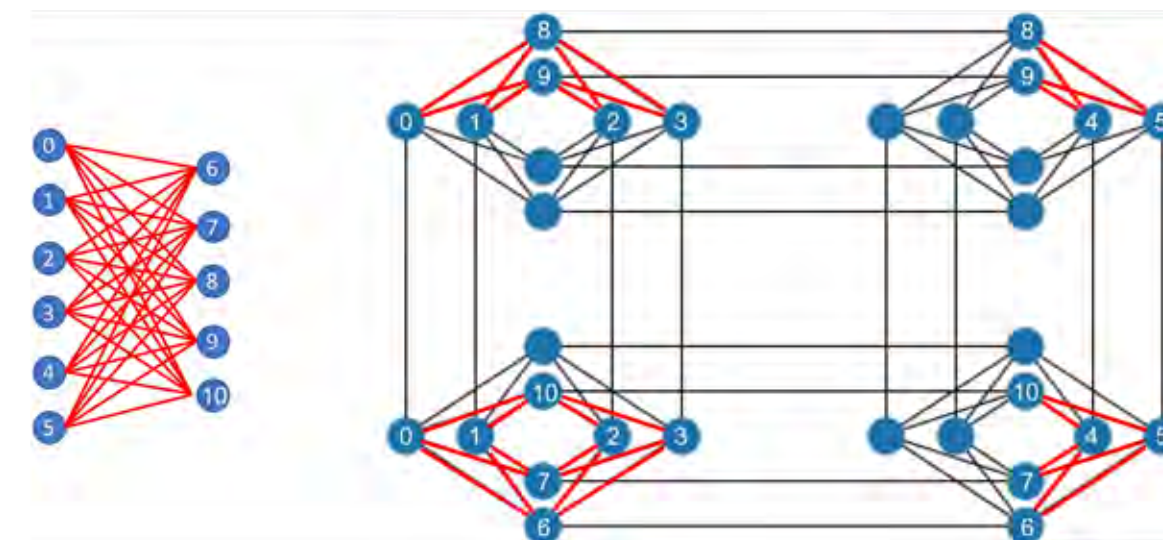


William Oates, Cummins, Inc. Professor and chair of mechanical engineering.

“That parameter in the model replicates what the quantum annealer is doing,” Oates said. “If you can accurately estimate it, you can train your neural network more effectively and use it for predicting things.”

One way to build **neural networks** is by using a restricted Boltzmann machine, an algorithm that uses probability to learn based on inputs given to the network. Oates and Xu found a way to **automatically calculate** an important parameter associated with effective temperature that is used in that algorithm.

► Illustration of a Restricted Boltzmann Machine (RBM) bipartite graph of size 6x5 (left), and embedded Chimera graph<sup>7</sup> on D-Wave hardware (right). (Courtesy Oates)



# Engineering researchers visualize the motion of vortices in superfluid turbulence

**NOBEL LAUREATE IN PHYSICS RICHARD FEYNMAN** once described turbulence as “the most important unsolved problem of classical physics.”

Understanding turbulence in classical fluids like water and air is difficult partly because of the challenge in identifying the vortices swirling within those fluids. Locating vortex tubes and tracking their motion could greatly simplify the modeling of turbulence.

But that challenge is easier in quantum fluids, which exist at low enough temperatures that quantum mechanics—which deals with physics on the scale of atoms or subatomic particles—govern their behavior.

In a new study published in Proceedings of the National Academy of Sciences, engineering researchers managed to visualize the vortex tubes in a quantum fluid, findings that could help researchers better understand turbulence in quantum fluids and beyond.

“Our study is important not only because it broadens our understanding of turbulence in general, but also because it could benefit the studies of various physical systems that also involve vortex tubes, such as superconductors and even neutron stars,” said Wei Guo, an associate professor of mechanical engineering and the study’s principal investigator.

The research team studied superfluid helium-4, a quantum fluid that exists at extremely low temperatures and can flow forever down a narrow space without apparent friction.

superdiffusion of the tracers in their experiment was not actually caused by Lévy flights. Something else was happening.

“We finally figured out that the superdiffusion we observed was caused by the relationship between the vortex velocities at different times,” said Yuan Tang, a postdoctoral researcher at the National High Magnetic Field Laboratory and a paper author. “The motion of every vortex segment initially appeared to be random, but actually, the velocity of a segment at one time was positively correlated to its velocity at the next time instance. This observation has allowed us to uncover some hidden generic statistical properties of a chaotic random vortex tangle, which could be useful in multiple branches of physics.”

Unlike in classical fluids, vortex tubes in superfluid helium-4 are stable and well-defined objects.

“They are essentially tiny tornadoes swirling in a chaotic storm but with extremely thin hollow cores,” Tang said. “You can’t see them with the naked eye, not even with the strongest microscope.”

“To solve this, we conducted our experiments in the cryogenics lab, where we added tracer particles in helium to visualize them,” added Shiran Bao, a postdoctoral researcher at the National High Magnetic Field Laboratory and a paper author.

The researchers injected a mixture of deuterium gas and helium gas into the cold superfluid helium. Upon injection, the deuterium gas solidified and formed tiny ice particles, which the researchers used as the tracers in the fluid.

“The **motion** of every vortex segment initially appeared to be **random**, but actually, the velocity of a segment at one time was positively correlated to its velocity at the next time instance. This observation has allowed us to uncover some hidden generic **statistical properties** of a chaotic random vortex tangle, which could be **useful** in multiple branches of physics.” —ASSOCIATE PROFESSOR WEI GUO

Guo’s team examined tracer particles trapped in the vortices and observed for the first time that as vortex tubes appeared, they moved in a random pattern and, on average, rapidly moved away from their starting point. The displacement of these trapped tracers appeared to increase with time much faster than that in regular molecular diffusion — a process known as superdiffusion.

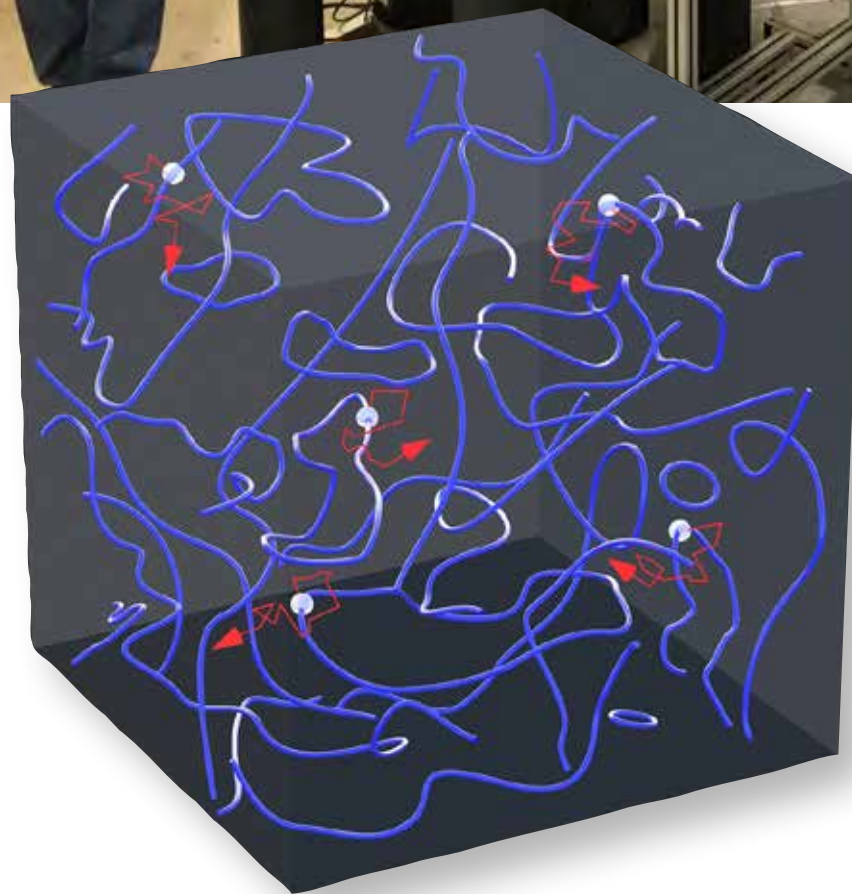
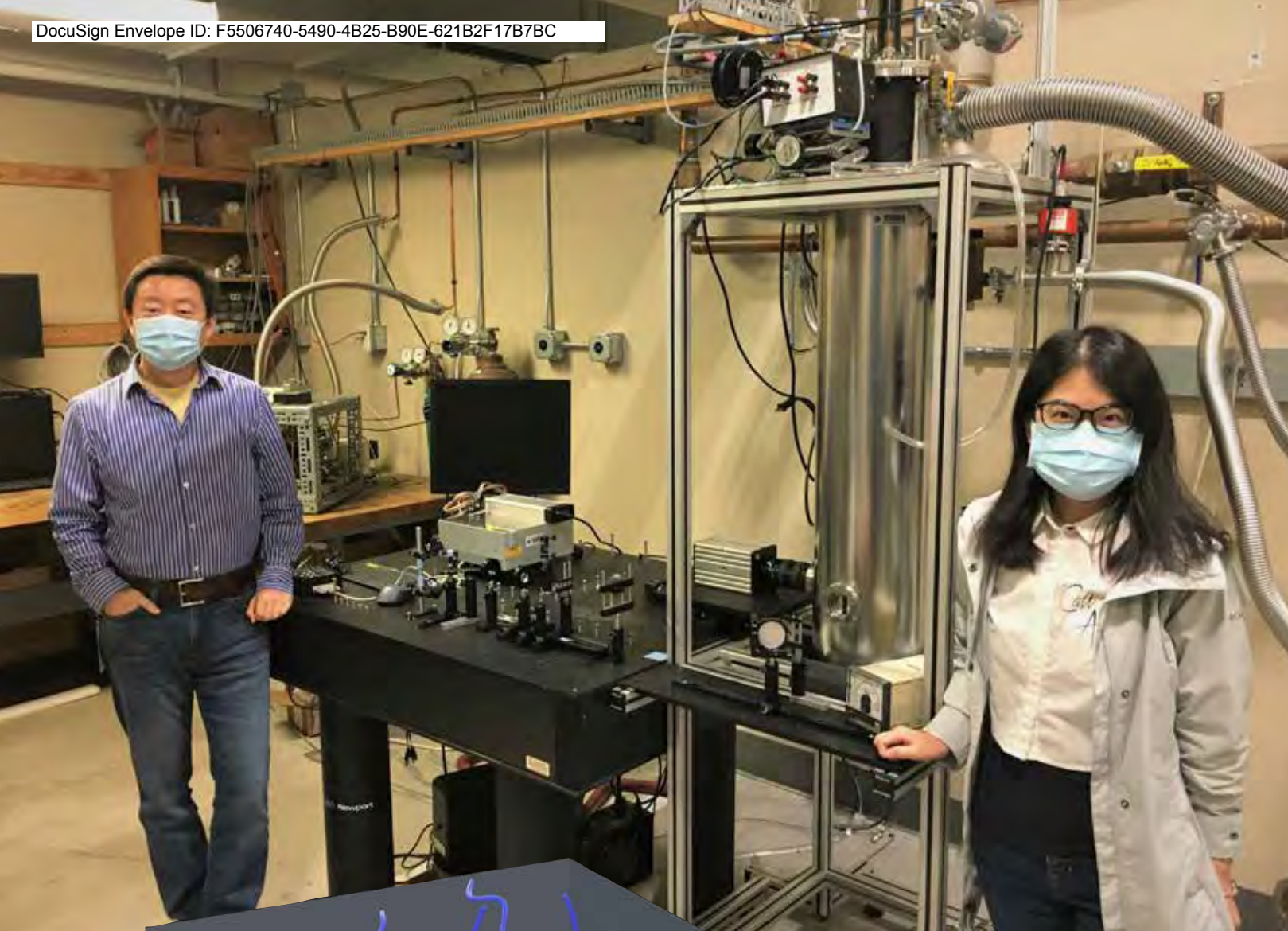
Analyzing what happened led them to uncover how the vortex velocities changed over time, which is important information for statistical modeling of quantum-fluid turbulence.

“Superdiffusion has been observed in many systems such as the cellular transport in biological systems and the search patterns of human hunter-gatherers,” Guo said. “An established explanation of superdiffusion for things moving randomly is that they occasionally have exceptionally long displacements, which are known as Lévy flights.”

But after analyzing their data, Guo’s team concluded that the

“Just like tornadoes in air can suck in nearby leaves, our tracers can also get trapped on the vortex tubes in helium when they are close to the tubes,” Guo said.

This visualization technique is not new and has been used by scientists in research labs worldwide, but the breakthrough these researchers made was to develop a new algorithm that allowed them to distinguish the tracers trapped on vortices from those that were not trapped.



Associate professor in mechanical engineering **Wei Guo** (above, left) and post-doctoral researcher **Yuan Tang** (above, right) were able to visualize the vortex tubes in a quantum fluid (left), which could help researchers better understand turbulence in quantum fields and beyond. Their work was published in Proceedings of the National Academy of Sciences.

## The Center for Advanced Power Systems part of \$1.6 million grant from ARPA-E for transformational energy technology

### THE CENTER FOR ADVANCED POWER SYSTEMS

(CAPS) is part of a \$1.6 million grant from the U.S. Department of Energy's Advanced Research Projects Agency-Energy (ARPA-E). The project is a partnership with lead organization Advanced Conductor Technologies (ACT), as a small business in the superconductor sector. Researchers from CAPS and ACT aim to design power-dense superconducting cables for electric aircraft.

"This funding really speaks to the successful, long-term partnership of CAPS and ACT," said Sastry Pamidi, chair of the electrical and computer engineering department and associate director of CAPS. "ACT has been a partner with us in more than 10 different projects, totaling over \$1 million in research funds for the center's work."

In past projects, CAPS researchers have worked with ACT on their superconducting Conductor on Round Core (CORC®) cables for U.S. Navy electric ship technologies. The practical applications of ARPA-E's funded research focus on superconducting power cables for use in future twin-aisle electric aircraft with distributed electric propulsion.

"Electric aircraft require high power in smaller, lighter packages," Pamidi explained. "That means we need to make the power cables with a high power density. ACT's superconducting CORC® cables are perfect for that. Using our experience working on the technology for ships we will now be able to work on cables for electric aircraft."

The project team includes Pamidi and members of his research staff, Danko van der Laan, president and CEO of Advanced Conductor Technologies and other ACT personnel, and Doan Nguyen, Ph.D., Director of the National High Magnetic Field Laboratory's Pulsed Field Facility at Los Alamos National Laboratory.

"Our **goal** is to develop superconducting **cables** that will ultimately be able to deliver power of up to 50 MW to the **electric** motors of future **aircraft**, which is the power required during take-off of large twin-aisle passenger aircraft with 200–300 passengers. "

— DANKO VAN DER LAAN, PRESIDENT AND CEO OF ACT

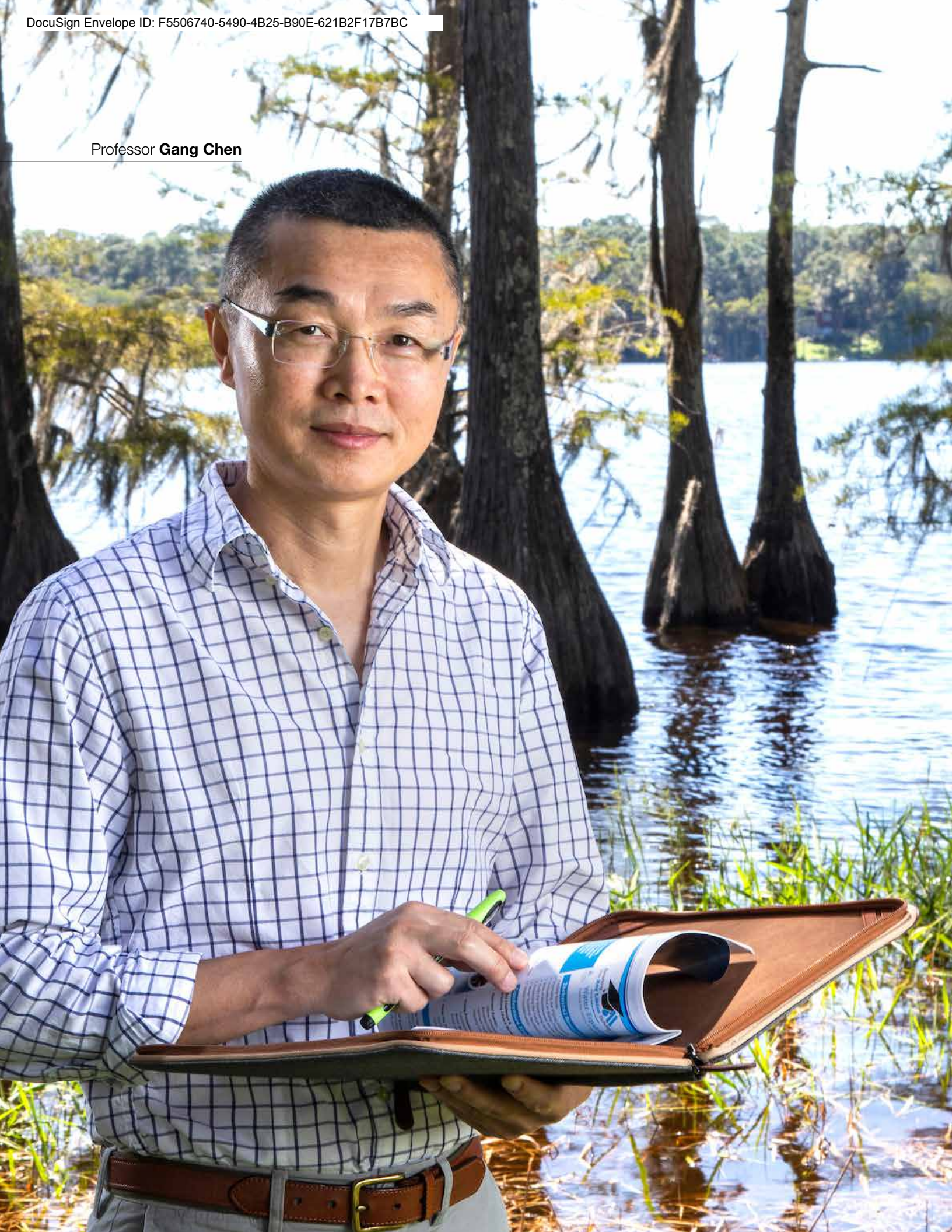
ACT received this competitive award from ARPA-E's (Topics Informing New Program Area's) Connecting Aviation By Lighter Electric Systems (CABLES) Topic, for the development of technologies for medium-voltage (>10 kV) power distribution cables with fault current limiting abilities and cable connectors for fully electric aviation applications.

"Our goal is to develop superconducting cables that will ultimately be able to deliver power of up to 50 MW to the electric motors of future aircraft, which is the power required during take-off of large twin-aisle passenger aircraft with 200-300 passengers. The cable technology would ultimately be applied to aircraft that would burn liquid hydrogen, which would also provide the cooling to the superconducting cables, enabling fully carbon-free commercial flights," according to ACT's van der Laan.



Professor **Sastry Pamidi** and **Danko van der Laan** of Advanced Conductor Technologies (ACT).

Students in the cryogenics superconducting lab at CAPS

Professor **Gang Chen**

# New climate model helps researchers better predict water needs

ENVIRONMENT

## NEW RESEARCH COMBINES CLIMATE AND LAND USE

projections to predict water availability.

“Current climate models are a reliable tool to predict future water availability,” said Gang Chen, a professor of civil and environmental engineering. “What we are lacking is enough data to make those models as effective as they can be.”

Chen is leading a team of experts to produce new data techniques to improve hydrological modeling that is essential for water resource management planning. Their work was published in *WATER*.

The study looked at the hydrological processes in Alabama’s Upper Choctawhatchee River Watershed, which eventually flows into Florida and empties into the Choctawhatchee Bay. Using modeling software known as the Soil and Water Assessment Tool, the researchers integrated land use projections with future climate data to study the combined effects on the hydrological response of the watershed.

“Using water balance simulations, we discovered that surface runoff and evapotranspiration are dominant pathways for water loss in the Southeast,” Chen said.

Yashar Makhtoumi, a doctoral candidate in the department of civil and environmental engineering, is working with Chen on new data downscaling techniques. The innovative process provides more data and improves modeling outcomes.

“Few research projects have been done to investigate the combined effects of land use change and climate change using projections,” Makhtoumi said.

“Current climate **models** are a reliable tool to predict future water availability. What we are lacking is enough **data** to make those models as **effective** as they can be.”

— PROFESSOR GANG CHEN

The results of the study showed the impacts on water resource variables were seasonal. Surface runoff caused the most significant changes in various simulations, and evapotranspiration was also an issue, though to a lesser degree. The models indicate that by midcentury, more frequent extremes in water balance are projected to be an issue.

Although the research focuses on a single watershed, the researchers believe their work could be applicable on a wider scale. That’s important for a state like Florida, where population growth, development and climate change are forcing residents and planners to realize the limitations of the state’s water supply.



Doctoral candidate in civil and environmental engineering **Yashar Makhtoumi** is working with Professor Chen to increase data and improve outcomes for the new water modeling technique.

“Our model demonstrated that it could capture hydrologic parameters accurately and could be used for future studies of water quality,” Chen said. “It can provide the necessary data to determine sustainable conservation practices needed now and in the future to help manage and protect our water resources.”

Researchers from Florida A&M University and California State Polytechnic University Pomona contributed to this work.

The research was supported by a \$1.2 million grant from the National Institute of Food and Agriculture of USDA.

# \$1.4M NIH grant helps researchers clean carcinogens from groundwater

**AN ENGINEERING RESEARCHER IS LEADING A STUDY** into how bacteria can be used to remove carcinogens from groundwater thanks to a \$1.4 million grant from the National Institute of Environmental Health Sciences.

Researchers from the FAMU-FSU College of Engineering will collaborate with Texas Tech University to investigate a bioremediation method that could remove health hazards like chlorinated volatile organic compounds (CVOCs) and 1,4-dioxane more rapidly than current technology. The process could be an effective tool for cleaning so-called Superfund sites, places that are contaminated from hazardous waste and deemed a priority for cleanup by the U.S. Environmental Protection Agency.

“The bioremediation techniques we are using have the potential to take carcinogens from polluted locations that normally require a long-term response,” said Youneng Tang, an assistant professor in the department of civil and environmental engineering.

The research uses bacteria that grow on what are called macrocyclic molecules, which have a unique geometry and internal chemistry that allows them to individually bind with molecules like CVOCs and 1,4-Dioxane.

That’s especially important for remediating groundwater containing those compounds, because they need different conditions to biodegrade. CVOCs require anaerobic conditions (free from oxygen) to biodegrade, but 1,4-Dioxane metabolizes under aerobic circumstances (needing oxygen).

“The process of remediation requires two steps,” Tang said. “First, we promote growth of dechlorinating biofilm on one type

“We hope our research will give us a better understanding of the mechanisms of how novel sorbents **enhance** bioremediation. Our long-term goal is to make biological processes more **effective** and **sustainable** in the near future.”

— ASSISTANT PROFESSOR YOUNENG TANG

of material to anaerobically biodegrade the CVOC, then we use another macrocyclic material to produce a highly efficient culture to aerobically metabolize 1,4-Dioxane.”

In an off-site treatment for the contaminants, the researchers pack a reactor with absorbing materials. Then they pump contaminated groundwater through the reactor to allow the bacteria to develop and degrade the contaminant.

For on-site treatment, they reduce an absorbent material to microscopic size and inject it directly into the ground. The material then absorbs contaminants and bacteria that can degrade the pollutants.

“We hope our research will give us a better understanding of the mechanisms of how novel sorbents enhance bioremediation,” Tang said. “Our long-term goal is to make biological processes more effective and sustainable in the near future.”

The researchers plan to perform two long-term studies at a Superfund site and are partnering with Geosyntec Consultants of Huntington Beach, California, to test the feasibility of the proposed remediation.

Yuexiao Shen, assistant professor of civil engineering at Texas Tech University, is leading the effort at TTU.

Colonies (cultures of bacteria) from Tang’s research on an agar plate. The colonies originated from a local wastewater treatment plant and are able to degrade 1,4-Dioxane (a contaminant in this project) to low levels. His research includes isolating the colonies as pure cultures for future studies.

Assistant Professor **Youneng Tang**

# Multidisciplinary NSF CIVIC grant to study community resilience to disaster

**EREN OZGUVEN, PROFESSOR IN CIVIL AND ENVIRONMENTAL** engineering, is co-PI for a cross-campus team of researchers in a new National Science Foundation Civic Innovation Challenge (NSF CIVIC) project titled “Rural Resiliency Hubs: A Planning Approach to Addressing the Resiliency Divide.” The project, co-led by Florida State University College of Communication and Information (CCI) Associate Dean for Research and School of Information Professor Marcia A. Mardis, began in January 2021.

In addition to Mardis and Ozguven, the team includes faculty from Florida State University’s College of Social Work, Department of Geography and College of Medicine.

“To bring researchers together from so many different units across campus gives us the benefit of a wide range of expertise and perspectives to support our nearby rural neighbors,” Mardis said.

According to Ozguven, the goal is to “study and develop emergency plans that fit distinct needs of rural communities, guided by a central hypothesis: Understanding interdependencies among the community actors, population needs, environment, information, and infrastructure that foster emergency operations efficacy in rural communities can lead to the successful strategies and policies for optimizing multi-faceted disaster response.”

The NSF CIVIC challenge is a research and action-based competition that strives to make a stronger research-to-innovation pipeline. It is awarded to researchers who encourage collaboration with civic community partners such as non-profit representatives, community organizers and community service providers. This challenge switches the community-university dynamic by asking communities to identify issues that require innovative thinking and then partner with researchers who can create solutions.

Building on Mardis and Jones’ current Institute of Museum and Library Services project about the central role of public libraries in rural Florida’s disaster response and related FSU projects funded by the NSF’s Coasts and People (CoPe) program and the College

of Medicine’s Clinical and Translational Science Award (CTSA) partnership, this multidisciplinary research team will investigate how rural communities respond to natural disasters. These previous studies have focused on how communities utilize public libraries and community assets to distribute aid to citizens, working from the premise that rural communities do not have quick access to public infrastructure or detailed plans for disaster response and, as a result, are suffering a “resiliency divide” from their urban counterparts.

“This project is short but impactful,” Mardis said. “Not only will this work help us define community-based disaster ecosystems, but it will also further position public libraries as resiliency hubs that are an intentional part of action plans and models for other communities.”



Professor in civil and environmental engineering **Eren Ozguven** collaborated in a NSF study to define and bolster community-based disaster ecosystems, including libraries.

The goal is to study and develop emergency plans that fit distinct needs of rural communities, guided by a central hypothesis: Understanding **interdependencies** in communities and the factors that foster emergency operations efficacy in rural communities can lead to the successful strategies and policies for optimizing **multi-faceted** disaster response.

Commercial products that delay or eliminate reflective cracking are on the market, but inconsistency in their **performance** is a big issue. There is a need for **better testing methods** in the lab for interlayer manufacturers and local transportation agencies.

## Civil engineering professor developing new testing apparatus for improved road repair materials

INFRASTRUCTURE

**ONE OUT OF EVERY FIVE MILES OF HIGHWAY PAVEMENT** is in poor condition and needs significant road repair, according to the American Society of Civil Engineers. Driving on poor roads costs U.S. motorists \$120.5 billion in extra vehicle repair and operating costs, according to the group, and cracks in road pavement is a factor.

Qian Zhang, an assistant professor in civil and environmental engineering, wants to improve those numbers and is developing a new system to test material that supports how roads perform.

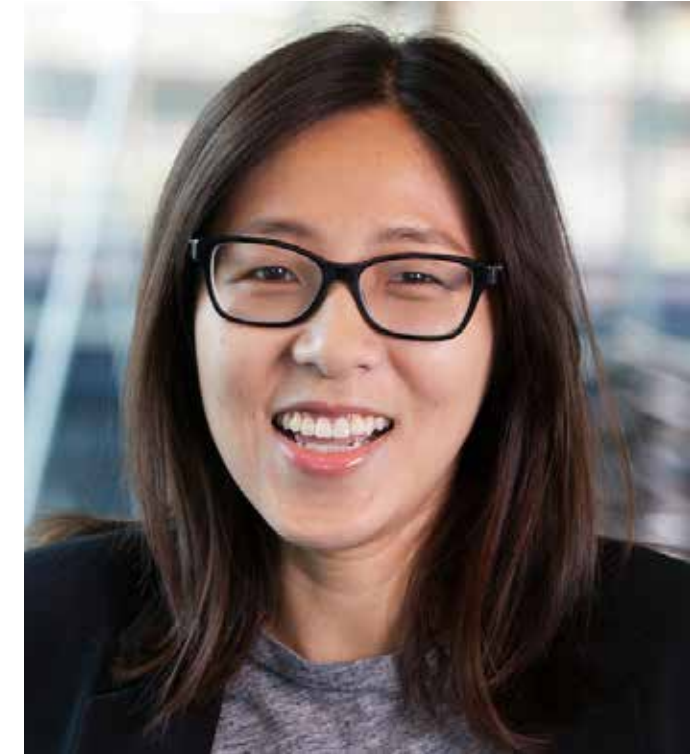
Zhang is working on a lab-scale testing apparatus and method that evaluates products used to reinforce pavement during rehabilitation. The products specifically treat reflective cracking problems that are a leading cause of pavement failure.

“Many commercial interlayer products and treatments have been developed to treat reflective cracking problems,” Zhang says. “These products don’t all perform in the same way, and we need consistent ways to evaluate them before they are used in the field.”

Reflective cracking is a type of failure in asphalt pavement repairs that occurs with traffic and thermal loading. Repeated stress causes cracks to develop in locations where there are joints in the existing pavement. Paved roads have interlayer products applied to improve performance that can also extend the life of the pavement.

“Local transportation agencies need to know what product works best for their particular road conditions,” Zhang says. “Manufacturers also need to better understand how their product performs.”

Conditions like road use, subgrade condition and many other factors can affect how well the interlayer products work. Commercial products that delay or eliminate reflective cracking are on the market, but inconsistency in their performance is a big issue. There is a need for better testing methods in the lab for interlayer manufacturers and local transportation agencies.



Assistant professor in civil and environmental engineering **Qian Zhang** won Florida State University’s Grant Assistance Program (GAP) Commercialization Investment Program funding for her road reinforcement testing product to help bring it to market.

“The **GAP award** helps researchers further develop a **promising** research invention—in my case, a testing system—and turn it into a **commercial** product.” — ASSISTANT PROFESSOR QIAN ZHANG

“We are working to address these challenges and develop a reliable testing set up and protocol that considers all major loading effects and support conditions related to reflective cracking,” Zhang explains.

Her research is funded in part by the Grant Assistance Program (GAP) Commercialization Investment Program at Florida State University. Zhang recently earned a GAP award that supports

researchers who bring their academic work to the marketplace.

“The GAP award help researchers to further develop a promising research invention — in my case, a testing system — and turn it into a commercial product,” Zhang says. She is working with a graduate student and leading synthetic pavement interlayer company, TenCate Geosynthetics, on the project.

# Engineering researcher develops a tool aimed at better stormwater management, planning

## FLORIDA IS THE THIRD MOST POPULOUS STATE

in the nation and it's still growing. As the population increases, the state must balance a growing population with protecting the natural environment.

The strained link between land development and the state's water resources is the focus of a new study by Assistant Professor Nasrin Alamdari.

Stormwater management systems are vital in reducing runoff and controlling flooding that can harm water quality. However, Alamdari, a civil engineer, says that more stormwater resource tools are needed for managers and other decision-makers to analyze how systems perform.

"We are developing a holistic planning tool for water resource managers and other decision-makers to use when deciding a course of action," Alamdari said. "Our tool predicts the effects of stormwater management and gives hard data to show the cost-effectiveness of various solutions."

Alamdari is developing a new open-source tool to predict the effects of best management practice (BMP) in stormwater management. BMP techniques include structural, vegetative and managerial practices to treat, prevent and reduce water pollution.

In urban areas where the strain from growth is the greatest, impervious surfaces prevent water from naturally soaking into the ground. The water instead picks up debris, trash, and other pollutants and causes flooding. Stormwater management practices include bio-retention basins, wet ponds, vegetated swales and infiltration trenches to handle water flow in the environment.

Alamdari is working with urban planners from cities and counties across Florida. The decision support tool she is working on allows integration of the hydrologic model, EPA Stormwater Management Model (SWMM), to simulate runoff and pollutant loads.

"The final product will be a free, open-source tool that includes hydrologic and water quality treatment in a different range of BMPs, site selection of BMPs, and automatic cost optimization based on runoff and nutrient reduction goals," Alamdari said.

The open-source tool will apply to urban communities throughout Florida, and the modeling framework is transferable to urban centers across the United States.

"We plan to increase public awareness through community participation and outreach," Alamdari said. "We hope to educate the general public as well as engineers, scientists, and stormwater managers in strategies available in their communities."

Her research is funded by a grant from the Florida Department of Environmental Protection.

"We are developing a **holistic** planning tool for water resource managers and other decision-makers to use when **deciding** a course of action. Our tool predicts the effects of stormwater management and gives **hard data** to show the cost-effectiveness of various solutions."

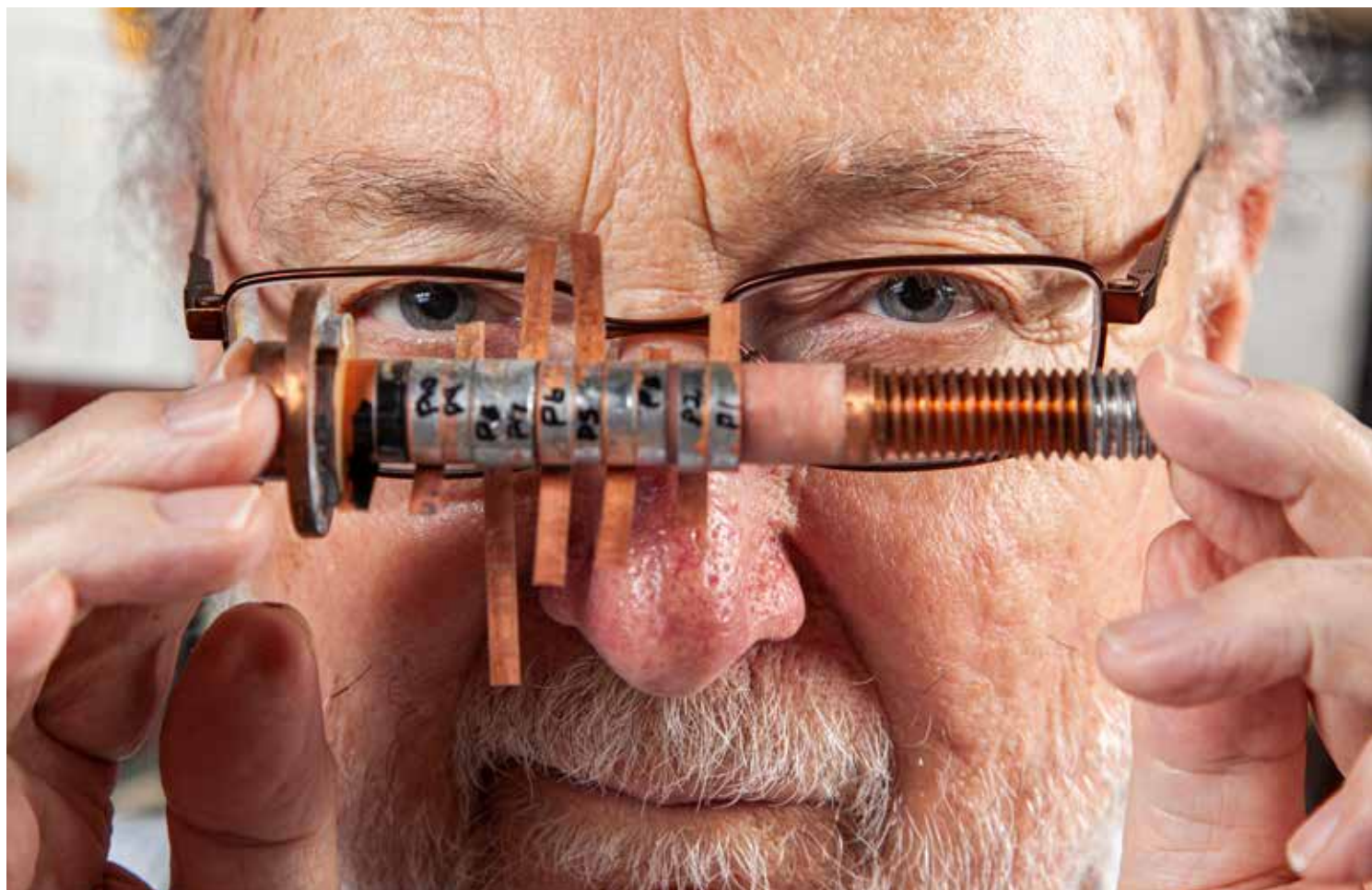
— ASSISTANT PROFESSOR NASRIN ALAMDARI



Assistant Professor in civil and environmental engineering **Nasrin Alamdari** recently built a tool that helps predict the effects of stormwater management and provides cost-effectiveness data for various solutions.



# Superconductivity expert elected Fellow of Royal Academy of Engineering



Materials scientist  
Engineering professor  
Chief materials scientist  
Fellow, Royal Academy

**DAVID LARBALESTIER, THE CHIEF MATERIALS SCIENTIST** at the National High Magnetic Field Laboratory and a Krafft Professor in the department of mechanical engineering at the FAMU-FSU College of Engineering, has been elected a Fellow of the Royal Academy of Engineering.

Larbalestier was cited for his “seminal work in high current, high field superconducting materials for over 50 years.” A native of the United Kingdom, he joins 49 of his compatriots in this year’s group of Fellows, along with three International Fellows. The Royal Academy is the U.K.’s national academy for engineering and technology, dedicated to advancing and promoting excellence in engineering for the benefit of society.

Larbalestier has accrued numerous honors over his career, most of which has been spent stateside. But this one, he said, feels different.

“There’s no question that there’s something special about being honored by the academy of the land of your birth,” Larbalestier said.

Throughout his career, Larbalestier has pushed the envelope on superconductor technologies. Superconductors are materials that conduct electricity with perfect efficiency. Unlike copper, in which energy is lost through the friction of the moving electrons,

superconductors allow electrons to flow unimpeded, under the right (and typically extremely cold) conditions.

Over the decades, he has played a leading role in developing early superconductors like niobium tin and niobium titanium, helped to transfer that technology to medical and scientific use in MRI machines, nuclear magnetic resonance instruments and particle accelerators, and has constantly improved the performance of those materials.

In the 1980s, the first high-temperature superconductors (HTS) were discovered, compounds that perform at higher, more practical temperatures but presented their own challenges in terms of wire production. In fact, no magnets of any utility were made with HTS wire for two decades. However, the National MagLab believed in their potential and in 2006 invited the Applied Superconductivity Center (ASC), then based at the University of Wisconsin-Madison and directed by Larbalestier, to join the lab and FSU.

Since then, he has led partnerships that have driven HTS materials to magnetic fields twice as high as any possible with niobium tin. This work culminated in the 32-tesla magnet, the world’s strongest superconducting magnet. Designed and built at the National MagLab and slated to open for experiments later this year, it features the HTS conductor YBCO (yttrium barium copper oxide).

Another world-record magnet that Larbalestier shepherded into being is the world’s strongest continuous field magnet. In 2017, this test magnet generated a field of 45.5 teslas using the superconductor known as REBCO (rare earth barium copper oxide) and a novel “no insulation” design. The article reporting the achievement, one of 12 papers Larbalestier has published in the prestigious journal *Nature*, was among the most highly cited science articles of 2019. In all, Larbalestier’s 490 publications have received more than 17,000 citations.

“From superconducting materials to magnet technologies to international partnerships, David has been the engine behind many prestigious firsts at the MagLab,” said Greg Boebinger, director of the National MagLab. “He fully deserves to be the first faculty member elected to the Royal Academy.”

The new honor pairs nicely with Larbalestier’s 2003 election as a Fellow of the National Academy of Engineering in the U.S., noted J. Murray Gibson, dean of the FAMU-FSU College of Engineering.

“David Larbalestier is a world-leading materials engineer who we are fortunate to have as a member of our mechanical engineering faculty,” Gibson said. “David’s work to develop real applications for superconducting wires has changed the world.”

After earning his doctorate in materials engineering at Imperial College London, Larbalestier launched his career at the Superconducting Magnet Research Group at Rutherford Laboratory in the U.K., where he developed multifilamentary niobium tin conductors and magnets. In 1976, he moved to the U.S. to become a faculty member at UW-Madison, where he taught in the department of materials science and engineering and the Department of Physics and joined the ASC, rising to director in 1990. He continued as director through 2018.

Since his early days in superconductivity, when he began collaborations with the magnet manufacturer Oxford Instruments that have flourished ever since, industry partnerships have been a hallmark of Larbalestier’s career. The MagLab has always supported that synergy as ASC research has helped advance more powerful, more efficient magnets from hospital MRIs to the Large Hadron Collider to the National MagLab’s own research magnets.

“It’s the ability of the MagLab to do both science and great technology that I’m very pleased to see celebrated in the Royal



Professor and Chief Materials Scientist **David Larbalestier**.

Over the decades, Larbalestier has played a **leading role** in developing early **superconductors** like niobium tin and niobium titanium, helped to transfer that technology to medical and scientific use in MRI machines, nuclear magnetic resonance instruments and particle accelerators, and has constantly **improved the performance** of those materials.

Academy’s citation,” said Larbalestier, who has also actively promoted collaborations with other national laboratories and university groups.

Many other honors have preceded this most recent distinction. Larbalestier has been awarded prizes from the Institute of Electrical and Electronics Engineers (IEEE) and the Council for Chemical Research; was given a Lifetime Achievement Award by the International Cryogenic Materials Conference; and was the Distinguished Lecturer at an IEEE Council on Superconductivity. He is a Fellow of the American Physical Society, the Institute of Physics (U.K.), the National Academy of Inventors, the IEEE, the Materials Research Society and the American Association for the Advancement of Science.

Among his many other professional duties, Larbalestier has served as a member of the U.S. Department of Energy’s High Energy Physics Advisory Panel and the National Materials and Manufacturing Board of the National Research Council.

# Professor honored as Fellow of the Cryogenic Society of America

A FAMU-FSU COLLEGE OF ENGINEERING PROFESSOR recognized in cryogenics has been selected as a Fellow from the Cryogenics Society of America.

Sastry Pamidi is the chair and professor of electrical and computer engineering and the associate director for the Center for Advanced Power Systems (CAPS). Pamidi received the award during the virtual joint 23rd Cryogenic Engineering Conference and International Cryogenic Materials Conference, held in July 2021.

“Professor Pamidi is a leader in the field of superconducting cables and cryogenic technology related to superconducting power devices,” said Dean Murray Gibson. “It is a pleasure to see him recognized by his colleagues.”

The Cryogenic Society of America Fellowship is bestowed on persons who have made notable contributions of significant magnitude to the field of cryogenics. The distinction is awarded to one or two persons every other year.

“It is a distinct honor to be elected as a Fellow of the Cryogenic Society of America,” Pamidi said. “I am pleased to join the distinguished group of CSA Fellows. The CSA is the professional organization for cryogenic engineers in all areas of the field, and I am proud that my contributions to the field of cryogenics are acknowledged by my peers.”

Pamidi has been working on the development of superconducting devices and related cryogenic technologies since 2000 and has published more than 190 peer-reviewed papers. He leads a multidisciplinary research group at CAPS and has worked

“Professor Pamidi has made **substantial** contributions in the area of **cryogenics** and has advanced our understanding in superconducting technologies that are **far-reaching**.”

— ROGER MCGINNIS, DIRECTOR OF CAPS

in research laboratories in Asia, Europe and the United States. He collaborates with many research groups worldwide.

“Dr. Pamidi’s research contributions and personal qualities are fitting with the status of a Fellow,” said Lance Cooley, a professor in mechanical engineering and the director of the Applied Superconductivity Center. “His warmth and friendliness have been essential to keep collaborations together and maintain esprit de corps during difficult project stretches.”

Pamidi and his team have been developing high-temperature superconducting devices by integrating cryogenic, superconducting and high voltage engineering technologies.

“Professor Pamidi has made substantial contributions in the area of cryogenics and has advanced our understanding in superconducting technologies that are far-reaching,” Roger McGinnis, director of CAPS, said. “He takes great pride in mentoring our students, and our students greatly appreciate his kindness, mentorship and teaching.”

Chul Kim and Peter Cheetham, faculty researchers at CAPS and members of Pamidi’s team, expressed a sentiment similar to McGinnis’.

“Professor Pamidi being recognized as a CSA fellow demonstrates the significant and long-lasting impact his research has had on the cryogenic community,” Cheetham said. “The recognition gives us the opportunity to show our appreciation and thank him for the work he does at both the FAMU-FSU College of Engineering and the Center for Advanced Power Systems to train and mentor the next generation of engineers.”

“Our team has greatly benefited from Professor Pamidi’s broad knowledge and passionate energy. His enthusiasm in research and teaching has a positive influence on everyone.” Kim said.

“Being honored as Fellow for the CSA is a recognition of not only my contributions but also of my past and current team members and my students who made significant contributions to advancing cryogenic technology for superconducting power devices,” Pamidi said.



Matthew Sze (in red with back to the camera) with Omicron, conducted a site visit to the high voltage lab at CAPS to demonstrate partial discharge measurements for power devices to graduate and undergraduate students enrolled in **Dr. Sastry Pamidi’s** Instrumentation and Measurement class. (Photo: M Wallheiser)

Professor **Sastry Pamidi**

# College partners with ASTERIX to build pipeline of diversity in STEM workforce

**FACULTY AT THE FAMU-FSU COLLEGE OF ENGINEERING** are part of a new Florida International University (FIU)-led consortium of universities, private and public partners, who received a \$4.9 million Department of Energy grant to help fill the need for more diversity in the STEM workforce.

Sharing a vision, the Advanced Sensor Technologies for Applications in Electrical Engineering - Research and Innovation eXcellence (ASTERIX) group is on a mission to provide opportunities for minority students to excel in careers in science, technology, engineering and math.

Shonda Bernadin, an associate professor in computer and electrical engineering, is the principal investigator for the grant. Through Florida A&M University, about \$1.5 million was awarded to the college as part of the overall ASTERIX project.

“The ASTERIX consortium will build a sustainable pipeline of talented diverse engineering students who are highly prepared to enter the STEM workforce, especially in areas of interest to the Department of Energy/National Nuclear Security Administration (DoE/NNSA) Enterprise,” Bernadin said.

Shekar Bhansali, a distinguished university professor of electrical and computer engineering at FIU, is the lead investigator for the ASTERIX project. Bhansali also is the director of the Division of Electrical, Communications, and Cyber Systems of the National Science Foundation (NSF).

“The consortium leverages the unique strengths of its participants, Florida colleges and national labs, to address one of the grand challenges in developing low-cost sensing systems: how to seamlessly code slip sensors and electronics with new materials for novel applications,” Bhansali said.

The consortium focuses on exploring novel manufacturing techniques to fabricate the next generation of sensors and electronics and provides opportunities for students to work closely with practitioners.

ASTERIX partners include Florida International University, Florida A&M University, Miami-Dade College, Department of Energy National Nuclear Security Administration, Los Alamos National Lab, Kansas City National Security Campus and Y12 National Security Complex.

The FIU-FAMU-MDC alliance will serve one of the largest populations of Hispanic and African-American students in the nation creating innovative academic and career pathways for minorities who want to pursue engineering careers.

“We want to leverage the strengths of partnering institutions with established research connections,” Bernadin said. “We hope to recruit and train academically-talented minority students from Kindergarten through college, using a variety of activities in outreach, education and research.”

Sastry Pamidi, chair and professor of the electrical and computer engineering department and associate director of the Center for Advanced Power Systems, is working with Bernadin as a co-investigator for the project.



Associate Professor in computer and electrical engineering **Shonda Bernadin** is a principal investigator for the ASTERIX grant, which focuses on building a sustainable pipeline of talented, diverse engineering students for the STEM workforce.

“The project is a great opportunity for our undergraduate and graduate students to get involved in highly collaborative research and provides excellent networking and professional growth opportunities,” Pamidi said. “The success in the project will lead to more opportunities for our department and college to establish relationships with government laboratories, Florida International University and Miami Dade College.”

The consortium hopes to recruit well-qualified STEM students to satisfy the increasing demand for scientists and engineers in areas of interest to the DoE, specifically, in advanced sensor technologies for applications in electrical engineering. Both undergraduate and graduate students will have access to enriching educational experiences, internship opportunities at ASTERIX and DoE laboratories.

“We hope to strengthen partnerships between the FIU, FAMU, and MDC electrical engineering departments and DoE enterprises,” Bernadin said, “and to allow young minority students to be trained as scientists and engineers to meet the research needs of a more diverse and representative industry.”

“We want to **leverage** the strengths of partnering institutions with established research connections, recruiting and training academically-talented **minority** students from Kindergarten through college, using a variety of **activities** in outreach, education and research.” — ASSOCIATE PROFESSOR SHONDA BERNADIN

# Alumnus named new engineering dean of the A. James Clark School at the University of Maryland

## WHEN SAMUEL GRAHAM WAS AT THE FAMU-FSU

College of Engineering in the early '90s, the young mechanical engineering major was a first-generation college student navigating the challenge of how to make it through college and pay for it.

Fast forward to 2021. In the fall term, the Florida State University (FSU) alumnus began as the new engineering dean of the A. James Clark School of Engineering at the University of Maryland.

"It's been quite a journey and I'm really excited about the opportunity to serve as dean," Graham said, "I hope to continue to build on the excellent research program at the college and help grow innovation and entrepreneurship in an inclusive manner. I hope we can become a national leader in diversity and inclusion in engineering."

"Having access to both FAMU and FSU and the support from faculty and friends is something I won't forget. The networks I built from both campuses provided a memorable experience I would not trade for anything." — S. GRAHAM, ALUMNUS

Graham graduated in 1998 from FSU with a bachelor's in mechanical engineering via FAMU-FSU Engineering and earned his master's and doctorate from the Georgia Institute of Technology. He began his career as a senior member of technical staff at Sandia National Laboratories before joining the faculty at Georgia Tech.

"My undergraduate experience at the FAMU-FSU College of Engineering prepared me well for the successes that followed," Graham said. "Having access to both FAMU and FSU and the support from faculty and friends is something I won't forget. The networks I built from both campuses provided a memorable experience I would not trade for anything."

Graham has served as a member of the Defense Science Study Group and the Air Force Scientific Advisory Board. He also received the National Science Foundation CAREER Award and serves on the advisory board of the Engineering Science Research Foundation of Sandia National Laboratories and the Emerging Technical Advisory Committee of the U.S. Department of Commerce. He is a fellow of the American Society of Mechanical Engineers and a Senior Member of the Institute of Electrical and Electronics Engineers.

Graham's research encompasses the development of new wide bandgap semiconductor devices, which enable smart power systems in electric vehicles and smart grids. The devices work with



Samuel Graham, dean of the A. James Clark School of Engineering at the University of Maryland and FAMU-FSU College of Engineering alumnus.

radio frequency communication systems such as 5G wireless and advanced radar.

As an educator, Graham wants students to look for opportunities that connect the classroom to their passions. He encourages them to embrace the journey and follow their personal roadmap to success.

"Learn from others' experiences but understand your path will be different and build strong networks while in school," Graham said. "It is amazing how many times you and your network will continue to interact in the future and help each other over your lifetime."

Dr. Hafiz Ahmad	Florida State University
Dr. Aws Al-Taie	University of Technology Iraq
Dr. Bhuiyan Alam	University of Toledo
Dr. Alex Almarza	University of Pittsburgh
Dr. Eric Berson	University of Louisville
Dr. Indranil Bhattacharya	Tennessee Tech University
Dr. Sylvia Bhattacharya	Kennesaw State University
Dr. Wasu Chaitree	University of Silpakorn, Thailand
Dr. Deo Chimba	Tennessee State University
Dr. Isacc Choutaplli	The University of Texas, Rio Grande Valley
Dr. Eric Coyle	Embry-Riddle Aeronautical University
Dr. Ashley Danley-Thomson	Florida Gulf Coast University
Dr. Santosh Dasika	Andhra University, India
Ms. Lisa Davids	Embry-Riddle Aeronautical University
Dr. Tarik Dickens	Florida Agricultural & Mechanical University
Dr. Ryan Doczy	American University Dubai
Dr. Celina Dozier	University of Central Florida
Dr. Gregg Duncan	University of Maryland
Dr. Damion Dunlap	Florida State University
Dr. Mohamed El-Gafy	Michigan State University
Dr. Farzad Ferdowsi	University of Louisiana, Lafayette
Dr. Erik Fernandez	University of Central Florida
Dr. Stacy Pace Finley	University of Southern California
Dr. Craig Galban	University of Michigan
Dr. Amine Ghanem	Roger Williams University
Dr. Jamie Gomez	University of New Mexico
Dr. Samuel Graham	University of Maryland
Dr. Warren Greyson	Johns Hopkins University
Dr. Marwan Al-Haik	Embry-Riddle Aeronautical University
Dr. Jerris Hooker	Florida State University
Dr. Kimberly Hunter	Florida State University
Dr. Muhammad Imran	BUIITEMS, Quetta, Pakistan
Dr. Anwarul Islam	Youngstown State University
Dr. Hamed Janani	Ferdowsi University of Mashhad, Iran
Dr. Raphael Kampmann	Florida State University
Dr. Emmanuel Kidando	Mercer University
Dr. Michael Kirkpatrick	Ecole Supérieure, Paris
Dr. Doreen Kobelo	Florida Agricultural & Mechanical University
Dr. Phil Kreth	University of Tennessee Space Institute
Dr. Tara Kulkarni	Norwich University
Dr. Valerian Kwigizile	Western Michigan University
Dr. Silas Leavesley	University of South Alabama
Dr. Jamal Lewis	University of California - Davis
Dr. Simeng Li	California Polytechnic State University, Pomona
Dr. Hailing Liu	Liaoning University of Petroleum and Chemical Technology, China

# Alumni faculty at peer institutions

Dr. Ihssan Massad	Yarmouk U. Jordan
Dr. Timur Mauga	United Arab Emirates (UAE) University
Dr. Geophrey Mbatia	Ardhi University (Tanzania)
Dr. Selma Mededovic Thagard	Clarkson University
Dr. Kayleigh Millerick	Texas Tech University
Dr. Jubily Musagasa	University of Dar es Salaam, Tanzania
Dr. Judith Mwakalonge	South Carolina State University
Dr. Aditya Nair	University of Nevada, Reno
Dr. Sirish Namilae	Embry-Riddle Aeronautical University
Dr. Gideon Nnaji	Tallahassee Community College
Dr. Terri Norton	Bucknell University
Dr. Mario Oyanader	California Baptist University
Dr. Gökhan ÖZKAN	Clemson University
Dr. Behnaz Papari	Texas A&M - Galveston
Dr. Chanyeop Park	Mississippi State University
Dr. Young Gyu Park	Daejin University, Korea
Dr. Michael Perez	Auburn University
Dr. Makita Phillips	Johns Hopkins University
Dr. Michelle Rambo-Roddenberry	Florida Agricultural and Mechanical University
Dr. Darin Ridgway	Ohio University
Dr. Aaron Robinson	University of Memphis
Dr. William Robinson	Vanderbilt University
Dr. Tobias Sando	University of North Florida
Dr. Sharon Sauer	Rose-Hulman Institute of Technology
Dr. Joseph Seymour	Montana State University
Dr. Salman Siddiqui	Georgia Southern University
Dr. Melissa Smith	Clemson University
Dr. Yiyang Sun	Syracuse University
Dr. John Solomon	Tuskegee University
Dr. Cherie Stabler	University of Florida
Dr. Tejal Udhan-Mulay	Florida Agricultural & Mechanical University
Dr. Omar Thomas	University of West Indies at Mona, Jamaica
Dr. Gary Triplett	Virginia Commonwealth University
Dr. Tuyen Vu	Clarkson University
Dr. Ken Walsh	Ohio University
Dr. Robert Wandell	Florida State University
Dr. Mark Weatherspoon	Florida Agricultural and Mechanical University
Dr. Claudia Wilson	New Mexico Tech
Dr. Sudong Xu	Southeast University, Nanjing, China
Dr. Chi-An Yeh	North Carolina State University
Dr. Donghui Zhu	Stony Brook University-SUNY

## HIGH-IMPACT ENGINEERING RESEARCH

**CONDUCTIVE PERFORMANCE OF 3D PRINTED COMPOSITES**

Researchers discovered they can influence and increase the electrical performance of composites infused with graphene nano-platelets in an NSF study that could change the way materials are designed and manufactured. Their research is highlighted in the journal *Additive Manufacturing*, a peer-reviewed publication that reviews innovative research papers in additive manufacturing. **Subramanian Ramakrishnan** is a professor in chemical and biomedical engineering and is the lead investigator for the study. He is collaborating with researchers from industrial and manufacturing engineering and the Air Force Research Laboratory to conduct the work. Funding from the project is supported in part by a \$5 million grant from the NSF. "Our aim is to 3D-print lightweight conductive composites and to study the effect of printing conditions on particle orientation and final composite performance," Ramakrishnan said. "The combination of epoxy resins and graphene nano-platelets is of interest in several applications for the Air Force, such as thermal interface materials, heat sinks, and electromagnetic shielding materials."

**EXTERNAL MAGNETIC FIELD MAKES STRONGER ALLOYS**

New research shows critical changes to the microstructure of iron-based alloys, materials that are important for manufacturing permanent magnets for use in electrical appliances and cars. In a new study, researchers from the FAMU-FSU College of Engineering, National High Magnetic Field Laboratory and the School of Materials Science and Engineering at Northeastern University in China, are collaborating to understand the effect of the magnetic field on the microstructure of magnetic materials. Their findings may improve the ways these materials are processed and ultimately perform. Scientists are interested in the microstructure of these materials because it can be shaped for tuning magnetization. By influencing and controlling the microstructure, scientists can control both the magnetic and mechanical properties of the substance. "We have found that an external magnetic field can drive changes to the microstructure of the specific alloys of iron (Fe), chromium (Cr) and cobalt (Co) used for magnet-based materials," **Theo Siegrist**, a professor of chemical and biomedical engineering and National MagLab researcher, said. "The application effects the hardness of the alloys when heat is applied."

**NEW MODEL OF FLOW PROPERTIES FOR CLASS OF POLYMERS**

Researchers developed a theoretical model that explains the flow of polymer materials. They found that the energy required to start flowing is the sum of the energy required to break the bonds of two separate parts of the polymer, which is useful for manufacturers or recyclers who are designing ways to use vitrimers. Their work was published in *Macromolecules*. "If you're able to predict the flow properties, that helps guide the design of the processing units to process these," said **Ralm Ricarte**, an assistant professor of chemical and biomedical engineering and paper co-author. "You can understand at what temperature it will start flowing and how viscous it will be. If you want to create a special application, you could determine what sort of chemistry you would need to build what you want with the very specific properties you might want."

**MAKING CERAMIC NANOMATERIAL PRODUCTION SAFER AND EXPANDING USE**

In a new study, scientists will collaborate with researchers from Clark Atlanta University on a multi-disciplinary NSF study on MXenes, the novel class of 2D nanomaterials. **Natalie Arnett**, an associate professor in chemical and biomedical engineering, leads the team of scientists developing novel MXene materials for batteries, radiation shielding and supercapacitors. They also aim to improve the performance of existing MXene applications. "We want to develop MXenes by characterizing their electronic and magnetic properties," Arnett said. "These materials hold great promise for several applications." First discovered in 2011, MXenes are created from 3-dimensional crystals called MAXs, often consisting of titanium or chromium, aluminum, and carbon or nitrogen, arranged in microscopic layers.

**NEW MICROWAVE TECHNIQUE MAKES FERTILIZER BETTER AND MORE ENVIRONMENTALLY FRIENDLY**

Researchers have discovered a new technique that uses microwave technology to synthesize fertilizer for agriculture production. The process makes the fertilizer more efficient and better for the environment. Their work was recently published in *Polymer Testing*, an open-access scientific journal. **Gang Chen**, a civil and environmental professor, and his team are using the new technology to improve the performance of biochar-hydrogel composites. Biochar is a cost-effective product used for soil fertility. When combined with the hydrogel, the product absorbs water and fertilizes the soil. By adding the microwave processing technique, the researchers were able to improve the effectiveness of the composite by 20 percent. "The microwave-mediated polymerization technique we are using heats the material and optimizes its structure," Chen said. "The process is cost-effective, better for the environment, and greatly improves the performance of the material." Superabsorbent hydrogels are widely used in agricultural production to improve

the efficiency of conventional fertilizers. They enhance water and fertilizer retention in soil. Although useful in the industry, they are made from organic solvents that can be harmful to the environment. Wide applications of these types of hydrogels can be costly as well, and the researchers hope the new cost-effective technology will encourage industry to use the more environmentally friendly product.

**NEDA YAGHOOBIAN RECEIVES NSF CAREER AWARD FOR FIRE SCIENCE RESEARCH**

**Neda Yaghoobian**, mechanical engineering researcher and assistant professor recently earned an NSF Faculty Early Career Development Award to advance the prediction and mitigation of fire spread into wildfire-prone areas. Her findings may elevate the importance of fire science in

the national landscape. Yaghoobian is the principal and sole investigator in a new study to explore the effect of the flight behavior and transport of fragments of burning materials, called "firebrands" or flying embers, by turbulent winds. Yaghoobian's five-year \$500,000 grant began in the spring of 2021. "By understanding what a flying ember experiences in its flight path through turbulent winds we can predict where it will land and whether the ember can create a spot fire," Yaghoobian said. Yaghoobian's research uses computer modeling techniques to replicate the physics of firebrand transport in her models. The method allows her to examine the flight dynamics of the fiery ember particles in the turbulent wind flows to predict where they might land, and whether they can initiate new spot fires.

**KAMPMANN HONORED AS DISTINGUISHED TEACHER**

**Raphael Kampmann**, a civil engineering teaching faculty member, is the recipient of Florida State University's 2021 Distinguished Teacher Award. "I am very happy that I have been recognized for the effort and dedication that I put into my work with students. It is fantastic to see students reach a learning goal through their own path, and I believe that those moments are equally inspiring to the students and to the instructor." Kampmann became a full-time faculty member in the college in 2015. He has received several awards for his teaching, including FSU's Undergraduate Teaching Award, the National Outstanding Faculty Advisor Award from the American Society of Civil Engineers and the Distinguished Engineering Educator Award from The Engineers' Council. He received the Distinguished Teacher Award during the university's annual Faculty Awards ceremony, which was held virtually April 22.

**BERNADIN RECEIVES RESEARCH EXCELLENCE AWARD**

**Shonda Bernadin**, associate professor of electrical engineering, received the Florida A&M University 2021 Research Excellence Award. The award honors outstanding faculty members for their commitment to research excellence. "I am pleased that Dr. Bernadin is being honored with the Research Excellence Award," Sastry Pamidi, chair of the Department of Electrical and Computer Engineering, said. "She makes valuable contributions to FAMU and to the college—not only in research, but also in the areas of outreach, recruitment and retention." Bernadin is active in engineering education research, K-12 outreach activities, and retention efforts within her department. Recent grants from the

U.S. Department of Defense Army Outreach Program, the Intel Corporation, and the National Center for Women & Technology support her mission of building a strong pipeline of diverse engineering professionals to the workforce.

**LI RECEIVES DEVELOPING SCHOLAR AWARD**

**Yan Li**, associate professor of chemical and biomedical engineering and a Faculty Affiliate of the Institute for Successful Longevity, was honored with a Developing Scholar Award at Florida State University's 2021 Faculty Awards ceremony. The Developing Scholar Award identifies, recognizes and honors future research leaders currently at the rank of Associate Professor. Dr. Li's award provides \$10,000 to be used in the coming year to promote her research. The award is sponsored by the Council on Research and Creativity in FSU's Office of Research Development.

**PROFESSORS RECEIVE JUNIOR & SENIOR FACULTY TEACHING INNOVATION AWARD**

Two faculty in civil and environmental engineering, **Yassir AbdelRazig** (professor) and **Maxim Dulebenets**, (assistant professor) received the 2021 Florida Agricultural and Mechanical University (FAMU) Senior and Junior (respectively) Faculty Teaching Innovation Award (TIA). The award recognizes outstanding faculty members who explore and implement nontraditional teaching strategies, approaches, techniques or tools to produce measurable gains for student outcomes. It exemplifies the efforts of the teacher to explore new ways of teaching, impacting the students to think critically. "The civil department has been blessed with many outstanding teachers: this is our third university-level teaching award in recent years," Lisa Spainhour, professor and chair of the college's civil and environmental engineering department, said.

**NEW TRANSIT IDEA STUDY HELPS RESEARCHERS IMPROVE THE SAFETY OF DRIVERLESS PUBLIC TRANSPORTATION**

Researchers are trying to answer whether the nation is ready for driverless vehicles with a new \$100,000 multi-disciplinary study funded by the Federal Transit Administration (FTA). The 21-month Transit IDEA project is part of the Transit Cooperative Research Program, designed to foster innovative concepts. **Sungmoon Jung**, a professor in civil and environmental engineering, is the principal investigator for the study that uses computer-based simulations to investigate crash risks. He is working with **MohammadReza Seyedi, Ph.D.**, a post-doctoral researcher, in the study that will help the industry make the autonomous bus safer. "For this project, experts in autonomous bus operation and researchers in computational mechanics are collaborating to make the autonomous bus safer for road users."

**CENTER FOR ADVANCED POWER SYSTEMS TO PARTNER WITH CITY ON POWER GRID RESEARCH**

Researchers will join the City of Tallahassee and other partners on a U.S. Department of Energy project to improve integration of solar panels into electrical grids. The project, which is funded by a \$3.8 million grant from DOE as well as \$1.8 million from FSU and other research partners, will develop cutting-edge technologies including electronic controls and artificial intelligence to allow power plants to better utilize solar panels with the help of a battery energy storage system (BESS). The technology could potentially lower energy costs by 10 percent or more. “We want to enhance connected operations and the ability of solar plants to determine whether to send their energy to the grid or to store it for later,” said **Yuan Li**, an assistant professor. “It means making the power plant more flexible in order to support the power grid, which will make the grid more resilient.” Researchers will develop a control system that can give power plants enhanced capabilities, including the ability to quickly and reliably switch between a connection with the electrical grid to a self-contained system. The project will test and demonstrate the technologies on a 100-kilowatt hybrid photovoltaic/BESS power plant connected to the City of Tallahassee Utilities grid. The project involves faculty members **Olugbenga Moses Anubi, Hui Li, Yuan Li** and **Fang Peng**.



PAMIDI & KIM

**COLLABORATING TO DETECT FAULTS IN SUPERCONDUCTING CABLES USING MACHINE LEARNING**

In a new study, engineering researchers are developing a novel machine learning tool that may increase the reliability of high-temperature superconductor (HTS) power systems. The method finds early indicators of series faults in HTS cables. Series faults occur when one or more conductors fail, creating an imbalance that can cause problems in the system. Detecting defects early greatly improves the life and safety of the cables and prevents catastrophic and costly damage. **Sastry Pamidi**, chair of the electrical and computer engineering department and the Associate Director of the Center for Advanced Power Systems (CAPS), is a lead researcher on the study that will help improve early fault detection. “We’re collaborating with Dr. Lukas Graber’s group at Georgia Tech on multiple projects,” Pamidi said. “We are developing a machine learning tool to detect the magnetic signature of HTS cables in order to monitor their transmission characteristics.” The project team includes Pamidi and members of his research staff, CAPS research faculty members **Peter Cheetham** and **Chul Kim**, along with researchers from the Georgia Institute of Technology, Mississippi State University, and the Korea Electric Power Corporation.

**ENGINEERING RESEARCHERS IMPROVE PERFORMANCE OF HIGH-TEMPERATURE SUPERCONDUCTOR WIRES**

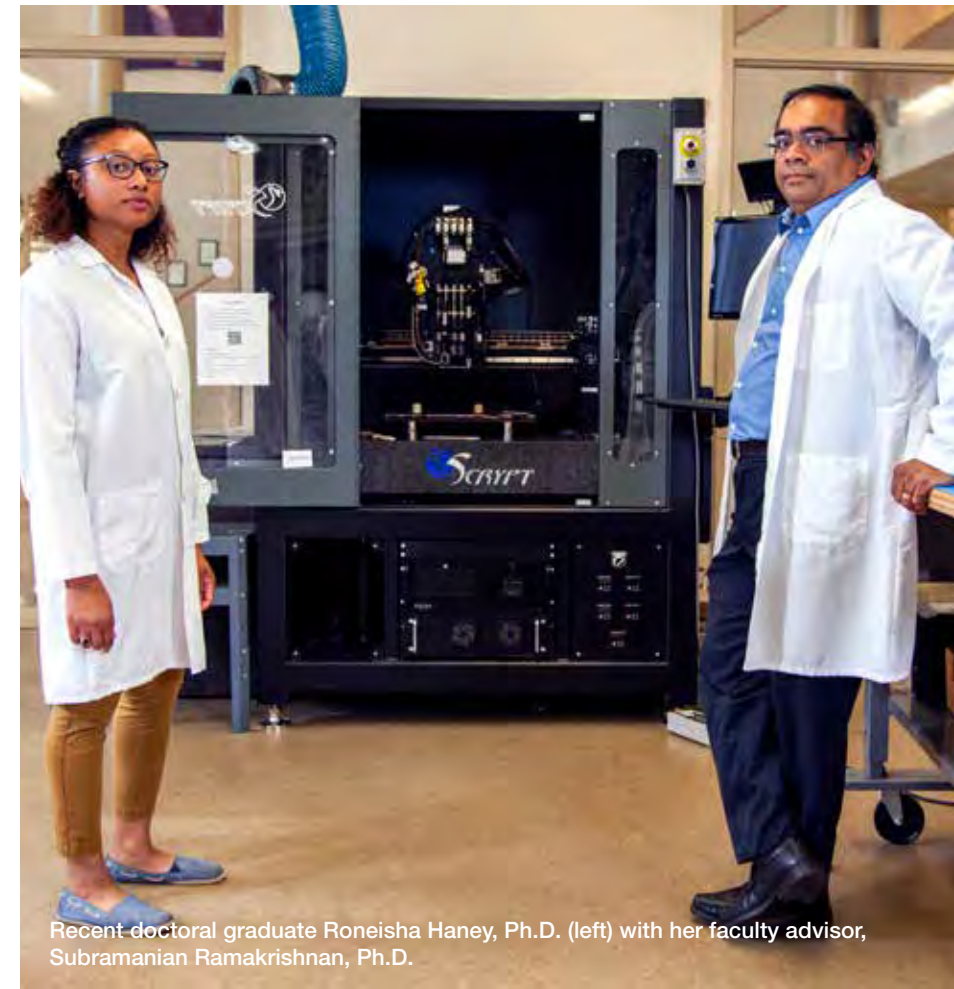
Researchers used high-resolution scanning electron microscopy to understand how processing methods influence grains in bismuth-based superconducting wires (known as Bi-2212). Those grains form the underlying structures of high-temperature superconductors, and scientists viewing the Bi-2212 grains at the atomic scale successfully optimized their alignment in a process that makes the material more efficient in carrying a superconducting current, or supercurrent. Their work was published in the journal *Superconductor Science and Technology*. They found that the individual grains have a long rectangular shape, with their longer side pointing along the same axis as the wire—a so-called biaxial texture. They are arranged in a circular pattern following the path of the wire, so that orientation is only apparent at very small scale. Those two properties together give the Bi-2212 grains a quasi-biaxial texture, which turned out to be an ideal configuration for supercurrent flow. “By understanding how to optimize the structure of these grains, we can fabricate the HTS round wires that carry higher currents in the most efficient way,” said **Abiola Temidayo Oloye**, a doctoral candidate and researcher at the National High Magnetic Field Laboratory (MagLab) and the paper’s lead author.



GUO (RIGHT) AND STUDENT MEMBERS OF HIS RESEARCH TEAM

**USING 3D IMAGING TECHNOLOGY TO ADVANCE QUANTUM FLUID RESEARCH**

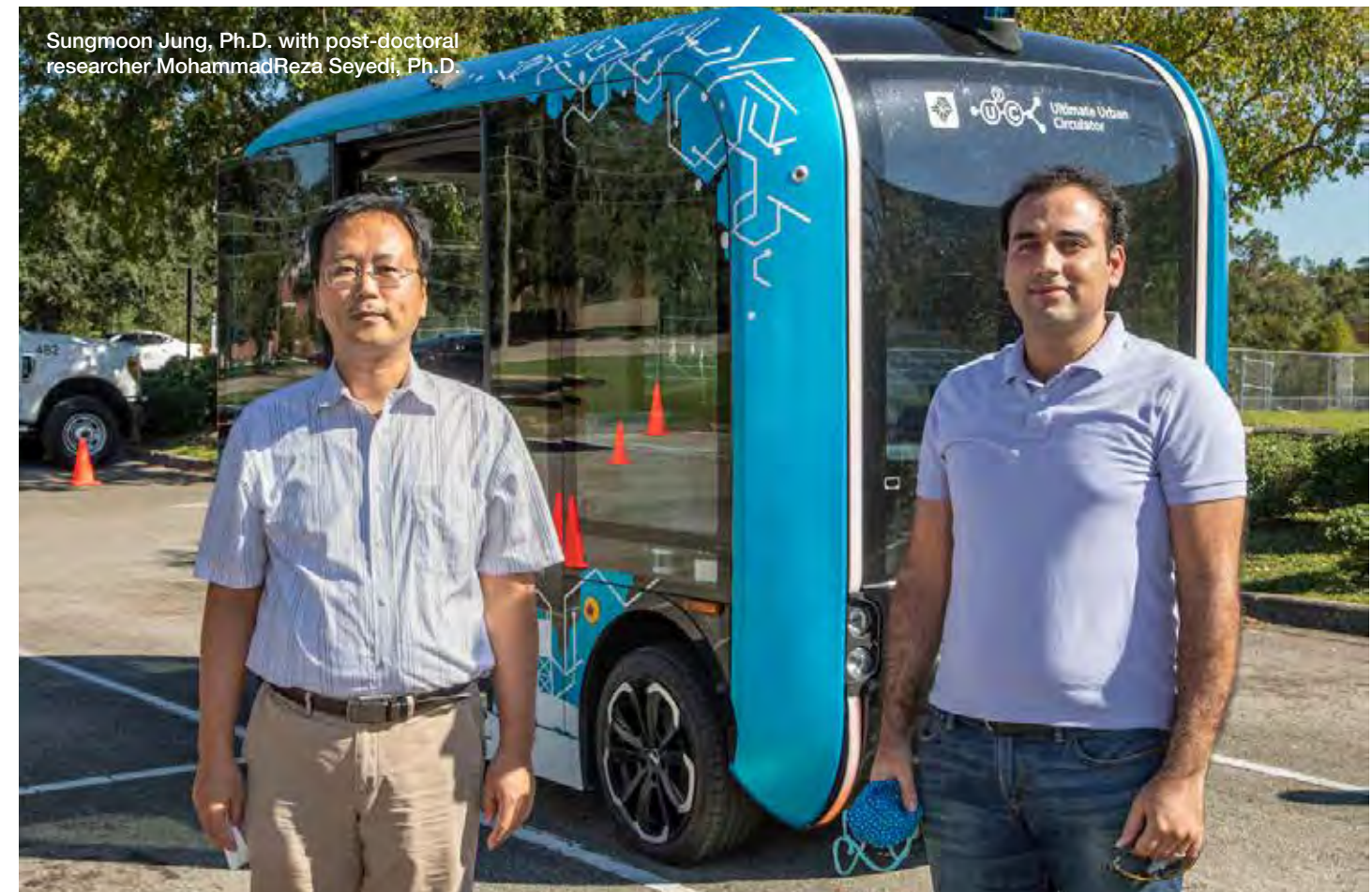
**Wei Guo**, an associate professor of mechanical engineering, is the principal investigator for a new grant funded by the NSF to investigate the dynamics of superfluids. The research will advance our understanding of quantum turbulence using three-dimensional flow visualization technologies. Previous research from Takeshi Egami of Oak Ridge National Laboratory showed that when helium gas is cooled to extreme temperatures, it becomes a liquid and behaves oddly—it can flow without friction as a superfluid. Absence of friction means no loss of kinetic energy in the fluid. Guo and his team of graduate students and post-doctoral researchers will use multidimensional flow visualization to further study the superfluid and its unique properties. “We will cool helium to its superfluid state,” Guo said. “Then we will develop and use advanced 3D flow visualization systems to study phenomenon related to turbulence in this quantum fluid.”



Recent doctoral graduate Roneisha Haney, Ph.D. (left) with her faculty advisor, Subramanian Ramakrishnan, Ph.D.



Raphael Kampmann, Ph.D.



Sungmoon Jung, Ph.D. with post-doctoral researcher MohammadReza Seyedi, Ph.D.



## FAMU-FSU Engineering

2525 Pottsdamer Street  
Tallahassee FL 32310  
[www.eng.famu.fsu.edu](http://www.eng.famu.fsu.edu)

One **college**,  
two **universities**,  
unlimited **opportunity**.

The FAMU-FSU College of Engineering is the joint engineering institution for Florida A&M and Florida State universities, the only such shared college in the nation. We are located less than three miles from each campus. After satisfying prerequisites at their home university, students learn together at the central engineering campus with its adjacent, nationally-renowned associated research centers and a national laboratory.



LEARNING SYSTEMS INSTITUTE  
FLORIDA STATE UNIVERSITY

# CAPABILITY STATEMENT



*The Learning Systems Institute (LSI) at Florida State University is at the forefront of developing innovative solutions that bridge theory and practice in education. Our experts' advanced research not only provides state-of-the-art methods but also a clear path for implementation. For more than 50 years, LSI has delivered systems that measurably improve the learning and performance of organizations and individuals here in Florida and globally.*

**1969** *Since 1969, LSI has delivered systems that measurably improve the learning and performance of organizations and individuals here in Florida and across the world.*

## **Our University**

Florida State University, founded in 1851, is recognized as a preeminent research university by the State of Florida. Located in the state capital city of Tallahassee, U.S. News & World Report ranks FSU No. 19 among public universities in the United States (2023), appearing in the Top 20 for the fourth consecutive year. Florida State offers leading undergraduate, graduate, and professional programs. Many units have programs that consistently rank among the

nation's top twenty-five public universities, including those in Physics, Chemistry, Statistics, Ecology, Evolutionary Biology, Meteorology, Political Science, Psychology, Sociology, Criminology, Information, Creative Writing, Public Policy, Business, and Law.

## **Learning Systems Institute**

Established in 1969, the Learning Systems Institute (LSI) is a multidisciplinary research and development organization dedicated to innovating learning to

improve human performance. LSI is a leader in multidimensional education projects and capacity building for reform and strengthening educational systems. LSI faculty and staff have expertise in performance improvement, learning technologies, international development, teacher education, and professional development with extensive experience implementing educational programs in Florida, the United States, and 47 countries worldwide.





**The Learning Systems Institute (LSI)** at Florida State University is at the forefront of developing innovative solutions that bridge theory and practice in education. Our experts' advanced research provides not only state-of-the-art methods but also a clear path for implementation. We have been providing innovative work for 53 years.

Our expert faculty and staff have delivered systems that measurably improve the learning and performance of organizations and individuals here in Florida and worldwide. Our work has earned LSI an international reputation for efficient and effective management and technical work that meets clients' needs.

LSI is a leader in multidimensional education projects and capacity building for reforming and strengthening educational systems. LSI faculty and staff have expertise in performance improvement, learning technologies, international development, higher education capacity building, teacher training, instructional design and curriculum development, STEM education, education technology, policy and standard development, literacy, and inclusive education. LSI has extensive experience implementing educational programs in Florida, the United States, and 47 countries worldwide, with a strong record of managing multi-million-dollar research and service projects.

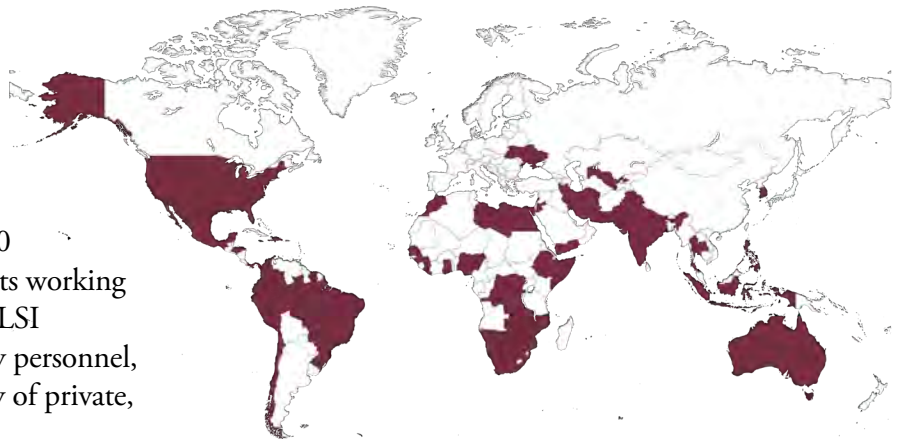
Since 1969, LSI awards have exceeded \$750 million and the institute had 54 active projects working with 13 countries in the fiscal year 2021-22. LSI currently employs nearly two hundred faculty personnel, researchers, and support staff serving a variety of private, state, federal, and international clients.

*"At USAID, we have a passion for education and high hopes for its future in Nigeria. In that spirit, this partnership (with LSI and FSU) played a critical role in ensuring the next generation of Nigerian children is equipped with the reading skills that will serve as the basis for a lifetime of learning."*

*-USAID Nigeria Mission Director  
Stephen M. Haykin*

# 47

**EXPERIENCE WORKING  
IN 47 COUNTRIES**





### LSI's International Work

LSI has overseen dozens of projects globally. Areas of activity include basic education (primary and secondary), higher education, vocational training, health, urban development, education technology, teacher training, reading/literacy instruction, rural communication, girl's education, instructional design, accommodations, and modifications for students with special needs; learning disabilities libraries; STEM (science, technology, engineering, math); expert performance improvement; learning technologies; sector assessments and evaluations.

LSI has provided technical assistance to developing countries, many funded directly or indirectly by the United States Agency for International Development (USAID), the U.S. State Department, UNICEF, and other international donors. Most of these international projects aim to improve primary, secondary, and tertiary education and support educational reforms that call for pre and in-service teacher education, curriculum, and materials development for all these levels, including technical and vocational training for workforce development.

### FCR-STEM

The Florida Center for Research in Science, Technology, Engineering, and Mathematics (FCR-STEM) was created by the Florida Legislature and competitively awarded to Florida State University in 2007. It is another highly respected center operated by LSI faculty and staff. The mission of FCR-STEM is to help the State of Florida improve STEM teaching and learning in grades K-12 and prepare students for higher education and STEM careers in the 21st century. Through impacts on teacher knowledge and classroom practice, FCR-STEM strives to improve student achievement, narrow student achievement gaps, and increase student pursuit in STEM fields. These broad goals are addressed primarily through high-quality research, teacher professional development, and the development of innovative resources and tools to support instruction aligned with curriculum standards.

Among FCR-STEM's significant accomplishments are the impacts of professional development on teacher and student outcomes, the design and delivery of intensive professional development for over 2,500 K-12 math and science teachers in Florida, and the development of CPALMS ([www.cpalms.org](http://www.cpalms.org)). The CPALMS website contains over 12,000 free lessons and other instructional resources, vetted by content and teacher experts, plus online tools to support teachers' planning and instruction. More than 250,000 Florida educators have an active account on CPALMS, and the platform has served more than 750,000,000 resource downloads.

# 750M

**MORE THAN 750 MILLION  
RESOURCE DOWNLOADS  
ON CPALMS.ORG**

# 250k

**OVER 250,000 FLORIDA  
EDUCATORS HAVE AN  
ACTIVE CPALMS ACCOUNT**

# 12,000

**12,000 FREE LESSONS**

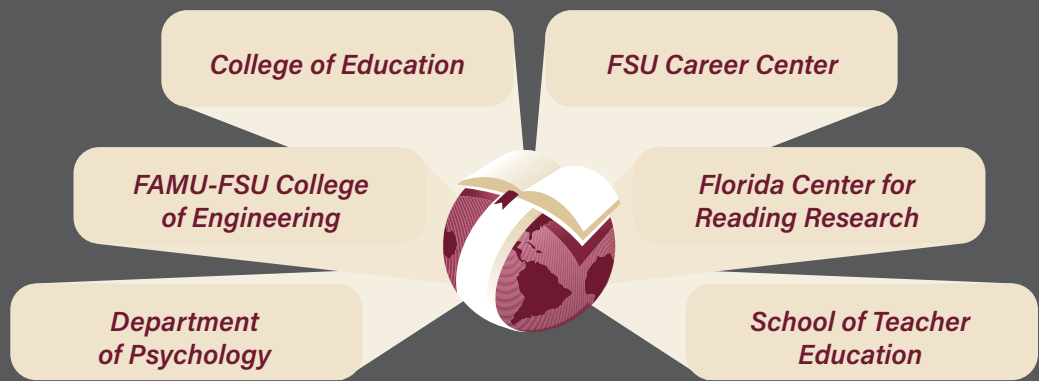
***IMPACT Driven: More than 40,000 Florida teachers have received training from CPALMS.***

# WORKING WITH LSI

At LSI, our mission is to improve learning and human performance globally, utilizing innovative approaches and implementation techniques. LSI is at the forefront of developing solutions that bridge theory and practice in education. Our experts' advanced research provides state-of-the-art methods and a clear path for implementation. For more than 50 years and in 47 countries, LSI has delivered systems that measurably improve the learning and performance of organizations and individuals in Florida and worldwide.

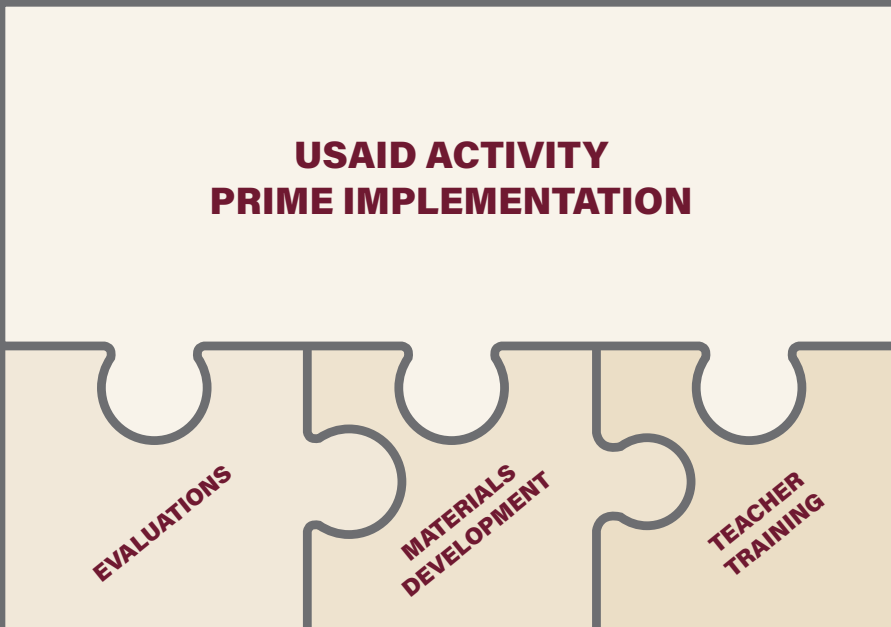
LSI is dedicated to researching and developing instructional and non-instructional interventions to improve performance. Our efforts focus on how individuals and organizations perform complex tasks and how we can help them achieve their performance goals. Our analytical approach is systemic, and our solutions are interdisciplinary, incorporating cognitive and educational psychology as well as instructional and information technology. Our ability to reach any faculty member or department at Florida State University and year-round availability allow our LSI faculty and staff to provide unmatched resources and results.

At LSI, you have one point of contact that can reach any department or faculty member on FSU's campus including:



We have expertise managing both prime and sub awards of all sizes.

## USAID ACTIVITY PRIME IMPLEMENTATION



## AVAILABLE YEAR-ROUND

LSI at Florida State University offers unmatched access and availability to our faculty.

# OUR EXPERTISE

For 53 years, LSI has been innovating and expanding its expertise. We are a multidisciplinary research and development organization dedicated to innovating learning to improve human performance. LSI's project-based teams feature top researchers from multiple departments at FSU and leading institutions globally.

The team of researchers housed at LSI constitutes the institute's core faculty. Faculty members from across the university are frequent contributors to the institute. LSI's faculty members have expertise in research design and methodology across a range of approaches and techniques.

Specific strengths of recent work include reading research, experimental and quasi-experimental research of educational programs and interventions; collection, management, and analyses of large datasets; experimental studies utilizing nested designs and hierarchical data modeling; and value-added methodologies. Most of LSI's lead research faculty hold a teaching appointment at Florida State University.



## Instructional Design & Curriculum Development

LSI supports millions of students, educators, and professionals by developing teaching and learning resources based on the expertise of subject area experts. Award-winning educators and the latest research in learning and cognition, instructional design, and teaching methods.



## Teacher Training/Learning

LSI has equipped tens of thousands of educators and industry professionals for success on the job by developing and delivering capacity-building workshops where participants enhance their content knowledge, improve their skills, and apply new learning in the real world.



## Research, Monitoring, and Evaluation

LSI faculty are experts in a wide range of research methodologies and evaluation approaches, from large-scale randomized controlled trials to qualitative case studies. We have experience conducting research, monitoring, and evaluation worldwide, including in conflict and crisis settings.



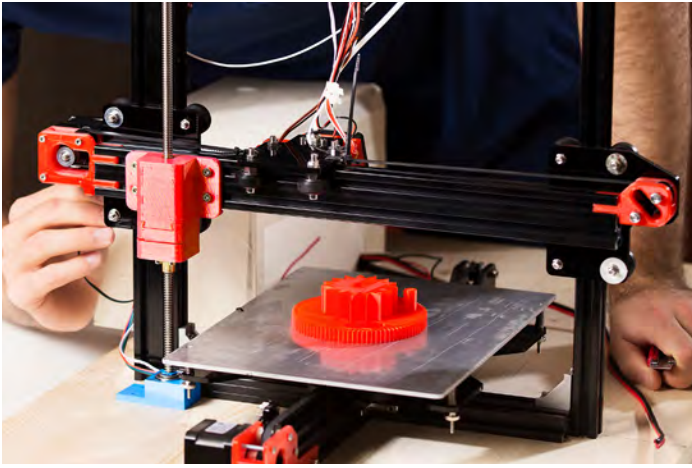
## Higher Education Capacity Building

LSI has engaged in higher education capacity building for more than 50 years. We take a collaborative, peer-to-peer approach to develop the skills of higher education faculty in various areas, including instruction, research, and administration.



## Literacy

LSI faculty have deep expertise in promoting literacy in contexts around the world. Current and past projects have involved literacy materials development, teacher training, coaching, and literacy assessment development. Using evidence-based approaches, LSI faculty develop contextually-appropriate approaches in improving literacy outcomes.



### Education Technology

For more than 40 years, LSI has been at the forefront of advancements in educational technology. Our faculty and staff have built applications and solutions used by millions of educators and students. Some of those innovations include CPALMS, the MySTEMKits curriculum with 3D printable manipulatives, CMAP for curriculum planning, and numerous apps and platforms. LSI creates applications that enhance teaching and learning by increasing efficiencies, making information more accessible, improving collaborations, and tools to provide just-in-time support and resources for teachers and students.



### STEM Education

LSI houses The Florida Center for Research in Science, Technology, Engineering and Mathematics (FCR–STEM), a multidisciplinary research center created by the Florida Legislature and competitively awarded to Florida State University in 2007. The FCR-STEM's mission is to help the State of Florida improve STEM teaching and learning in grades K- 12 and prepare students for higher education and STEM careers in the 21st century. These broad goals are addressed primarily through high-quality research, teacher professional development, and the development of innovative resources and tools to support instruction aligned with curriculum standards.



### Policy and Standards

In the U.S. and in countries around the world, LSI advises policymakers on setting standards, developing benchmarks, and setting education sector policies related to teachers and student outcomes.



### Inclusive Education

LSI faculty are experts in creating customized services and supports to ensure all students with disabilities have the same educational, social, and future opportunities as their peers. We have more than 20 years of experience in this area, and LSI is also the home of the Florida Inclusion Network.

# RECENT LSI PROJECTS

LSI is currently working on international projects with education professionals from Egypt, Lebanon, Malawi, the Philippines, Rwanda, Uzbekistan and Zambia. This past year, we worked on projects with 13 countries. The work being conducted by the LSI faculty and staff in the United States and around the world will allow educators all over the globe to impact millions of students.



## Transforming Teacher Education - Zambia

The Learning Systems Institute (LSI) at Florida State University is leading a five-year, \$15 million project sponsored by the U.S. Agency for International Development to improve pre-service teacher training in Zambia. LSI faculty, in collaboration with partners School-to-School International and the University of Zambia, will work with 12 universities and colleges of education in the country to improve the training of

primary grade teachers. Over the five-year period, the “USAID Transforming Teacher Education Program” will give more than 60 Zambian teacher educators the skills to deliver effective instruction to 9,000 college and university students studying to become primary grade teachers.

## Community College Administrator Program

Since 2014, LSI has worked with the U.S. State Department and in partnership with Santa Fe College to conduct the Community College Administrator Program. The initiative is intended to enhance international understanding of U.S. community colleges and U.S. community college systems. Overall, approximately 250 individuals from more than 200 institutions in 15 countries have participated in the CCAP.



## Tuzone Gusoma Schools and Systems - Rwanda

In conjunction with FHI 360 and its partners, the Learning Systems Institute is working to ensure that literacy instruction of Kinyarwanda (an official language in Rwanda) in pre-primary and lower primary schools is high quality, inclusive, and effective. LSI helped to roll out a previously developed module on teaching literacy skills in the Kinyarwanda language that was delivered to instructors from Teacher Training Colleges across Rwanda. The LSI team also completed a Baseline Situation Assessment and a Rapid Situation Assessment presenting the findings to 50 national stakeholders. Finally, the LSI team worked closely with the Rwanda Education Board to establish a Teaching Practice Advisory Group. This group will review and refine the Teaching Practice Framework.



## Strengthening Teacher Education Practice - Malawi

LSI is in its second year leading a \$15.6 million project sponsored by the U.S. Agency for International Development to improve teacher training in Malawi. The Strengthening Teacher Education and Practice Activity will improve the higher education system that trains primary school teachers in the country as well as the professional development practices that support teachers through their careers.

LSI faculty is working with 16 teacher training colleges across the country to improve teacher education programs and develop new training materials related to literacy and numeracy education. Another part of the project will provide support to the Ministry of Education to deliver continuous professional development courses to teachers who are already in classrooms. The STEP project is a landmark investment by USAID to support the institutions of higher education that provide pre-service teacher education.



## ABC+: Advancing Basic Education - Philippines

The ABC+: Advancing Basic Education in the Philippines project works with DepEd, local governments, and the private sector to address factors that contribute to low learning outcomes in Bicol (Region V) and Western Visayas (Region VI) and is also implementing a smaller set of interventions in select School Divisions in the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM). LSI is working with Bicol University and Western Visayas State University to design modules for university courses on early literacy development to strengthen the pre-service preparation of future teachers. The project also focuses on fostering a more equitable, inclusive, and nurturing climate for learning in the early grades as part of its social and emotional learning (SEL) focus.



## Education for Excellence Program - Uzbekistan

To support the Ministry of Public Education in achieving its reform agenda, USAID initiated the four-year, \$29.5 million Uzbekistan Education for Excellence Program in December 2019. The LSI team provided training, facilitation, and guidance on the development of the new curriculum standards for math, Uzbek language arts, and English as a foreign language. In addition, the LSI team helped the ministry in evaluating, choosing, and customizing textbooks for teaching English as a second language.

This is a significant transformation of the education system in the country that will have a very long-lasting effect.

LSI also led the development of a digital platform that will house all the curriculum standards, curricular materials, including textbooks and supplemental resources, and be used by all 300,000 teachers in Uzbekistan.





# 2022-23 ANNUAL REPORT





## Letter From the Director

As FSU and the Learning Systems Institute turned the calendar for the fiscal year 2022-23, I wanted to reflect on and share the successes of our faculty and staff this past academic year. I must begin by thanking all our LSI personnel for their hard work and dedication to our vision and shared mission with the University. Our team members spend months away from their families and homes helping to build and innovate learning systems worldwide. At home, our staff has spent just as many hours ensuring Florida educators and students are at the forefront when it comes to learning and educational technology. In 2022-23, LSI continued to make a tangible impact on learning in Florida, across the United States, and all over the world.

As LSI enters its 54th year of delivering systems that measurably improve the learning and performance of organizations and individuals, we are so proud of our accomplishments. In 2022-23, we surpassed the \$750 million mark in lifetime contracts and grant awards and have significantly contributed to education in 47 countries in our 54 years. LSI worked on international projects this past fiscal year with education professionals from Egypt, Lebanon, Malawi, the Philippines, Rwanda, Uzbekistan, and Zambia. Our faculty won and started 12 new projects last year, and our portfolio of research and development grants reached nearly \$70 million in funding.

FSU singled out our Institute as one of the ways the University is changing the world, and to make that type of impact, we know it takes funding. Due to the arduous work of so many, 2022-23 was one of the most successful years funding our work. During the last fiscal year, LSI had a 15X return on investment on every university/state dollar invested in our Institute, we grew our expenditures by 15% on top of the 38% from the year before, and our awards once again increased year-over-year. This is the fourth consecutive fiscal year in which LSI has increased its return on investment, set a new record ROI, and increased its expenditures.



In addition to these accomplishments, we have aligned our passion for making a global impact on learning with the University's values and goals. It is something we are incredibly proud of as well. The University's mission includes strategic goals of "Academic and Research Excellence," "Entrepreneurship and Innovation," and "Excellence and Reputation." LSI has a proven record of success in all these areas that are important to the mission of the University. We have a rich history of international research, innovation in building learning systems, literacy, and STEM education, and the Institute's reputation for excellence has long been established and continues to thrive.

As an Institute whose top priority is improving human performance and learning as far around the world as possible, we are so proud that we can live up to our values and goals while doing it in a fiscally responsible manner. Our faculty and staff innovate and educate. Their work in 2022-23 has the potential to impact 600,000 educators and 16 million students, and we do it all while upholding the mission and reputation of Florida State University. I am proud to be LSI's director and work alongside such a talented and selfless team.

*Rabieh R*

Rabieh Razzouk  
Director, Learning Systems Institute

## Accomplishments

### Strengthening Teacher Education and Practice - Malawi

In January 2021, LSI received a cooperative agreement for the USAID STEP activity based in Lilongwe, Malawi. Over the past year, LSI has delivered intensive professional development training to 130 Teacher Educators from all public and private Teacher Training Colleges (TTCs) across Malawi. These educators are being prepared to lead participatory action research projects at their TTCs. In the coming year, the local team will continue to collaborate with the Malawi Ministry of Education (MoE) to develop a diploma program for primary teachers, with the aim to upgrade all teachers from a certificate to a diploma, as well as to design a continuous professional development program for teachers and teacher educators.



#### Impact

The project team has delivered intensive professional development training to 130 teacher educators from all public and private Teacher Training Colleges (TTCs) in Malawi. These same participants are currently engaged in 21 different Participatory Action Research projects at 16 TTCs across Malawi.

### Transforming Teacher Education in Zambia

Key accomplishments during year three of the USAID-funded project included finalization of new instructional modules for language and literacy for use in pre-service teacher training programs in colleges of education, training of lecturers from 12 colleges and universities on the new materials, development and rollout of a revised school experience approach along with accompanying guidelines and observation tools, support to two Zambian lecturers to participate in FSU residencies, and two Zambian lecturers to participate in master's degree programs. The participatory action research team published a peer-reviewed article in an international journal. In collaboration with the University of Zambia, TTE supported a special master's program in literacy, language, and applied linguistics open to the lecturers who participated in TTE. The lecturers can complete their master's degrees in one year, half the usual duration of study. Coaching visits commenced, allowing lecturers to receive feedback on their instruction from TTE staff and UNZA partners.



#### Impact

New instructional modules for language and literacy for use in pre-service teacher training programs in colleges of education were finalized and lecturers from 12 colleges and universities were trained on the new materials. An enhanced approach to the student teaching practicum was rolled out in all government colleges of education.

## National Reading Program Implementation and Expansion - Malawi

During the past year, LSI has provided intensive capacity development to the Malawi Institute of Education (MIE) through workshops and virtual sessions in this USAID-funded project. Together, we have developed new teacher guides and learner books for English and Chichewa language arts classes for grades seven and eight to be used in all primary schools across Malawi. Through this process, our team improved the capacity of 10 MIE staff and approximately 100 other professionals (teachers, teacher educators, and curriculum writers) in literacy education, curriculum development, and monitoring and evaluation.



### Impact

Our team improved the capacity of approximately 100 teachers, teacher educators, and curriculum writers in literacy education, curriculum development, and monitoring and evaluation.

## Teacher Excellence Initiative - Egypt

The Teacher Excellence Initiative (TEI) is a five-year project sponsored by the U.S. Agency for International Development (USAID). In 2022, the Education Development Center (EDC) signed a sub-award agreement with FSU to support the Teacher Excellence Initiative Activity. LSI is collaborating with FSU's School of Teacher Education (STE) to provide technical expertise in strengthening education systems in Egypt.

The TEI-Egypt project focuses on improving the quality and relevance of teacher preparation in Egyptian public universities, ensuring that teachers possess the necessary skills to support student learning in K-12 schools across the country. In collaboration with TEI partners, the FSU team has conducted a study to assess current university programs and course syllabi for pre-service teacher education. The study focuses on aligning these programs with competency standards for in-service teachers. The findings from this study will guide stakeholders in supporting ongoing reforms of undergraduate teacher education programs.

In Fall 2023, FSU plans to host a study tour, bringing Egyptian government officials, university deans, and faculty members from five selected universities to the FSU campus in Tallahassee. Additionally, FSU will



### Impact

The TEI-Egypt project focuses on improving the quality and relevance of teacher preparation in 15 Egyptian public universities, ensuring that teachers possess the necessary skills to support student learning in K-12 schools across the country.

establish a visiting fellows program, allowing Faculties of Education faculty members to engage with counterparts at the FSU School of Teacher Education from Spring 2024 to Fall 2025.

## Lebanon Higher Education Capacity Development

LSI continued its partnership with the USAID/ Lebanon Higher Education Capacity Development Program by welcoming 19 university staff members from Lebanon to Tallahassee. The group spent five days focusing on career development programs, with much of the program hosted by The Career Center at FSU. LSI trained administrators and faculty from 10 Lebanese universities participating in the program. They were provided training and support on building career centers, grant proposal writing and infrastructure setup, design thinking, and other areas.



### Impact

"We were so impressed with the level of facilities here at Florida State, the level of professionalism and the multi-layers of support FSU is providing to students through their career services outreach and resources. We are impressed with Florida State's ability to accommodate these international visits!"

- **Bill Potter**, Project Director of the Higher Education Capacity Development Program

## ABC+: Advancing Basic Education in the Philippines

As part of their partnership with USAID-Advancing Basic Education in the Philippines, LSI continued supporting Bicol University (BU) and West Visayas State University (WVSU) faculty. Since improving mother-tongue literacy instruction is not just a regional priority but a national priority of the Philippines, LSI participated in *Sharing of Lessons Learned on Strengthening Links Between Pre-Service and In-Service Teacher Education for Early Grade Reading Activity*. In this national event, the LSI team shared the monitoring, evaluation, learning plan findings, and the experience gained from developing and implementing the two new pre-service teacher education course modules codeveloped by FSU, BU, and WVSU.

In addition, LSI engaged BU and WVSU faculty and staff from the Department of Education offices in regions five and six in participatory action research experiences. For five months, 32 participants representing the four institutions met with the LSI faculty in person and remotely to develop their research skills and engage in rigorous education research. In addition to learning about literacy-based research methods, the participants designed research studies to produce contextually relevant evidence useful for early literacy instruction at schools and in pre-service training.



### Impact

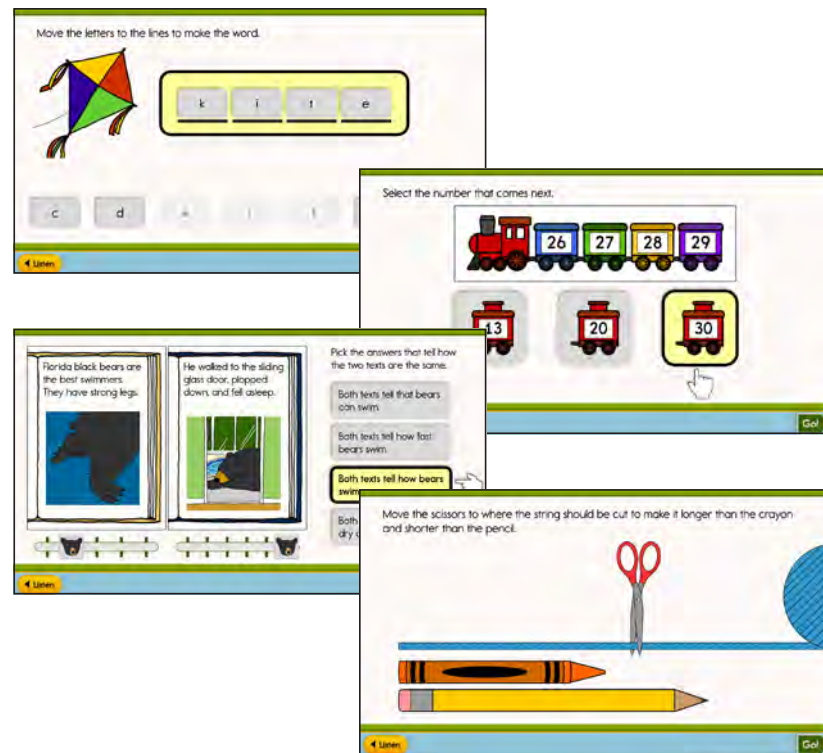
LSI built the capacity of Bicol University and West Visayas State University in implementing the Bachelor of Early Childhood Education and the Bachelor of Elementary Education curricula, with particular emphasis on early literacy instruction in the context of Department of Education's Mother Tongue-Based Multilingual Education program.

## PreK-2 Assessment

LSI is leading the creation of PreK-2 English language arts (ELA) and mathematics assessment items that will be on the Florida Assessment of Student Thinking (FAST), a progress monitoring assessment administered across the state, in which over 800,000 students will participate three times per year.

LSI trained over 100 PreK-2 practitioners from across Florida to create over 3,500 ELA and math test items. LSI guided item review teams to edit and vet each item, ensuring they are standards-aligned, reflect classroom-based pedagogy, and are appropriate for the unique needs of these early-grade learners.

Based on LSI's expertise and innovation, the team is pioneering a new interactive assessment format and system for PreK-2 learners that utilizes LSI's capabilities to help teachers adapt their instruction based on instantaneous and informative data while providing a playful computer-based formative assessment. Pilot studies are set to begin in the Fall of 2023.



### Impact

"LSI's ability to engage educators in the full test development process, which includes item writing, review of interpretive products (test specifications), and item review, has been particularly valuable. The Department considers its partnership with LSI exceedingly beneficial and anticipates continued collaboration in implementing high-quality, standards-based Florida assessments leading to higher student achievement and improved educator effectiveness."

- **Racquel Harrell**, Executive Director Test Development Center, Bureau of K-12 Student Assessment, FLDOE

## Community College Administrator Program

Since 2014, LSI has worked with the U.S. State Department and in partnership with Santa Fe College to conduct the Community College Administrator Program (CCAP). The extensive six-week training program enhances international understanding of U.S. community colleges and U.S. community college systems. This year, administrators and officials from Egypt and the Philippines participated in the project.



### Impact

Approximately 250 individuals from more than 200 institutions in 15 countries have participated in the CCAP.

## Uzbekistan Education for Excellence Program

Under the Uzbekistan Education for Excellence Program funded by the U.S. Agency for International Development, the LSI team has provided training, facilitation, and guidance on developing new curriculum standards for math, Uzbek language arts, and English as a foreign language (EFL). In addition to developing EFL standards, the LSI team supported textbook selection and customized a series of student books, teacher books, and workbooks for EFL in grades 1-11. This involved making appropriate changes to the books and developing instructional videos to assist teachers in effectively using the new materials.

Nationwide distribution of the series of English textbooks for all grade levels has been completed for the 2022-2023 school year. In 2023, the LSI team conducted a Status of Instruction study focusing on adopting the new English language teaching textbooks introduced in all public schools during the 2022-2023 academic year.

Furthermore, the LSI team has led the development of an educational digital platform to house all curriculum standards and materials (including textbooks and supplemental resources) accessible to



### Impact

The program has distributed a series of English textbooks for all grade levels nationwide benefiting 40,000 teachers and six million students. In addition, the program developed an educational digital platform to house all curriculum standards and materials accessible to all 300,000 teachers in Uzbekistan.

all 300,000 teachers in Uzbekistan. The platform was launched for a pilot group of teachers in 2022, and the LSI team trained the ministry's staff on the full version in June 2023. This unprecedented effort will provide immediate and direct support to all teachers, enabling them to access materials made available by the ministry. This one-stop shop for all their curricular needs brings significant day-to-day support to teachers in Uzbekistan.



## The Florida Inclusion Network

FIN collaborates with all districts and schools to provide customized services and supports ensuring all students with disabilities have the same educational, social, and future opportunities as their peers.

In partnership with districts, FIN facilitates the implementation of inclusive best practices through:

- Data-driven, student-focused planning and problem-solving across districts and schools.
- Data-driven professional development and technical assistance to increase knowledge and skills of district and school personnel.
- Coaching and resources for district and school personnel to sustain inclusive best practices.
- Sharing information to build collaborative relationships between families, schools, and districts.

## Tunoze Gusoma Schools and Systems - Rwanda

During the past year, the Tunoze Gusoma Schools and Systems project team has provided intensive professional development on literacy education to 46 teacher educators drawn from Teacher Training Colleges (TTCs) across Rwanda. In order to provide teacher educators and student teachers with opportunities to practice teaching lessons using curriculum from the primary schools, 2,288 curricular books/materials were delivered to 16 TTCs. Each TTC received 143 books/materials to use in literacy-related activities.

Moving forward, we will focus on providing training on early childhood education pedagogies and training education leaders to support teacher educators and student teachers. The Teaching Practice Advisory Group has reviewed and revised the structure of student teachers' practicum and school attachment and has begun to provide training on the new handbook and materials in preparation for the new model to be piloted in the next academic year.



### Impact

This project has provided intensive professional development on literacy education to 46 teacher educators drawn from Teacher Training Colleges across Rwanda; 2,288 curricular books/materials were delivered to 16 TTCs. Each TTC received 143 books/materials to use in literacy-related activities.

## Math Lions

This was the first year of the Math Lions project, funded by the National Science Foundation. In this project, we aim to 1) develop materials for a math anxiety intervention for children, 2) test the intervention's effect on math anxiety in a cluster randomized trial in schools, and 3) see whether there are subsequent effects on working memory, math avoidance, and then math achievement.

During this first year, the focus was on developing the intervention materials, including a facilitator guide, and child workbooks. We worked with collaborators in Italy and the advisory board to develop these materials through an iterative process. We are now preparing to administer the intervention to children in the lab to test out the materials and make any improvements to them before conducting the intervention in schools.



### Impact

"Unfortunately, people with math anxiety tend to have a harder time with math and are less likely to take higher-level math courses or pursue STEM careers. We wanted to address math anxiety early so we could decrease the chances of negative educational impacts later in life."

- **Dr. Colleen Ganley**, Associate Professor Department of Psychology & Learning Systems Institute

## The Successful Start: Cognitively Guided Instruction

LSI received a two-year grant from the Children's Board of Hillsborough County to fund The Successful Start: Cognitively Guided Instruction project. The activity aims to enhance the effectiveness of early elementary mathematics in Hillsborough County by providing mathematics teacher professional development to 300 voluntary pre-kindergarten through third grade teachers in collaboration with Hillsborough County Public Schools. The program began in the summer of 2023 and will continue through the school year 2023-24 and 2024-25.

The Cognitively Guided Instruction (CGI) program provided to teachers during the Successful Start project is based on an evidence-based CGI program that meets the What Works Clearinghouse standards for moderate evidence of effectiveness. CGI is one of the few mathematics teacher professional development programs that has this level of proven evidence of effectiveness.



### Impact

This summer in Hillsborough County, Florida, 150 elementary educators have been given a chance to improve their math teaching abilities through the CGI professional development program. So far, the program has provided six days, equivalent to 42 hours, of training for these participants.



## Ralph Stair Prize For Innovation In Education

Dr. Stephanie Simmons Zuilkowski, Associate Director for Research at the Learning Systems Institute, was awarded the Ralph Stair Prize for Innovation in Education. The honor is awarded biennially to an individual or collaborative team at FSU who has developed innovative education approaches that demonstrate the potential of having a great impact nationally and internationally. Zuilkowski was honored for her work leading the development of the Nigerian Center For Reading Research at Bayero University-Kano, a project sponsored by the U.S. Agency for International Development (USAID). The project to establish the research center took place over three years and was achieved despite the personal risk inherent in working in the region.

# CPALMS

*CPALMS is a unique platform developed by LSI to support K-12 education in Florida and used by millions from all around the globe. More than 260,000 K-12 Florida educators and approximately three million Florida students actively use CPALMS to access educational resources, information to help them teach and learn, and software applications to support them throughout. CPALMS is the State of Florida's official source for standards information and course descriptions. It provides access to thousands of standards-aligned, high-quality instructional and educational resources designed specifically to support standards-based instruction. Over the years, CPALMS has become a platform of tools and continues to grow the level of support it provides to the entire state and the world. During the year, the CPALMS team worked on multiple projects and grants.*

## CPALMS Impact

CPALMS now offers more than 12,000 high-quality educational resources developed by FSU faculty and K-12 educators. Our team has created over 1,300 original student tutorials for students to use anytime and from anywhere. These are interactive online lessons on the topics from the curriculum standards the students need to learn in math, science, English Language Arts, and social studies. During the pandemic, LSI made all the CPALMS resources accessible to students, parents, and educators around the globe to support them in teaching and learning from home. More than 20 million students depended on CPALMS during that period. Since CPALMS

started offering educational resources, more than 800 million resource views/downloads have been delivered. During the last year, CPALMS had more than 70 million resources delivered to Florida's educators and students.

## Original Student Tutorials

The CPALMS team created more than 150 new original student tutorials and maintained 1,300 tutorials throughout the year. The development of these tutorials is a collaboration between K-12 educators, subject specialists, instructional designers, graphic designers, narrators, and others who collectively spend 200-400 labor hours to create each tutorial. During the last year, several tutorials crossed a million views.

## CPALMS Civics Platform and Educational Resources

The CPALMS team is working on multiple projects to develop educational resources for civics, including integrated resources that can be used in math, science, English Language Arts (ELA), computer science/coding, social studies, and fine and performing arts. Over 1,200 instructional resources, such as lesson plans, student tutorials, and videos, are being created and will be distributed on CPALMS for over 260,000 Florida teachers and 2.8M Florida K-12 students.

CPALMS will be debuting a new type of K-2 student resource, Interactive Research Pages, that will allow students to independently research and learn about civics while using ELA skills and concepts. Civics family guides were created to help families better understand the civics initiative and civics topics covered in each grade, along with ideas on how families can continue learning at home.

CPALMS was chosen to be the platform for the new Florida civics portal. Our team created the platform to deliver civics education instructional resources to all K-12 educators across the state. The portal features thousands of educational resources the CPALMS team guided during the development process to support teachers as they implement civics education, provide innovative ways to teach civics, and integrate civics into other content areas. The portal provides students and parents with resources that will enhance home-based support of civics education. While building this vast support system for the entire state, LSI vetted submissions from over 500 K-12 teachers and worked with collaborators from other Florida universities and organizations.



## Impact

More than 1,200 original educational resources were created for teaching math, English Language Arts, science, coding, fine arts, and social studies with embedded civics context. More than 500 Florida educators participated in the program this year helping to create resources that will be used by all Florida's educators and students.

## CPALMS Initiative for Career Technical Education

CPALMS has expanded its support to include Career and Technical Education (CTE). In partnership with and funding support from the Florida Department of Education, the CPALMS team is designing and migrating a complex process and a massive data set to modern, efficient, and usable tools and resources for all educators. By the end of the project, CPALMS will have a CTE application to help the state manage all the programs, courses, and standards data, along with software tools and educational resources for teachers across the state. This project will lay the foundation to build support for students to explore CTE programs, careers, college degrees, and much more. At the same time, it will create a one-stop-shop for CTE teachers across the state to access resources for teaching and learning.

During the past year, CPALMS staff trained 100 educators to create more than 250 educational resources that will be the first of many CTE resources featured on the new CPALMS CTE application. The resources are grounded in research-based integration and engaging pedagogy to support Florida CTE teachers who reach over 460,000 students preparing for future work.



### Impact

CPALMS trained 100 educators to create more than 250 educational resources that will be the first of many Career and Technical Education (CTE) resources featured on the new CPALMS CTE application. The resources will support Florida CTE teachers who reach over 460,000 students preparing for the future work

## Professional Learning Platform

CPALMS supported the Department of Education's Civics Excellence Initiative by building an interactive online learning system featuring a 55-hour teacher professional development course. The system was created from the ground up in the CPALMS platform and was launched in just months. It includes the development of advanced and AI tools for grading and detecting plagiarism, as well as a built-in support system. More than 13,000 Florida teachers completed this online course since January, and more than 18,500 are expected to complete the course by the end of September.



### Impact

Over 500,000 hours of videos have been viewed, and more than 715,000 assignments were submitted and reviewed in six months. The platform assisted 13,000 Florida educators in completing a course, achieving a teaching endorsement, and earning a stipend.



## CPALMS Professional Development

Throughout the year, the CPALMS staff hosted professional development (PD) workshops in Tallahassee and around the state. The PDs covered financial literacy, civics integration, career and technical education, and coding with Scratch. Almost 700 Florida educators participated in over 20 workshops this year.

The most ambitious PDs were held in Tallahassee in June, as nearly 300 Florida teachers came to the capital city for over 35 hours of PD rooted in research-based pedagogy and integration methods. An essential part of these PDs in Tallahassee was offering unique immersive experiences which increased teacher content

### Impact

"Overall, the experience was wonderful. The training is exceptional. The integration and the technology use are phenomenal. The help provided is wonderful."

- Adam Bagby, teacher in St. Augustine and CPALMS Professional Development participant

knowledge while inspiring engaging lesson ideas for teaching units the participants created. Attendees visited the Florida Supreme Court, the historic Capitol building, the Florida House of Representatives, and the Senate. The teachers also took a tour from Cascades Park to Wakulla Springs to learn about water management and civic duty.

## Tools Competition Finalist

The CPALMS platform, developed by staff at the Learning Systems Institute at Florida State University, was named one of 16 finalists in the Tools Competition for learning engineering tools. The Tools Competition is a multi-million-dollar global prize challenge for education technology solutions tackling the most pressing issues in education and advancing learning science. The competition awards more than \$4 million for innovative learning tools in four areas addressing pressing challenges in education. CPALMS is a finalist in the transforming assessments track. The Learning Engineering Tools Competition aims to spur the development and deployment of technologies that address pressing education issues from early childhood to secondary education while advancing the field of learning engineering.



# By the Numbers

## Financial Performance

LSI is a research and development unit that is heavily dependent on competitive external contract and grant funding. This funding is critical to make the positive impact in teaching and learning around the world. Continued funding support is an excellent indicator of the high-quality work that the LSI team produces. This year, LSI surpassed \$762 million in contract and grant funding since inception making it one the top producing institutes and centers in this area.

\$762M

Contracts and grants generated by LSI since inception  
(Not adjusted for inflation)

During fiscal year 22-23, our researchers...

Managed **34** active projects with a value of **\$70.4M**

Generated more than **\$14M** in new funding

Won **12** new contracts and grants

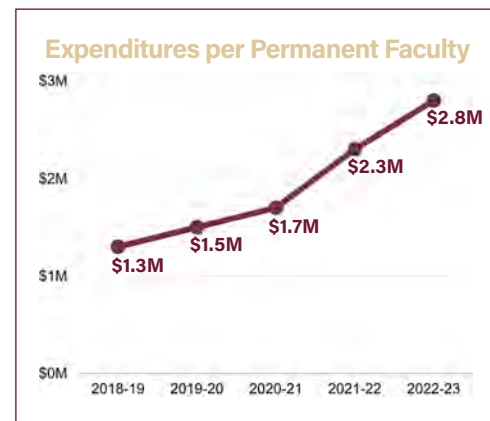
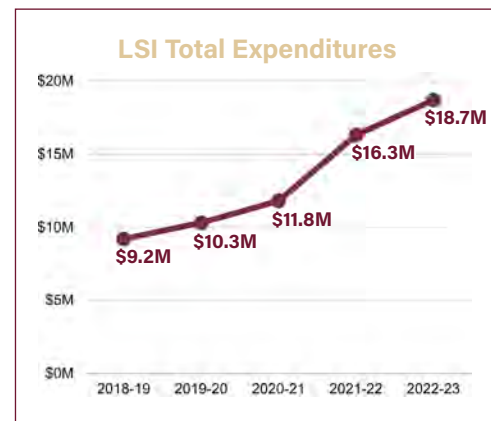
### Return on Investment (ROI)

An important metric for LSI's performance is generating a strong return on every state/university dollar invested in the institute. This ratio is measured by dividing total dollar expenditures on contracts and grants by total expenditures from state/university dollars. This year, LSI's ROI reached **15X**, a year-over-year increase for the **fourth** consecutive year.



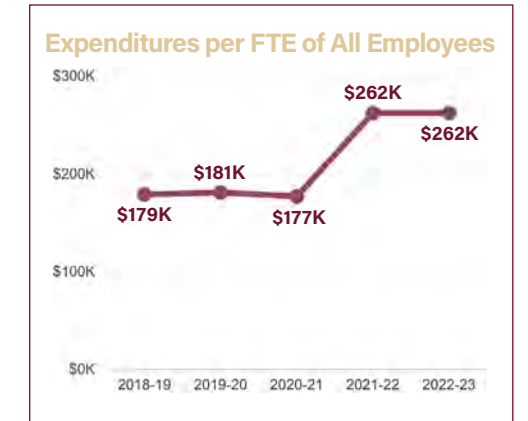
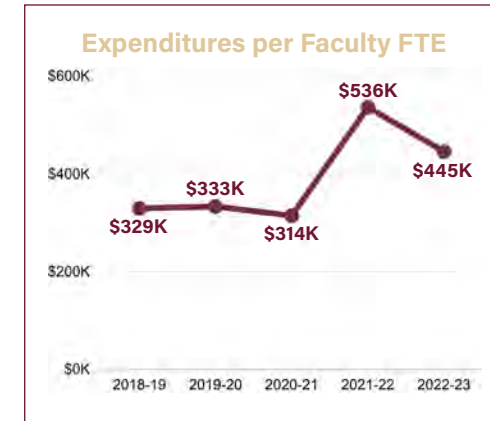
### R&D Expenditures

The overall expenditures during FY 22- 23 exceeded **\$18.77 million**. That is a **15% increase** over the prior year and an increase over each of the previous four fiscal years.



### Expenditures

While generating record levels of expenditures, the team demonstrated ingenuity, high productivity, and increased efficiency.



### LSI Team Update

The institute is making investments to continue to expand and deepen the expertise of the overall team. LSI added 31 new employees to our count during the year.

<b>96</b> Faculty Employees ( <b>42.11</b> FTE)	<b>10</b> A&P Employees ( <b>6.17</b> FTE)	<b>17</b> OPS Grad Student Employees ( <b>2.99</b> FTE)
<b>26</b> OPS Student Employees ( <b>2.96</b> FTE)		<b>61</b> OPS Employees ( <b>10.61</b> FTE)
224 Total Employees (71.52 FTE)		

While LSI is not an academic unit, we are proud to provide graduate students and undergraduate students the opportunities to work on real-world projects. During FY 22-23, LSI supported 17 graduate students and 26 undergraduate students. In addition, LSI hosted **four** interns including **two** high school students from Leon County Public Schools.

In November of 2022 LSI was awarded its **fifth Florida TaxWatch Productivity Award**. LSI Director Rabieh Razzouk was named a 2022 award recipient in technology with an estimated cost savings of **\$3,750,000**. The award recognizes and rewards state employees and workgroups who find ways to improve services, increase efficiencies, and save Florida taxpayers millions of dollars each year.



*The  
Florida Senate  
Welcomes the  
Learning Systems Institute  
at FSU*



**LEARNING SYSTEMS INSTITUTE**  
AT FLORIDA STATE UNIVERSITY

[lsi.fsu.edu](http://lsi.fsu.edu)





The High-Performance Materials Institute (HPMI) is a multidisciplinary research institute associated with the FAMU-FSU College of Engineering. HPMI strives to recruit, develop and retain top quality faculty and staff who will develop HPMI into a center of excellence for innovation, research and education in the field of advanced materials, composites and nanomanufacturing. Currently, HPMI is involved in several technology areas: High-Performance Composites and Nanomaterials, Auxetic Foams and Structures, Structural Health Monitoring, Advanced Manufacturing, New LED and Solar Cell Materials, and Data Science-driven Materials Research and Manufacturing Process Modeling.

HPMI has proven a number of technology concepts that have the potential to narrow the gap between fundamental research and practical applications. These technologies include auxetic foams, continuous alignment of nanotubes, roll-to-roll fabrication of nanotube membranes or buckypapers, multifunctional nanotube composites for mechanical properties, electrical conductivity, thermal management, radiation shielding and EMI attenuation, mechanoluminescent structure health monitoring and carbon nanomaterials for energy storage and sensor applications.

In 2007, the Florida Board of Governors designated HPMI as Florida Center of Excellence in Advanced Materials to provide leading materials and manufacturing innovation, research and working force training to support industrial and economic growth. In 2002, HPMI personnel also established Florida's first National Science Foundation (NSF) Industry/University Cooperative Research Center (IUCRC).

HPMI has a comprehensive set of state-of-the-art materials processing, testing, characterization and computing facilities for nanomaterials research housed in the 43,000-square foot Materials Research Building.

HPMI is part of one of the two first Space Technology Research Institutes (STRI) established by NASA. HPMI is in its second year of the 5-year project that is focused on developing materials to be used in deep space travel. HPMI also supports the efforts of NSF RISE and CREST Centers for 3D Advanced Manufacturing.

In addition to conducting numerous projects sponsored by the National Science Foundation, over the years, HPMI has worked with most military research centers, including Air Force Research Labs, Air Force Office of Scientific Research, Army Research Lab and Office of Naval Research. HPMI has also worked with other industrial entities including Boeing, General Dynamics, Lockheed Martin, and Raytheon.

## EQUIPMENT AT-A-GLANCE

### ADVANCED IMAGING AND ELECTRONIC MICROSCOPY

- > Atomic force microscope (Multimode with Nanoscope VII, Veeco Instruments Inc.)
- > Scanning electron microscope (7401F field emission, JEOL), FIB (G4 UC from FEI)
- > Transmission electron microscope (ARM200Fc STEM/TEM with Cs correction, JEOL)

### SPECTROSCOPY

- > Renishaw Confocal Research Raman Microscopy (upgraded InVia, 633 nm and 785 nm laser sources)
- > Bruker, Nanostar SAXS/WAXS X-ray scattering machine
- > Tristar Surface Area and Porosity Analyzer.

### THERMAL ANALYSIS

- > Differential Scanning Calorimeter
- > Thermomechanical Analyzer
- > Thermogravimetric Analyzer
- > Two (2) Dynamic Mechanical Analyzers from TA Instruments Inc.

### SCALE-UP COMPOSITE MANUFACTURING

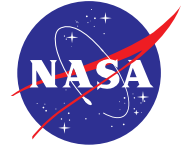
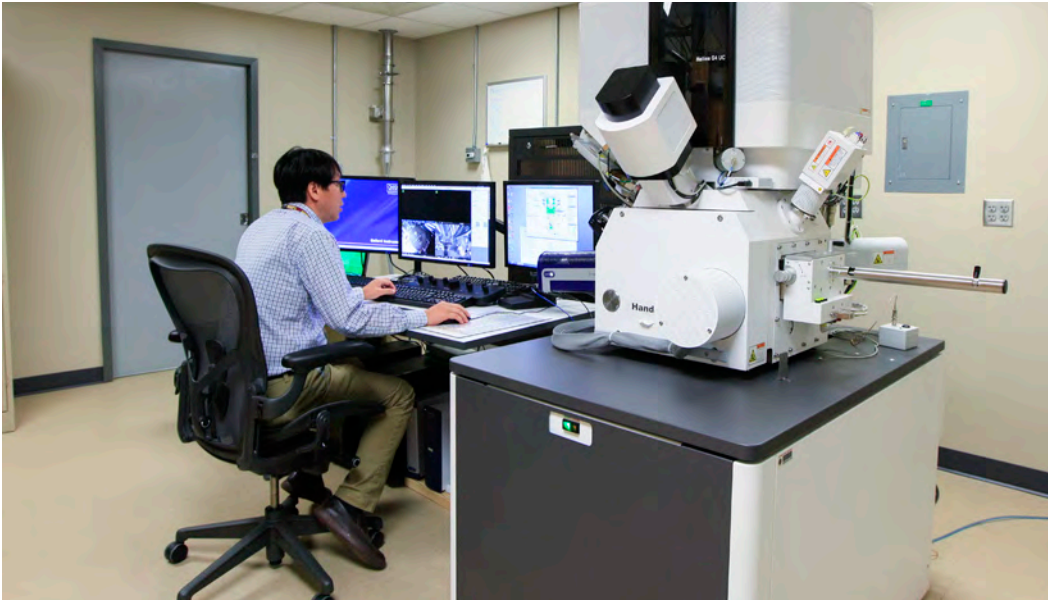
- > VARTM, hot-press and prereg/vacuum bagging/autoclave processes as well as plastic extrusion process in-house.

### 3D PRINTER LAB

- > nScript 3D-450n/MTGen software the principal manufacturing equipment for this project
- > Dedicated PC station for design and control
- > Stratasys Objet and Dimension systems
- > Lulzbots (6)
- > Makerbot 2X Experimental with several in-house printers

Currently, HPMI has

**17** affiliated faculty members and  
**70** research students, including  
about **35** doctoral students.



#### EXAMPLES OF PROJECTS WITH GOVERNMENT AND INDUSTRIAL PARTNERS:

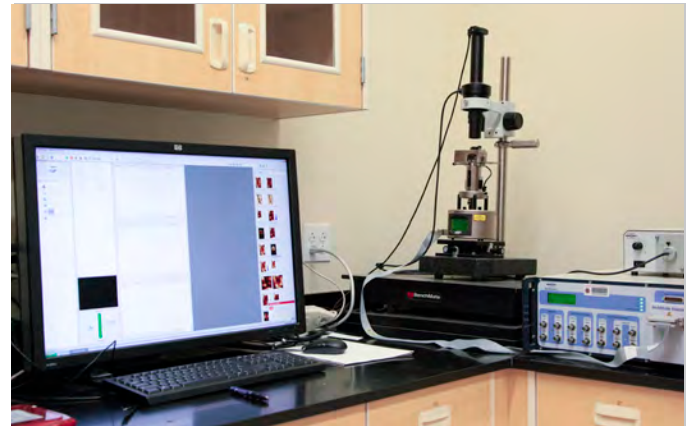
- AFRL and industrial partner: lightweight EMI shielding composite structures with the effectiveness >40 dB crossing radar frequency range
- AFOSR/AFRL and industrial partner: Ultra-high through-thickness thermal conductivity composites for aerospace applications
- AFRL/industrial partner: Scale-up manufacturing and performance evaluation of new concept CNT composites
- ONR/industrial partner: Scale-up CNT alignment and high-performance composites
- NASA/AFOSR and industrial partner: Ultra-high strength composites exploration
- ARL and industrial partner: Rapid manufacturing of large UVA parts through VARTM manufacturing process
- VA and industrial partner: Rapid manufacturing high-quality and complex geometry composite medical devices through advanced manufacturing
- AFRL and Industrial partner: Manufacturing and performance evaluation of nonmetal conductors
- NSF/industrial partners: Roll-to-roll manufacturing of high-quality and high-conductive CNT buckypapers for aircraft manufacturing applications
- Industrial partners: aerospace-quality multifunctional composites design and fabrications with both random and aligned CNT networks with proprietary prepreg/autoclave manufacturing process
- Industrial partner: Design and rapid manufacturing of composite electronic enclosures with high EMI shielding capability
- Industrial partner: Ultra-lightweight composite structures with tunable EMI shielding
- Industrial partner: High-resolution STEM/FIB 3D tomography analysis of carbon fiber and CF/resin matrix interface microstructures



## AVAILABLE EQUIPMENT



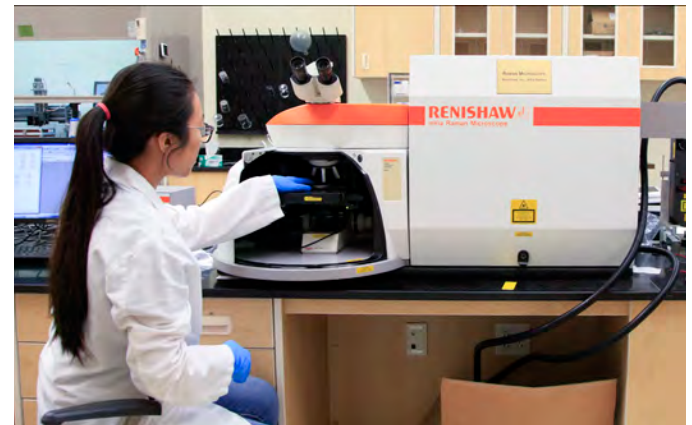
Focused Ion Beam/Scanning Electron Microscope (FIB/SEM, Helios G4 UC)



Multimode 8 Atomic Force Microscope (AFM)



Nanostar Small-Angle X-ray Scattering (SAXS)



Confocal Micro-Raman Microscope



Transmission Electron  
Microscope (JEM-  
ARM200cF)



AGS-J Mechanical Test  
Machine



MTS Landmark  
Servohydraulic System

## AVAILABLE EQUIPMENT



High Temperature and High Pressure Furnace



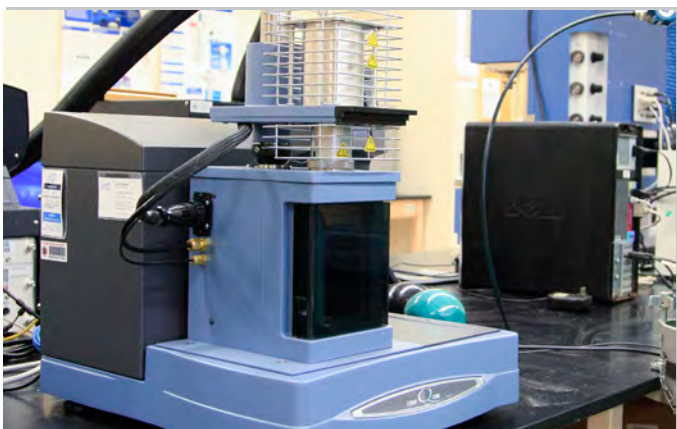
Autoclave



nScript 3D Printer



Differential Scanning Calorimetry (DSC 2500)



Thermomechanical Analyzer (TMA, Q400)



Benchtop Ultra Centrifuge

# Appendix C1



## Advanced Aerospace Materials and Advanced Manufacturing

### I. Description of the Capability and Expertise of the High-performance Materials Institute (HPMI) (an existing facility)

The High-Performance Materials Institute (HPMI) is a multidisciplinary research institute. HPMI strives to recruit, develop, and retain top-quality faculty, students and staff who will develop HPMI into a center of excellence for innovation, research, and education in the field of advanced materials, aerospace composites, nanotechnology, additive manufacturing and data-driven material discovery and manufacturing process modeling and optimization.

HPMI has proven many technology concepts that have the potential to narrow the gap between fundamental research and engineering applications. These technologies include auxetic foams, continuous alignment of nanotubes, roll-to-roll fabrication of nanotube membranes or buckypapers, multifunctional aerospace composites for mechanical properties, electrical conductivity, thermal management, radiation shielding, and EMI attenuation, mechanoluminescent structure health monitoring, carbon nanomaterials for energy storage and sensor applications, and printed sensor development.

In 2007, the Florida Board of Governors designated HPMI as the Florida Center of Excellence in Advanced Materials to provide leading materials and manufacturing innovation, research, and working force training to support industrial and economic growth. In 2002, HPMI personnel also established Florida's first National Science Foundation (NSF) Industry/University Cooperative Research Center (IUCRC). Currently, HPMI is part of one of the two first Space Technology Research Institutes (STRI) established by NASA. This 6-year project is focused on developing materials to be used in deep space travel. The HPMI team is leading a large AFRL project to develop multifunctional composite systems. HPMI also supports the efforts of NSF RISE and CREST Centers for 3D Advanced Manufacturing.

HPMI has a comprehensive set of state-of-the-art materials processing, testing, characterization, and computing facilities for advanced aerospace composite and additive manufacturing research housed in the 43,000 square foot Materials Research Building with a total value of equipment more than \$25M. HPMI has available advanced imaging and electronic microscopy capabilities with an atomic force microscope (Multimode with Nanoscope VII, Veeco Instruments Inc.), scanning electron microscope (7401F field emission, JEOL), FIB (G4 UC from FEI), and a transmission electron microscope (ARM200Fc STEM/TEM with Cs correction, JEOL). For spectroscopy, HPMI has a Renishaw Confocal Research Raman Microscopy (upgraded InVia, 633 nm, and 785 nm laser sources), a Bruker, Nanostar SAXS/WAXS X-ray scattering machine, and a Tristar Surface Area and Porosity Analyzer. For thermal analysis, HPMI has a Differential Scanning Calorimeter, a Thermomechanical Analyzer, a Thermogravimetric Analyzer, and two Dynamic Mechanical Analyzers from TA Instruments Inc. HPMI also has capabilities of scale-up composite manufacturing with VARTM, hot-press and prereg/vacuum bagging/autoclave processes as well as plastic extrusion process in house. HPMI also houses a 3D printer lab, consisting of nScript 3D-450n/MTGen software, the principal manufacturing equipment for this project and has a dedicated PC station for design and control, Stratasys Objet and Dimension systems and Makerbot 2X Experimental with several in-house printers. The figure below shows examples of the HPMI labs and capabilities.

In addition to conducting numerous projects sponsored by the National Science Foundation, over the years, HPMI has worked with most military research centers, including Air Force Research Labs, Air Force Office of Scientific Research, Army Research Lab and Office of Naval Research. HPMI has also worked with other industrial entities including Boeing, General Dynamics, Lockheed Martin, and Raytheon.



## II. InSPIRE - Aerospace Composites Manufacturing & Prototyping (Proposed New Facility)

We focus on establishing an ecosystem of advanced aerospace materials and additive manufacturing technical hub at the InSPIRE. The effort will first build a user facility aiming for scalable capability and expertise of high TRL level (4-7) research, industrial product prototype development, and facilitation of large collaborative R&D programs of academics, government, and industrial partners. The major effort include:

1. **High-temperature composite fabrication** (up to 2800°C and 24 in x 24 in demonstration part processing and test capability; ~1,000 ft<sup>2</sup>); including high-temperature furnaces (such as HP 100 from Thermal Technology), custom-made resin infiltration setup, basic high-temperature test capability (~2800°C)
2. **Certified composite manufacturing cleanroom and high-bay** (~6,000 ft<sup>2</sup>) space, including industry-scale walking-in freezer for prepreg and resin storage (up to 500lb materials) and working stations for composite layups. (the high bay area for aerospace composite fabrication (similar to Materials Research Building high bay space). Modular spaces for different manufacturing processes, including standard aerospace autoclave process ( such as Econoclave<sup>®</sup> 1MX1.5M autoclave from ASC Processing Systems for 1 m x 1.5 m part size), high-pressure RTM system ( up to 48 in x 48 in part size), filament winding process ( 1.5 ft x 5 ft part size); High-pressure thermoplastic processing capabilities (multiple composite hot press machines, up to 48 in x 48 in part size); Non-destructive tests (Laser shearography and ultrasound inspection of composite parts, up to 48 in x 48 in part size), and composite test sample preparation room. Materials preparation include industry-standard on-site resin preparation, thermal analysis and mechanical test labs and quality control setups.
3. **Automated tape laying (ATL) and automated fiber placement (AFP) and tools** for composite production prototyping capabilities to target mid-size, complex geometry, composite layup and manufacturing automation requirements, such as CORIOLIS Csolo ATL (robot-based model) and Robotic FP from Ingersoll Machine Tools. We need to closely work with potential industrial and governmental partners to custom-design and manufacture ATL and AFP equipment and tools. The



goal is to ensure potential large composite manufacturing projects and long-term collaborations with potential partners.

4. **Advanced Additive Manufacturing** will focus on the state-of-the-art industry-application-ready capabilities, including high-precise and production-grade thermoplastic additive manufacturing (such as HP Jet Fusion 5200), advanced metal and electronics printing for aerospace applications (such as LENS CS 1500 Systems with a large work envelop and 5-axis motion control and Aerosol Jet HD2 for electronics printing from Optomec), and 2-3 custom-design 3D printing capacities for hybrid printings for new product development.
5. **AI/ML Driven Manufacturing Lab and Training** will focus on advanced software and digital twin capabilities with experimental verification and validation for industrial applications.

#### **Business-Revenue Model:**

- Seek large-scale federal projects, grants and contracts
- Build long-term collaborating relationships with major military bases and industrial partners as a major tech hub for materials and manufacturing innovations
- Generate patents and IPs, and support/participate spin-off companies
- Attract major industries to move into the areas

**Significant Users:** AFRL-RX, AFRL-RQ, ARL, Navy Labs, NASA, Lockheed Martin, Northrop Grumman, Boeing, Solvay, Huntsman and NASA as well as many SEMs.

### **III. Examples of other facilities**

There are *a few competitive facilities* which plays critical roles to bridge university composite research and industries, including the National Composites Centre (Bristol, UK), recent Solvay-NIAR Manufacturing Innovation Center, the Center for Composite Materials (CCM) at the University of Delaware, the University of Dayton Research Institute and The Institute for Advanced Composites Manufacturing Innovation (IACMI, a DOE sponsored National Network for Manufacturing Innovation). However, there are huge needs for composites, nanomaterials and advanced manufacturing, and our unique facility, ecosystem and expertise can lead to the success of the project. The follow figures show examples of the facilities and equipment as we discussed above



**ATP at the NCC, UK**



**Typical cleanroom for aerospace composite manufacturing**



**ATP at the Solvay-NIAR Manufacturing Innovation Center**



**HP Jet Fusion 5200 Print Center**





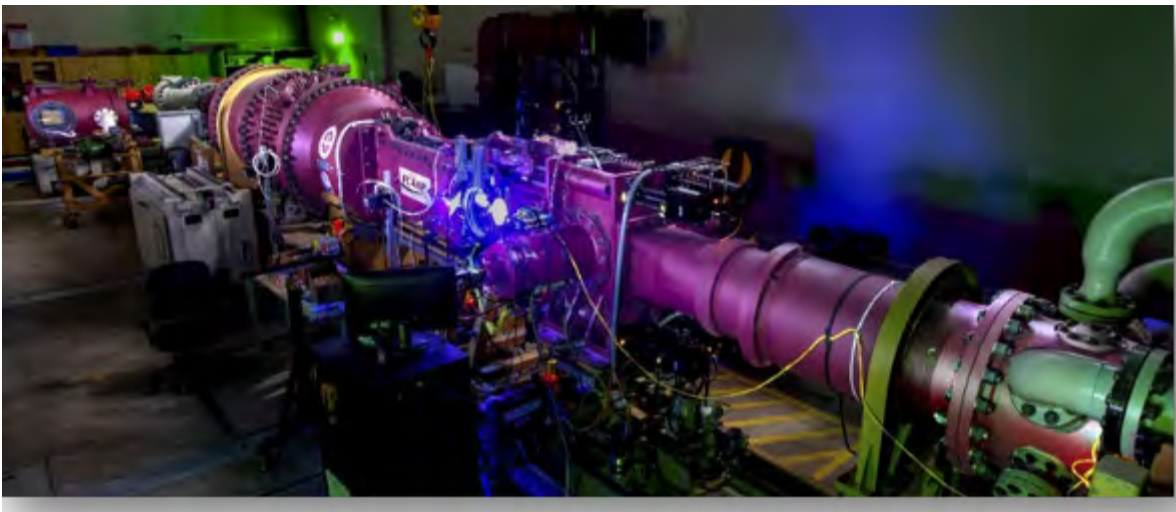
## Hypersonic – Supersonic Advanced Wind Tunnel

### I. Description of the FCAAP Polysonic Wind Tunnel (an existing facility)

The Polysonic Wind Tunnel (PSWT) at the Florida Center for Advanced Aero-Propulsion (FCAAP) at FAMU-FSU College of Engineering operates over a *Mach number range of 0.2 to 5*, with independent control of Reynolds number. The facility features two separate test sections: 1) 12-in x 12-in x 24-in test section with solid walls for sub/supersonic Mach number testing, and 2) 12-in x 12-in x 48-in with slotted walls for testing in the transonic speed regime. The facility is connected to a high-pressure storage system of 110m<sup>3</sup> of dry air at 500psia pressure. Typical run times are 30 - 100 seconds depending upon the test conditions. Recently, a heater and additional Nozzles are being added to increase its operational capability, a \$2-3M improvement.

**Diagnostics:** The PSWT is equipped with the most advanced diagnostics that permit integrated aerodynamic measurements as well as detailed measurements, where both are needed for air vehicle engineering design and for validation of high-fidelity simulation tools. This instrumentation includes a six-component strain gauge balance to measure aerodynamic forces and moments, an electronic pressure scanners (ESP) for steady pressure distributions and Kulite pressure transducers for unsteady pressures. The tunnel is designed for maximum optical access, a feature that makes this a unique facility, that allow of optical flow diagnostic capabilities such as Schlieren, shadowgraph and surface oil flow visualizations. This optical access also permits advanced optically-based diagnostics such as stereo-tomographic and time-resolved Particle Image Velocimetry, using multiple double pulsed Nd-YAG lasers, and a 150W 30kHz photonics laser, numerous high resolution CMOS and CCD cameras and advanced optics to measure off-body velocity field. The facility is also equipped with mean and Fast (kHz rate) Pressure Sensitive Paint (PSP) that allow of global mean and unsteady surface pressure fluctuations on large areas and test models.

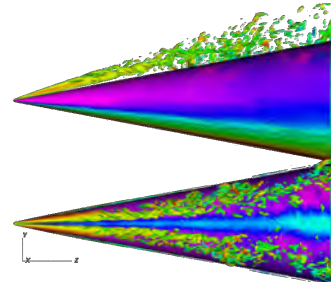
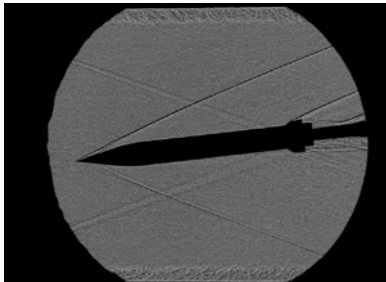
The figure below shows a picture of the facility, some representative flow visualization and simulations enabled by data acquired from the FCAAP PSWT. The PSWT is a one-of-a kind facility which has been in high demand for testing by DoD, Research Organizations and the Aviation and Aerospace Industry.





### Tunnel Specifications

- **12" x 12" Test Section**
- **Mach No. Range 0.2 – 5.0 (Inc. Transonic Regime)**
- **Reynolds number range: 5 - 30 million/ft**
- **Run time: 60-100 seconds (Typical)**
- **Excellent Flow Quality**
  - $C_{p_{RMS}}$ : Subsonic & Transonic  $\leq 2\%$ ,
  - $C_{p_{RMS}}$ : Supersonic  $\leq 0.2\%$
  - Turbulence Intensity:  $< 0.2\%$
  - Flow Angularity:  $\leq 0.2^\circ$



### FCAAP Polysonic Wind Tunnel – Facility Picture, Specifications and Sample Data

**Cost:** The cost to stand up the wind tunnel and its associated critical instrumentation and requisite support hardware and facilities: **\$10-12M** (in 2012/14 dollars). Cost to stand up today, **\$17-\$20**.

### II. InSPIRE - Hypersonic Wind Tunnel, IHWT (Proposed New Facility)

The proposed facility is a *larger wind tunnel with a much higher Mach number range*, relative to the PSWT, which has been in constant demand. The envisioned specifications and technical characteristics of this tunnel are:

- Blowdown to vacuum
- Mach Number: 5 to 10
- Reynolds Number range:  $0.2 - 10 \times 10^6/\text{ft}$
- Run times:  $\sim 30-60$  sec at 30–40-minute intervals
- Test Section: 18 in. diameter
- Stagnation temperature to  $2500^\circ\text{R}$

**Significant Users:** AFRL-RW, AFRL-RQ, ARL, Navy Labs, Lockheed Martin, Northrop Grumman, Boeing. Almost all of these use PSWT but have significant testing needs that are outside its capabilities. They should be early and repeat users-customers.

### III. Examples of other facilities

There are *no other facilities* at other universities or university-led institutes that have the range of capabilities of the proposed facility and the expertise to support the comprehensive testing it will provide. Most have limited range and/or diagnostics and are mostly focused on fundamental research, not application focused (applied) research. Most applied research, industry focused test facilities are oversubscribed with long wait times and/or very expensive to test.

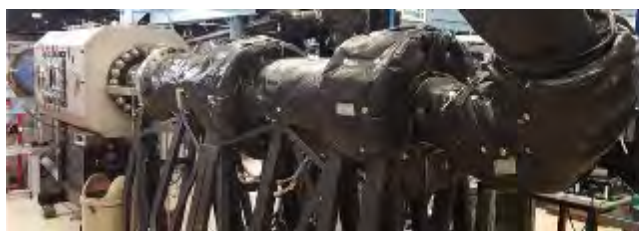


**Purdue Mach 6 Quiet Flow Ludwig Tube, 9.5" Diameter Test Section**



**Hypersonic Wind Tunnel**

**Sandia Lab Hypersonic Tunnel – Mach 6, 8, 14**



**Mach 6 Quiet Tunnel (M6QT) – TAMU**



**AEDC Hypersonic Tunnel 9 (1m dia)– Mach 7, 8, 10, 14, 16.5**

**Appendix D**

FLORIDA STATE  
UNIVERSITY



Sponsored Research Administration

October 20, 2023

Proposal: "Institute for Strategic Partnerships, Innovation, Research and Education"  
Florida State University Principal Investigator: Dr. Stacey Patterson  
Period of Performance: 12/1/2023 to 11/30/2029  
Amount Requested: \$98,456,615

Florida State University is pleased to submit the above referenced proposal to Florida Triumph Gulf Coast.

This proposal has been reviewed and approved by Florida State University's Office of Sponsored Research. Florida State University is prepared to negotiate and enter into a subsequent agreement resulting from this proposal.

If you have any questions or require additional information, please do not hesitate to contact Kathy Pennington by telephone at 850-645-9809 or via email at SRA-Pre@fsu.edu.

Sincerely,

A handwritten signature in black ink that reads "Russell D. Lentz".

Digitally signed by Russell D.  
Lentz for Stacey Patterson, VPR  
Date: 2023.10.20 14:08:12  
-04'00'

Stacey Patterson, PhD  
Vice President for Research

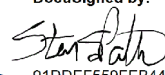


**THE FLORIDA STATE UNIVERSITY**

*Office of the Vice President for Research*  
3012 Westcott North  
Tallahassee, Florida 32306-1330  
Telephone: (850) 644-9694, FAX: (850) 645-0108

**DELEGATION OF AUTHORITY**

**TO:** Unit Record and Administration  
**FROM:** Stacey Patterson, Vice President for Research  
**DATE:** October 15, 2022  
**SUBJECT:** Delegation of Authority

DocuSigned by:  
  
91DDEF559FEB441...

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Effective October 15, 2022, Russell Lentz, Associate Director of Sponsored Research Administration, is authorized to negotiate, enter into, and execute in my name and for the Board of Trustees of the Florida State University all contracts, grants and other documents necessary and appropriate to the activities described in Section 1004.22(3), Florida Statutes.

This authority shall be exercised in accordance with all applicable laws, rules and regulations of the United States and the State of Florida. I reserve the authority to review, amend, modify, or annul any action taken pursuant hereto, which I deem to be in the best interest of the Florida State University, and to amend, modify, or withdraw the authority described above.

SP/jg

cc: Russ Lentz  
Office of General Counsel



15<sup>th</sup> May 2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the *FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED)*. The workforce training, research informed development, and technology transition emphases of this institute, specifically in the areas of high-speed aerodynamics, along with advanced materials and manufacturing are directly in line with the focus and interest of Aerosonic. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Aerosonic as well as the Florida Panhandle and its residents.

Aerosonic is one of the top 3 global suppliers of air data systems to the Aerospace Industry. We have more than 120 employees located in Clearwater, Florida. Over the past 5 years, Aerosonic worked closely with Dr. Rajan Kumar on a collaboration to utilize FSU's Polysonic Wind Tunnel for qualifying Aerosonic's latest generation of Integrated Multi-Function Probes, which are used on military fighter jets and trainers. During the collaboration, Aerosonic invested in tooling to enable the FSU Polysonic Wind Tunnel to reach the specification required for the application. We are continuing the relationship today, with more than a month of test time in the FSU Polysonic Wind Tunnel each year. Aerosonic also provides 3-5 internship opportunities per year for undergraduate and graduate students, with the intent of hiring from our intern pool upon graduation.

Once again, on behalf of Aerosonic, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the [Triumph Gulf Coast Board](#) will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,

A handwritten signature in blue ink, appearing to read "Greg Van Bemden".

Greg Van Bemden  
Vice President of Engineering  
[gvanbemden@aerosonic.com](mailto:gvanbemden@aerosonic.com)  
C: +1 727-457-7775  
O: +1 727-614-9590

# Appendix E2



**DEPARTMENT OF THE AIR FORCE**  
**AIR FORCE RESEARCH LABORATORY**  
**EGLIN AIR FORCE BASE, FLORIDA**

19 May 2023

MEMORANDUM FOR SUPPORT OF FSU InSPIRED

FROM: Chief Scientist Office, Munitions Directorate, Air Force Research Laboratory (DAF)

SUBJECT: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED

It is with great pleasure and enthusiasm to submit this letter supporting such a transformational initiative as the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED) program. Background and supporting information of this endeavor has gained our attention and the vision of InSPIRED is well-aligned to some of the Munitions Directorate's greatest needs. Emphasis in workforce training, research informed development, and technology transition along the lines of aerospace research and development and additive manufacturing capabilities for weapons are essential for the Munitions Directorate (AFRL/RW) and the broader ecosystem in the greater Northwest Florida region. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies, both from a component and, perhaps more importantly, from a system level perspective, is exactly the type of cutting-edge, application-driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work in earnest with FSU's InSPIRED Leadership to extend existing organizational ties and form a long-term partnership that will benefit the AFRL Munitions Directorate, as well as the Florida Panhandle and its residents.

The Munitions Directorate is chartered as the Dept. Air Force's primary S&T provider for all air-launched munitions, and a quick-scan of major news and publication headlines would highlight priority challenges reside in technologies such as hypersonics, advanced materials, munitions manufacturing and industrial capacity. Additionally, the InSPIRED Institute addresses gaps in enabling sciences of AI, data analytics, and multi-physics that accelerate the above technologies to bring unprecedented capabilities in the Northwest Florida region.

We have current research with FSU's Dr. Rajan Kumar and the Florida Center for Advanced Aero-Propulsion (FCAAP). It is an ideal model for gov't-academia R&D for proximity to AFRL/RW and workforce development; in fact, we have proven successes in workforce and STEM programs by sponsoring research and developing internship programs to receive FAMU/FSU College of Engineering students at Eglin Air Force Base, FL. We would use that proven success as a model, but expand on those programs by adding InSPIRED researchers and students. A collaboration goal with InSPIRED would be to identify up to four (4) internships per year. We would also encourage AFRL/RW researchers and staff to conduct sabbaticals in InSPIRED facilities.

Another consideration is that we would establish InSPIRED as one of the highlighted areas on annual AFRL/RW "Innovative Research Funding" (IRF). IRFs are R&D seedling initiatives

proposed by AFRL in-house researchers and are available up to \$250k per project. Currently, a total ceiling of \$1.5M per year is available for this IRF program. AFRL/RW would also consider Educational Partnership Agreements and/or Cooperative Research and Development Agreements as InSPIRED gets underway, as per need and mutually beneficial basis. The EPA / CRADA would include considerations in InSPIRED staff and/or students having access and use of specialized infrastructure and/or equipment that easily exceeds over \$1B capital equipment costs. Lastly, our professional staff would be encouraged to consider participating in any oversight and advisory boards that InSPIRED establishes for strategic guidance. (Please note: While all of this is in consideration, the statements made herein are not legally binding as the US Govt cannot enter into such promissory agreements without fair, open, and legally reviewed basis).

In summary, the AFRL Munitions Directorate is excited to put the strongest of support behind the FSU InSPIRED Center of Excellence. We have indicated commitments and goals that we believe exemplify meaningful intent and of high value to the proposal. InSPIRED will be invaluable in meeting the technology and workforce development needs for aerospace and advanced manufacturing sectors in the greater Northwest Florida region and our nation.

Sincerely,



DR. DAVID E. LAMBERT, ST, DAF  
Chief Scientist, Munitions Directorate  
Air Force Research Laboratory



## Appendix E3



05/18/2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU *Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED)*. The workforce training, research informed development, and technology transition emphases of this institute, specifically in the area of advanced manufacturing are directly in line with the focus and interest of Cummins Inc. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will Cummins Inc. as well as the Florida Panhandle and its residents.

Cummins has a long and storied history of developing and manufacturing advanced powertrains to meet the needs of world markets. With the implementation of our Destination Zero initiative, advanced manufacturing and prototyping technologies become critical tools to facilitate our sustainable future pathway. Research in the fields of advanced materials is greatly needed for commercial adoption of battery and hydrogen-based powertrains and we believe this InSPIRED institute has the technical expertise and capability to help drive these advancements.

Cummins and Florida State University have collaborated on many academic and research programs over the past decades, and we see FSU as a valuable source of technical knowledge and a rich talent pool for highly trained employees. Successful investigations into advanced spray technologies for diesel aftertreatment systems and using quantum computing for fuel cell optimizations give us the confidence that the InSPIRED institute will continue and expand the level of excellence that is needed for technology advancement. In order to support this initiative, Cummins plans to collaborate with FSU by providing employment opportunities and summer Internships for students, provide members to serve on advisory boards and when applicable provide research funds for advancements in materials and manufacturing.

Once again, on behalf of Cummins Inc. we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be



invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,

*Michael Hays*

**Michael Hays, Ph.D**

*Technical Project Leader – Hybrid Technologies*  
Cummins R&T

Cummins Inc.  
Mail Code: 50050  
1900 McKinley Ave.  
Columbus, Indiana 47201  
United States

## Appendix E4



**Danfoss LLC**

1769 E. Paul Dirac Drive

Tallahassee, FL 32310

Tel: +1 (850) 504 4800

[www.turbocor.danfoss.com](http://www.turbocor.danfoss.com)

May 9, 2023

RE: FSU INSTITUTE FOR Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED). The workforce training, research informed development, and technology transition emphases of this institute, specifically in the areas of advanced manufacturing and aerospace, are directly in line with the focus and interest of Danfoss. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at FSU University, along with the focus of InSPIRED on technologies, both from a component and perhaps more importantly, from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the manufacturing and aerospace industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Danfoss, as well as the Florida Panhandle and its residents.

Our company continues to push the boundaries of commercial applications of electrical and mechanical engineering and magnet technology. We are the world's leader in oil-free compressor technology using magnetic bearings to offer cutting edge solutions in the HVAC industry. Over the past 12 years, Danfoss Turbocor® has developed a deep and broad partnership with FSU, from hiring over 45 students per year for internships, funding research and students over \$150,000 per year, and continuing to serve as an FSU Research Foundation board member.

On behalf of Danfoss, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs in the advanced manufacturing and aerospace sectors in the region, Florida, and the Nation.

Best regards,

A handwritten signature in black ink, appearing to read 'Ricardo Schneider', is written over a light blue circular stamp.

Ricardo Schneider  
President, Danfoss Turbocor®

# Appendix E5



October 14, 2023

## **RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU *Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED)*. The workforce training, research informed development, and technology transition emphases of this institute, specifically in the areas of aerospace and advanced manufacturing are directly in line with the focus and interest to GE Aerospace. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit GE Aerospace as well as the Florida Panhandle and its residents.

GE Aerospace is a world-leading provider of jet engines, components and systems for commercial and military aircraft with a global service network to support these offerings. GE Aerospace and its joint ventures have an installed base of more than 40,000 commercial and 26,000 military aircraft engines, and the business is playing a vital role in shaping the future of flight. As GE Aerospace continues to expand in Florida, there is alignment with FSU InSPIRED primarily in the areas of aerospace propulsion with emphasis in advanced materials, advanced manufacturing, prototyping, digital engineering to include multi-physics simulation with models anchored in ground and flight test data.

On behalf of GE Aerospace, we strongly support the FSU InSPIRED Center of Excellence and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,

A handwritten signature in blue ink, appearing to read "Rich Perlman".

Rich Perlman  
Sr. Director of Hypersonics  
GE Aerospace



**L3HARRIS™**

**Ed Zoiss**

President

**Space and Airborne Systems Segment**

1395 Troutman Blvd NE

Palm Bay, FL 32905

t 321 729 7468

RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED

May 12, 2023

Dear Members of the Board,

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED). The workforce training, research informed development, and technology transition emphases of this institute, specifically in addressing emerging defense threats are directly in line with the focus and interest of L3Harris Technologies. We believe the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit L3Harris as well as the Florida Panhandle and its residents.

L3Harris Technologies is a Trusted Disruptor for the global aerospace and defense industry. With customers' mission-critical needs always in mind, our 46,000 employees deliver end-to-end technology solutions connecting the space, air, land, sea, and cyber domains. I have the pleasure of leading the Space and Airborne Systems (SAS) segment, headquartered in Palm Bay, Florida. SAS is a leading provider of full mission solutions as a prime and subsystem integrator in the space, airborne and cyber domains. We provide top tier capabilities in the design, development, integration, production, and sustainment of major weapons systems for national security, civil government, commercial and international customers.

Once again, on behalf of L3Harris we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal.

This institute will be invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida, and the nation.

Sincerely,  
Ed Zoiss

A handwritten signature in blue ink that reads "Ed".

President, Space and Airborne Systems  
L3Harris Technologies

**Lockheed Martin Missiles and Fire Control**

5600 Sand Lake Road Orlando, Florida 32819-8907

30 May 2023



**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

This letter is provided in strong support of the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED). The workforce training, research informed development, and technology transition emphases of this institute, specifically in the hypersonic modeling, aerothermal behavior, and advanced manufacturing are directly in line with the focus and interest of Lockheed Martin Missiles and Fire Control (LMMFC). We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and a system level perspective are exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We will work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit LMMFC as well as Florida and its residents.

Lockheed Martin is a key player in the defense industry, known for multiple weapons systems including Patriot Advanced Capability-3 (PAC-3), Javelin, Hellfire missiles, Joint Air-to-Surface Stand-Off Missile (JASSM), Air-Launched Rapid Response Weapon (ARRW), and many more. Lockheed Martin is continuously in the process of designing and analyzing new, potential weapons systems whose flight regimes span from low subsonic through hypersonic and all flight speeds in between. In efforts to remain on the cutting edge of research and development, LMMFC has supported graduate assistantships at Florida State University (FSU) as well as conducting multiple exploratory wind tunnel tests at their Poly-Sonic Wind Tunnel (PSWT).

Lockheed Martin looks forward to working with the FSU InSPIRED to serve on the Advisory Board, provide insight into the direction of the Institute's research, offer internships to participating students with potential employment opportunities. Since LMMFC has worked with FSU in the past, and hired several of its graduates, we are expecting the FSU InSPIRED to perform cutting-edge research, which will not only benefit LMMFC, but also the entire aerospace industry.

Once again, on behalf of Lockheed Martin Missiles and Fire Control, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs of the aerospace and advanced manufacturing sectors in the panhandle region, the rest of Florida, and the nation.

Sincerely,

A handwritten signature in black ink that reads "Glenn Gebert".

Glenn Gebert, Ph. D.

Lockheed Martin Corporate Senior Fellow

Lead of the Aerodynamics Technology Center

[glenn.a.gebert@lmco.com](mailto:glenn.a.gebert@lmco.com)



## Appendix E8

**HUNTSMAN**

Enriching lives through innovation

David Hatrick  
VP Global Technology & Strategy Marketing  
Huntsman Corporation  
12/05/2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED). The workforce training, research informed development, and technology transition emphases of this institute, specifically in the nanomaterial and multifunctional composites R&D areas. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Huntsman Advanced Materials/Nanocomp as well as the Florida Panhandle and its residents.

Huntsman Advanced Materials is a leading global material solutions provider. Our portfolio of adhesives, composites and formulation products meet demanding engineering specifications and address customer-specific needs across a wide variety of industrial and consumer applications. Serving more than 2,000 customers in over 30 countries, our dedicated employees are characterized by their expertise in complex chemistry, long-standing relationships with our customers, and their ability to develop and adapt our technology and applications know-how for new markets. Our MIRALON® carbon nanotube materials from Nanocomp are lightweight and electrically and thermally conductive – attributes that can benefit a wide variety of applications in aerospace, automotive, construction and other industries. We have built more than 15-years long-term collaboration with the HPMI team at FSU to develop fundamental understanding, characterization and application study of high-performance nanotube materials through many AFOSR, NASA and ONR projects. We look forward to continuously collaborate and support the HPMI nanocomposite research and manufacturing scale-up with the proposed new research institute.

We strongly support the establish the FSU InSPIRED Center of Excellence and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,



David Hatrick

HUNTSMAN ADVANCED MATERIALS AMERICAS LLC.  
10003 Woodloch Forest Drive, The Woodlands, TX 77380 USA  
Tel.: +1 281 719 6000 Fax.: +1 281 719 4213

[www.huntsman.com](http://www.huntsman.com)  
A business unit of Huntsman Corporation



Progress beyond

May 12, 2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED). The workforce training, research informed development, and technology transition emphases of this institute; specifically in the aerospace advanced composites R&D areas, are of particular interest. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university, with a focus on InSPIRED technologies, is a key element for maintaining US leadership. Leveraging work at the component level and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Solvay Composite Materials as well as the Florida Panhandle and its residents.

Combining fifty years of technology heritage, Solvay Composite Materials has developed a comprehensive product portfolio and expertise in designing materials and process engineering to deliver innovative customer solutions that maximize technology capability and simplify manufacturing. We also provide advanced composite and adhesive materials for extreme-demand environments, radical temperature changes, aircraft material expansion and contraction and other external conditions. We have been collaborating with the HPMI team at FSU in doctoral student fellowship support, advanced nanocomposite research, and more recently we were teamed together in the NASA US-COMP (a NASA STRI) projects. With the scale-up of aerospace composites R&D and prototyping capabilities in the proposed new institute, we look forward to developing more collaborative programs and contributing to work force training.

Once again, on behalf of Solvay Composite Materials, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and work force development needs for both aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,





Dr. Rob Maskell  
Chief Scientist  
Solvay Composite Technical Fellow  
Solvay Composite Materials  
2085 E. Technology Circle  
Tempe, AZ 85284, USA  
Email: [rob.maskell@solvay.com](mailto:rob.maskell@solvay.com)



4065 Executive Dr.  
Beavercreek, OH 45430  
Phone: (937) 266-9570; Fax: (937) 256-7702  
Sivaram.gogineni@spectralenergies.com

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May 08, 2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU *Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED)*. The workforce training, research informed development, and technology transition emphases of this institute, specifically in the areas of aerospace and/or advanced manufacturing are directly in line with the ongoing work and future business strategies of Spectral Energies. We believe that the broad, interdisciplinary partnership between the leading researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and perhaps more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries in Florida and beyond. We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Spectral Energies as well as the Florida Panhandle and its residents.

Spectral Energies is a small, disadvantaged, minority owned business located in Dayton, OH and providing engineering, research, and consulting services to DoD, NASA, DoE, and NIH organizations. It also works with Defense OEMs such as Lockheed, Raytheon, Boeing, GE Aviation and numerous academic institutions on broad range of technologies including but not limited to hypersonics, directed energy, microelectronics, AI/ML algorithms for inertial navigation, and additive manufacturing. Spectral Energies has been working with FAMU/FSU College of Engineering faculty over the past 15 years on aerodynamics, flow control, directed energy, and modeling & simulation related projects and its collaboration helped the company to win several SBIR/STTR contracts and to generate revenue on the order of \$3M. This collaboration also helped the company to recruit co-ops and graduates and provided an opportunity to train them on applied research related projects. This effort not only benefited the students but also the company in terms of generating new ideas and additional revenue.

If the proposed center were established, Spectral Energies will play an active role in collaborating with the faculty on generating new proposals that are of relevance to DoD, NASA, and DoE. The company would also be interested in recruiting summer interns and co-ops and train them on advanced research projects and business-related aspects. The company also has intentions to participate in any advisory role and to provide appropriate guidance and networking opportunities.



4065 Executive Dr.  
Beavercreek, OH 45430  
Phone: (937) 266-9570; Fax: (937) 256-7702  
Sivaram.gogineni@spectralenergies.com

Once again, on behalf of Spectral Energies, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the [Triumph Gulf Coast Board](#) will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs of the aerospace and advanced manufacturing sectors in the region, Florida and the nation.

Sincerely,

A handwritten signature in black ink that reads "Sivaram Gogineni". The signature is written in a cursive, flowing style.

Sivaram P. Gogineni, Ph.D.  
President  
Fellow AIAA, Fellow ASME



October 10, 2023

**RE: FSU Institute for Strategic Partnerships, Innovation, Research, Education & Development – InSPIRED**

Dear Members of the Board:

It is with great pleasure and enthusiasm that we submit this letter in support of the FSU *Institute for Strategic Partnerships, Innovation, Research, Education & Development (InSPIRED)*. The workforce training, research informed development, and technology transition emphases of this institute, specifically in the areas of aerospace, advanced manufacturing and application and are directly in line with the focus of Starfighters International, Inc. We believe that the broad, interdisciplinary partnership between the researchers and faculty at the university and the focus of InSPIRED on technologies both from a component and more importantly from a system level perspective is exactly the type of cutting edge, application driven research and development that will have a substantial impact on the aerospace and manufacturing industries. **Because we fly our pilots' lives are at risk, systems level prospective is not only required but vital.**

We plan to work closely with FSU's InSPIRED leadership to form a long-term partnership that will benefit Starfighters as well as the Florida Panhandle and its residents.

Starfighters has a fleet of F-104s based at the NASA Kennedy Space Center. We use them to test units, components, and entire systems to be used at high altitudes and high speeds. We are the only commercial provider in the world that can fly at a sustained MACH2. We have worked with FSU in the past for simulation and will be working with them, especially for hypersonic research, in the areas of material science, prototyping and analysis.

Starfighters is highly interested in working with the Center on:

- Internships and Coops – 1 to 3 students a year
- Employment (We are expanding and will have at least 11 hires in the next year and 10 more in the two years after that, half of which could be from the FSU.
- For 2024 we have \$3 million budgeted for research
- Personnel time (\$560,000 or about 2.4-man years)
- Fly non-conflicting payloads for free, discounted or as a match as a donation, depending on the need.
- We would gladly serve on the advisory board.
- And become a member of the Institute.

Once again, on behalf of Starfighters, we strongly support the FSU InSPIRED Center of Excellence as evidenced by our commitments outlined here, and we hope that the Triumph Gulf Coast Board will favorably consider this proposal. This institute will be invaluable in meeting the technology and workforce development needs aerospace and advanced manufacturing sectors in the region, Florida, and the nation.

Sincerely,

A handwritten signature in black ink that reads "Rick Svetkoff". The signature is written in a cursive, slightly slanted style.

Rick Svetkoff, President & CEO

"Logic will get you from A to B. Imagination will take you everywhere"

STARFIGHTERS AEROSPACE INC

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## Appendix F

# InSPIRE Education Return on Investment (ROI) and Construction Costs

### Summary

Our estimated returns on investment (**ROI**) for education from the InSPIRE project over **ten** years are:

- 17,500 – 45,500 Middle School – High School students interested in STEM (5 yr)
- 200 university students pursue STEM fields (5 yr)
- \$44M ROI from STEM
- 3,000 B.S. and M.S. Certifications
- \$9M ROI from Certifications

Our estimated **costs** from **start** of construction through **ten** years of personnel are:

- \$91.7M in construction
- \$62.22M in total personnel (over 10 years)
- \$6.2M in rental fees
- **\$160.2 total cost**

### K-12 & University Education ROI

The InSPIRE project is expected to impact the total number of trained teachers in K-12 Education, in addition to middle school and high school students. At least 1,000 teachers will be trained in STEM education, and an assumption is made that only 70 percent of teachers will implement STEM learning/changes in their classroom(s).<sup>1</sup> Given about 5-13 (or an average of 9) students per teacher per year will gain interest in STEM fields, a total of 3,500-9,100 (or an average of 6,300) students will gain interest in STEM in the first year of

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<sup>1</sup>Extracted numbers from the FSU LSI (Learning Systems Institute) ROI Fact Sheet. Percentage also includes accounting for teacher turnover and/or promotion.

implementation. Over a five-year period, one can expect approximately 17,500-45,500 (or an average of 31,500) additional students will be interested in the STEM fields.

**Table 1. K-12 Education**

Impacted Group	Trained Teachers	Percentage of Teachers Implementing STEM	MDL-HS Students in STEM; 5-13 students /teacher (1 yr)	MDL-HS Students in STEM (5 yr)
K-12	1,000	70%	3,500 - 9,100	<b>17,500 - 45,500</b>

University students will also be impacted by the proposed STEM programs that are offered. Working with 1,000 students, at least an additional 20 percent will gain interest and pursue STEM fields. Therefore, about 200 students can be expected to enroll in STEM programs within the first five years.

**Table 2. University Education**

Impacted Group	Students Reached	Percentage of Students Interested in STEM	Students (1 yr)	Students (5 yr)
University	1,000	20%	-	<b>200</b>

Certifications awarded for both undergraduate and graduate level degrees are expected to increase by 3,000 awarded certificates following the completed project. With an estimated \$3000 addition to salaries for those receiving these certificates, the expected ROI is **\$9 Million** over a 10-year period.

**Table 3. Certifications**

	Awarded due to the project (10 yr)	Expected Increase for an Individuals' Salary	Total increase in ROI
Certificates	3,000	\$3,000	\$9,000,000

According to the LSI ROI Fact Sheet, there is a quantifiable difference in salaries between those in the STEM field, and an even larger salary differential in the Science and Engineering field (when compared with non-S&E occupations). Individuals in a STEM field make approximately \$22,000 *more* than individuals in a non-STEM field. Similarly, science and engineering occupations make approximately \$51,970 *more* than non-science and engineering occupations. The salary difference can allow us to calculate the ROI of the offered STEM program by assuming that the 200 students that take interest in STEM fields will make \$22,000 more than if they continued in a non-STEM career. Therefore, the total ROI over a 10-year period for the STEM programs is approximately **\$44 Million**, and the total ROI over a 10-year period for Science and Engineering programs is approximately **\$104 Million**. This translates to a total return on investment greater than **\$385M** for the length of their careers.

**Table 4a. STEM Career Salaries Return on Investment (ROI)**

	Salary Difference	ROI (1 yr)	ROI (10 yr)	ROI (15 yr)	ROI (20 yr)
<b>STEM Field</b>	\$22,000	\$4.4M	\$44M	\$66M	\$88M
<b>S&amp;E vs. Non-S&amp;E</b>	\$52,000	\$10.4M	\$104M	\$156M	\$208M
<b>Average</b>	\$37,000	\$7.4M	\$74M	\$111M	\$148M
<b>Certificates</b>	\$3,000	-	\$9M	\$21.5M	\$28.7M
<b>Total ROI</b>	\$40,000	\$7.4M	\$83M	\$132.5M	\$176.7M

Thus, as shown in Table 4b, the grand total ROI for the InSPIRE Educational component includes the STEM, S&E, and Certificates differentials, or about \$83M over ten years, or \$459M in ROI based on lifetime earnings.<sup>2</sup>

	Salary Difference	ROI (1 yr)	ROI (10 yr)	ROI (15 yr)	ROI (20 yr)	ROI (lifetime earnings: 52 yr)
<b>STEM vs. Non-STEM</b>	\$22,000	\$4,400,000	\$44,000,000	\$66,000,000	\$88,000,000	\$228,800,000
<b>S&amp;E vs. Non-S&amp;E</b>	\$52,000	\$10,400,000	\$104,000,000	\$156,000,000	\$208,000,000	\$540,800,000
<b>Average between STEM and S&amp;E differences</b>	\$37,000	\$7,400,000	\$74,000,000	\$111,000,000	\$148,000,000	\$384,800,000
<b>Certificates</b>	\$3,000		\$9,000,000	\$21,546,000	\$28,728,000	\$74,692,800
<b>Total ROI (including certificates)</b>	\$40,000	\$7,400,000	\$83,000,000	\$132,546,000	\$176,728,000	\$459,492,800

## InSPIRE Costs over Time

**Table 5. Construction Costs in Millions of Dollars**

<b>Construction Costs By Year</b>					
<b>Costs</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>	<b>Years 4 -10</b>	<b>10-Year Total</b>
<b>Construction</b>	\$4,500,000	\$4,500,000	\$1,000,000	\$ -	\$10,000,000
<b>Reconstruction</b>	\$1,000,000	\$1,000,000	\$1,000,000	\$ -	\$3,000,000
<b>Design &amp; Eng.</b>	\$2,000,000	\$2,000,000	\$2,000,000	\$ -	\$6,000,000
<b>Equipment</b>	\$20,000,000	\$14,500,000	\$29,500,000	\$96,000,000	\$160,000,000
<b>Total</b>	\$27,500,000	\$22,000,000	\$33,500,000	\$96,000,000	\$179,000,000

<sup>2</sup> It should be noted that LSI's methodology estimates lifetime earnings over 52 years.



**Table 6. Personnel Costs in Millions of Dollars**

<b>10-Year Personnel Costs</b>	
<b>Institute Administration</b>	<b>\$45,069,486</b>
<b>Workforce Training &amp; Education in STEM</b>	<b>\$17,040,205</b>
<b>Advanced Aerospace Materials &amp; Additive Manufacturing</b>	<b>\$21,010,769</b>
<b>Aerospace: High Speed Aerodynamics &amp; Hypersonics</b>	<b>\$29,020,007</b>
<b>Total</b>	<b>\$112,140,467</b>

**Table 7. Leasing/Rental Fees, Supplies, and Other Operating Expenses, in Millions of Dollars**

<b>10-Year Operating Costs</b>	
<b>Supplies</b>	\$33,010,859
<b>Lease &amp; Rental Fees</b>	\$11,853,800
<b>Operating Costs</b>	\$61,964,159
<b>Total</b>	<b>\$106,828,818</b>

**Table 8. Total Costs in Millions of Dollars**

<b>Costs</b>	<b>10-Year Total</b>
<b>Construction</b>	\$10,000,000
<b>Reconstruction</b>	\$3,000,000
<b>Design &amp; Eng.</b>	\$6,000,000
<b>Land Ac/Devel.</b>	\$2,000,000
<b>Equipment</b>	\$160,000,000
<b>Supplies</b>	\$33,010,859
<b>Personnel</b>	\$112,140,467
<b>Lease/Rental Fees</b>	\$11,853,800
<b>Operating Costs</b>	\$61,964,159
<b>Total</b>	<b>\$399,969,285</b>

## **Economic Impacts Methodology – IMPLAN Analysis**

In order to obtain estimates of the different types of macroeconomic effects of the proposed InSPIRE activities on the eight region-specific Florida economy, CEFA used a well-established analytical tool known as the Impact Analysis for Planning, or IMPLAN model. IMPLAN is a widely accepted integrated input-output model. IMPLAN is used extensively by state and local government agencies to measure proposed legislative and other program and policy economic impacts across the private and public sectors. There are several advantages to using IMPLAN:

- It is calibrated to local conditions using a relatively large amount of local county level and state of Florida specific data;
- It is based on a strong theoretical foundation; and
- It uses a well-researched and accepted applied economics impact assessment methodology supported by many years of use across all regions of the U.S.

The economic impact model used for this analysis was specifically developed for the counties of Florida, and includes 544 sectors and the latest dataset – year 2021 data. IMPLAN's principal advantage is that it may be used to estimate direct, indirect and induced economic impacts for any static (point-in-time) economic stimulus.

## **Economic Impact Model Input Data**

The FSU CEFA research team collected projected capital outlay, and expenditures for 2023 from Project InSPIRE staff. The data included:

- Capital Outlay
  - New and renovation construction, and;
  - Equipment
- Personnel/Operating Costs
  - Salaries: Administrative, Workforce T&E in STEM, Adv. Manu. & Aerospace
  - Leasing/Rental fees, and;
  - Supplies and Other Operating Costs

The data for employment included number of full-time equivalents (FTEs), wages and benefits. The capital outlay and operating expense data was then further compiled into a datasheet (coded by North American Industrial Classification System<sup>3</sup>, or NAICS codes). The NAICS codes were further crosswalked to IMPLAN codes in order to conduct the next stage of the economic research; the economic impact analysis (using the IMPLAN model).

Consistent with standard practice, the direct impacts, as well as the indirect and induced impacts, are calculated for the InSPIRE market area.<sup>4</sup> There is a direct effect that is directly related to the increase in revenues associated with the change in sales. Next, there is an indirect effect that comes from retailers and others paying their suppliers and employees. Finally, an induced effect comes from the increase in wealth experienced by suppliers and employees of retailers and others who spend their increased revenues in the local economy. This analysis evaluates InSPIRE's broader economic impacts, measured in terms of economic output, local jobs, and income. Calculations are provided for two categories of impacts: a) Construction (or Temporary) impacts; and b) Permanent impacts associated with ongoing operations. The total economic impact of Project InSPIRE is the summation of the one-time economic impacts associated with the construction phase of the project(s) and the ongoing, annual (permanent) operations of Project InSPIRE.

These InSPIRE-related activities will generate the following types of economic impacts in the market area:

- Direct Impacts: Relate to: a) the short-term business activity associated with project construction, and b) the ongoing business activity associated with the businesses associated with the project.
- Indirect Impacts: Will result when local firms directly impacted by the project in turn purchase materials, supplies or services from other firms.
- Induced Impacts. Relate to the consumption and spending of employees of firms that are directly or indirectly affected by the project. These would include all of the goods and services normally associated with household consumption (i.e., housing, retail purchases, local services, etc.).

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<sup>3</sup> NAICS: <https://www.census.gov/naics/>

<sup>4</sup> The market area is defined as: Bay, Escambia, Franklin, Gulf, Okaloosa, Santa Rosa, Wakulla and Walton Counties.

### **Results of the Economic Impact Analysis (IMPLAN)**

The total economic impacts of Project InSPIRE are shown in Table 8, and are estimated to be a total of 7,122 jobs, \$377 million in income or wages and about \$1.1 billion in total economic output. It should be noted that the k-12 and university-affiliated STEM teachers and students, were not included in the economic impact analysis. The construction impacts are estimated to total 1,307 jobs, about \$84 million in income or wages and nearly \$284 million in total economic output. On a permanent basis, the project is projected to generate 5,815 jobs (or about 582 annually), nearly \$293 million in income or wages, and about \$785 million in total economic output (or \$79 million annually). The federal, state and local taxes for Project InSPIRE are estimated to be \$123 million (or \$12.3 million on an annual basis).

### **Additional Economic Data**

#### **Spin-offs/Start-ups**

The spin-off/start-up companies are important for creating the innovation culture and churn needed to bring entrepreneurs and investors directly into play for the out years. The team expects the following number of projected employees for the spin-off/start-up companies. The spin-offs/start-ups are likely to not contribute much to the ROI on the InSPIRE project in Years 1-10 (for an expected total of 96 employees):

- Year 5 - 1
- Year 6 - 3
- Year 7 - 7
- Year 8 - 15
- Year 9 - 27
- Year 10 - 43

## Visitor Data

One of the measures of the impact of the InSPIRE Project is through the change in total visitor spending. Using the Average total costs of visitor spending in the State of Florida, the expected additional visitor spending can be estimated in the eight affected counties. Total visitors to the Panama City Campus area are expected to increase by 400 total visitors within the first year, with an estimated three percent growth every year for the following ten years. This will amount to approximately 4,600 total visitors in the subsequent ten years from the completion of the project. The average costs per visitor are calculated using the total spending by visitors then averaged by the total number of visitors. These visitor expenditures are categorized into line item expenses e.g., lodging, food and beverages, transportation, shopping and retail, and entertainment. The average values are also calculated into sorted groups by international and domestic visitors, and then day trip visitors as opposed to overnight visitors. The total expected average spending of visitors to the Panama City Area following the InSPIRE Project is approximately **\$800** per visitor, or a total of **\$3.7 million** over the next ten years. Assuming that the majority of these visitors are only visiting on a day trip, therefore removing the costs of lodging in the area, the spending per visitor would be approximately **\$560** with a total of **\$2.6 million**. The results of all expected total visitor costs per type of visitor, and type of visit, is shown below.

**Table 9. Average Spending per Visitor Relating to the InSPIRE Project**

<b>Average Spending Per Visitor</b>	
	<b>Average (\$)</b>
<b>Domestic</b>	\$732
<b>International</b>	\$1,397
<b>Overnight</b>	\$920
<b>Daytrip</b>	\$561
<b>Total</b>	<b>\$800</b>

### Assumptions Relating to Visitor Spending

- The ratio of international to national tourists is 10:90 (this is based off of the state average for 2019, where only about 10% of visitors were international visitors)
- The expected number of visitors staying at a hotel is currently 100% for the total average between international and international tourists (so 400 for the first year), but 89% of visitors are expected to be overnight lodgers according to the overnight vs. day visitors (also taken from the 11:89 ratio provided in 2019) so that there are about 356 visitors staying in hotels.<sup>5,6</sup>
- The average number of days of a visit is currently for the average number of days for a visit to Florida, which is 3-4 nights.
- We are still assuming that all costs/ number of visitors grow at 3% every year (visitors, lodging costs, transportation costs, etc...).

**Table 10. Total Expected Visitor Spending Relating to the InSPIRE Project (Years 1-10)**

Total Visitor Spending											
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Total
Visitors	400	412	424	437	450	464	478	492	507	522	4,586
Lodging	\$92,820	\$95,604	\$98,472	\$101,426	\$104,469	\$107,603	\$110,831	\$114,156	\$117,581	\$121,108	\$1,064,072
Food & Beverage	\$71,798	\$73,952	\$76,170	\$78,455	\$80,809	\$83,233	\$85,730	\$88,302	\$90,951	\$93,680	\$823,080
Transportation	\$62,742	\$64,624	\$66,563	\$68,560	\$70,617	\$72,735	\$74,917	\$77,165	\$79,480	\$81,864	\$719,268
Shopping & Retail	\$51,746	\$53,298	\$54,897	\$56,544	\$58,241	\$59,988	\$61,788	\$63,641	\$65,550	\$67,517	\$593,211
Entertainment & Recreation	\$40,750	\$41,973	\$43,232	\$44,529	\$45,865	\$47,240	\$48,658	\$50,117	\$51,621	\$53,170	\$467,154
<b>Total</b>	<b>\$319,855</b>	<b>\$329,451</b>	<b>\$339,335</b>	<b>\$349,515</b>	<b>\$360,000</b>	<b>\$370,800</b>	<b>\$381,924</b>	<b>\$393,382</b>	<b>\$405,183</b>	<b>\$417,339</b>	<b>\$3,666,784</b>

<sup>5</sup> The team was assuming more vehicle travel than air travel. Please note that this can be further adjusted relative to the State of Florida, as the ratio of air travel and other means to Florida is about 38:62.

<sup>6</sup> Transportation costs and Lodging costs are equal to zero for day trips according to the provided data.

**Table 11. Total Economic Impacts (Construction and Personnel Years 1-10)**

<b>Project InSPIRE</b>	<b>Economic Output (Sales/Rev.)</b>	<b>Employment</b>	<b>Income</b>
<b>Economic Measure</b>			
<b>Construction</b>	\$283,614,644	1,307	\$84,049,718
<b>Personnel/Operating Exp</b>	\$784,708,804	5,815	\$292,847,986
<b>Grand Total</b>	<b>\$1,068,323,448</b>	<b>7,122</b>	<b>\$376,897,704</b>

**Employment**

<b>Employment</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Construction</b>	629	383	295	1,307
<b>Personnel/Oper Exp</b>	3,922	868	1,026	5,815
<b>Grand Total</b>	<b>4,551</b>	<b>1,251</b>	<b>1,321</b>	<b>7,122</b>

\* in 2023 \$

**Output**

<b>Output</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Construction</b>	\$179,000,000	\$56,865,106	\$47,749,538	\$283,614,644
<b>Personnel/Oper Exp</b>	\$477,804,412	\$140,903,090	\$166,001,302	\$784,708,804
<b>Grand Total</b>	<b>\$656,804,412</b>	<b>\$197,768,196</b>	<b>\$213,750,840</b>	<b>\$1,068,323,448</b>

\* in 2023 \$

**Income**

<b>Income</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
<b>Construction</b>	\$50,567,092	\$19,191,341	\$14,291,286	\$84,049,718
<b>Personnel/Oper Exp</b>	\$202,004,033	\$41,159,445	\$49,684,509	\$292,847,986
<b>Grand Total</b>	<b>\$252,571,124</b>	<b>\$60,350,786</b>	<b>\$63,975,794</b>	<b>\$376,897,704</b>

\* in 2023 \$



**State, Local and Fed. Taxes**

<b>Project InSPIRE Economic Measure</b>	<b>Personnel/Operating Exp</b>	<b>Construction</b>	<b>Grand Total</b>
<b>State &amp; Local Taxes</b>	\$26,888,388	\$15,769,600	\$42,657,988
<b>Federal Taxes</b>	\$63,306,650	\$16,509,396	\$79,816,046
<b>Grand Total</b>	<b>\$90,195,038</b>	<b>\$32,278,997</b>	<b>\$122,474,034</b>

\* in 2023 \$

**Summary Economic Impacts**

<b>Project InSPIRE Economic Measure</b>	<b>Economic Output (Sales/Revenues)</b>	<b>Employment</b>	<b>Income</b>
<b>Const., Equip,Operations</b>	\$1,068,323,448	7,122	\$376,897,704
<b>Educational (Degrees/Cert)*</b>			\$83,000,000
<b>Grand Total</b>	<b>\$1,068,323,448</b>	<b>7,122</b>	<b>\$459,897,704</b>

\* in 2023 \$; Over ten years

## **Economic Impacts Methodology – REMI Analysis**

REMI (2021 data) is a widely used dynamic integrated input output (I/O) and econometric model. The REMI model is based on neoclassical theory and was founded in 1980. The model's structure incorporates inter-industry transactions and endogenous final demand feedbacks. The basic assumption of REMI is that the model is based on theoretical structural restrictions rather than individual econometric estimates based on single time-series observations for each region. It has much in common with the computable general equilibrium (CGE) models. REMI is used extensively to measure proposed legislative and other program and policy economic impacts across the private and public sectors of the state by the Florida Joint Legislative Management Committee, Division of Economic and Demographic Research, the Florida Department of Employment Opportunity and other state and local government agencies. In addition, it is the chosen tool to measure these impacts by a number of universities and private research groups that evaluate economic impacts across the state and nation. REMI shares two underlying assumptions with mainstream economic theory: households maximize their utility and producers maximize their profits. It includes hundreds of equations that describe cause-and-effect relationships in the economy, extending beyond an I/O model. The REMI used for this analysis (version 3.0.0) was developed specifically for the state of Florida and includes 160 sectors. REMI's principal advantage is that it is a dynamic I/O econometric model and can be used to forecast both direct and indirect economic effects over multiple-year time frames. REMI uses three sources of employment, wage and salary data: the Bureau of Economic Analysis (BEA) employment, wage and personal income series, ES 202 establishment employment and wage and salary data, and county business patterns (CBPs) data published by the Bureau of the Census. The industries are based on the North American Industrial Classification System (NAICS).

Project InSPIRE 15-year economic impact forecast time horizon is based on projected Capital Outlay and Operating data<sup>7</sup>, relative to the baseline economy. The expenses input data included the following data categories for operating data provided by the Project

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<sup>7</sup> Input data described in previous data methodology section.

InSPIRE research and data team<sup>8</sup>. There was no duplication of any category nor numbers provided in the input data. In order to estimate the expected growth rate of operating expenses, an assumption of three percent annually is used. Employee income and counts are based on a growth rate of two percent annually.<sup>9</sup>

### **Results of the Economic Impact Analysis (REMI)**

The 10-year economic impact results, as depicted in the following Figures 1-4, and based on projected Construction/Capital Outlay , Operating, Spinoffs/Startups, and Visitor data, show the expected economic impacts of Project InSPIRE , relative to the baseline economy of Florida.

The total economic impacts for Florida over time to year 10 (as shown in Figure 5):

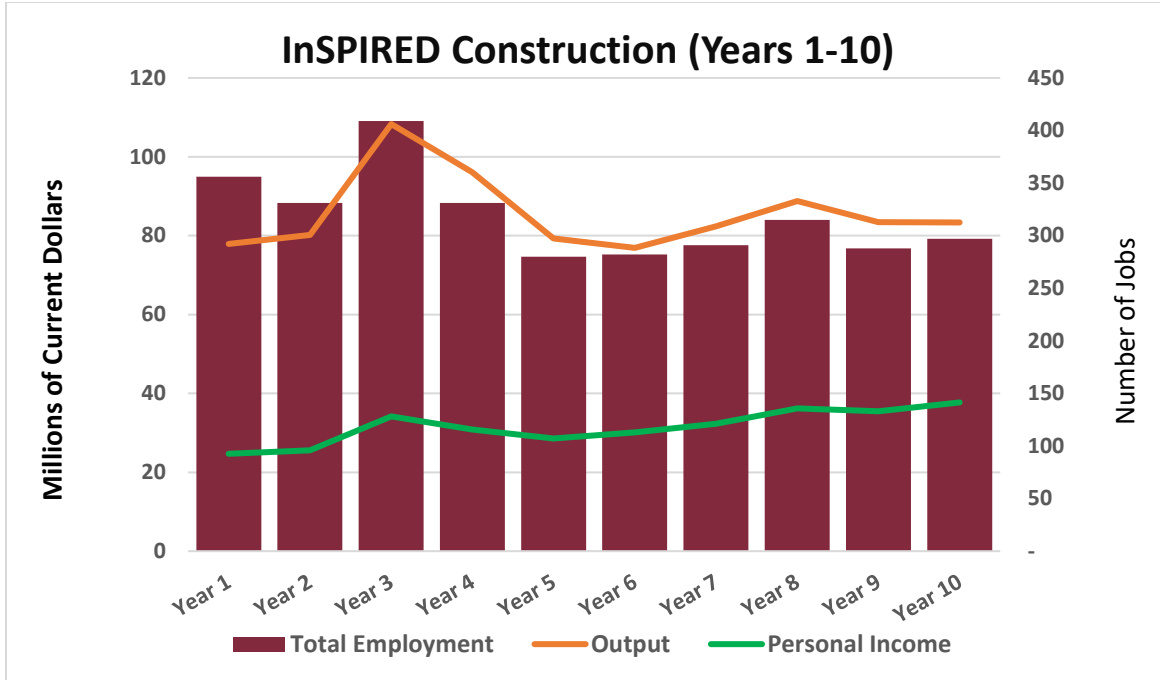
- Employment increases incrementally from 487 in year 1 to 587 in year 3. It then dips to 470 in year 5, and then reaches a peak of 616 jobs in year 10.
- Annual Output increases steadily from \$98 million in year 1 to \$162 million in year 10.
- Personal Income increases incrementally from \$32 million in year 1, to about \$73 million in year 10.

The results reveal that the impacts on the Florida economy will be positive and significant, in terms of Output, Employment, and Income, both for years 1 through 10.

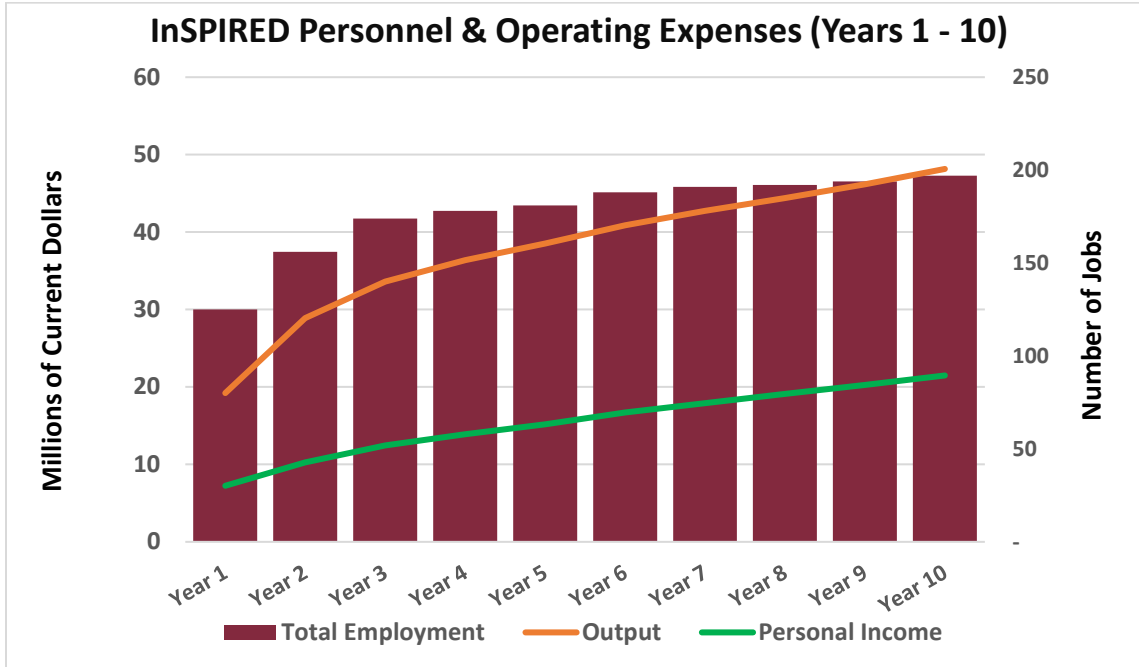
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<sup>8</sup> Input data provided by Ms. Deb Gautier, FSU Director of Strategic Initiatives, Office of Associate Provost for Innovation, Research, and Entrepreneurship.

<sup>9</sup> The growth rate(s) for operating expenses and income, of three percent and two percent, respectively, were based on economic assumptions related to growth rates for expenses/income which are based on the current credit underwriting standards.

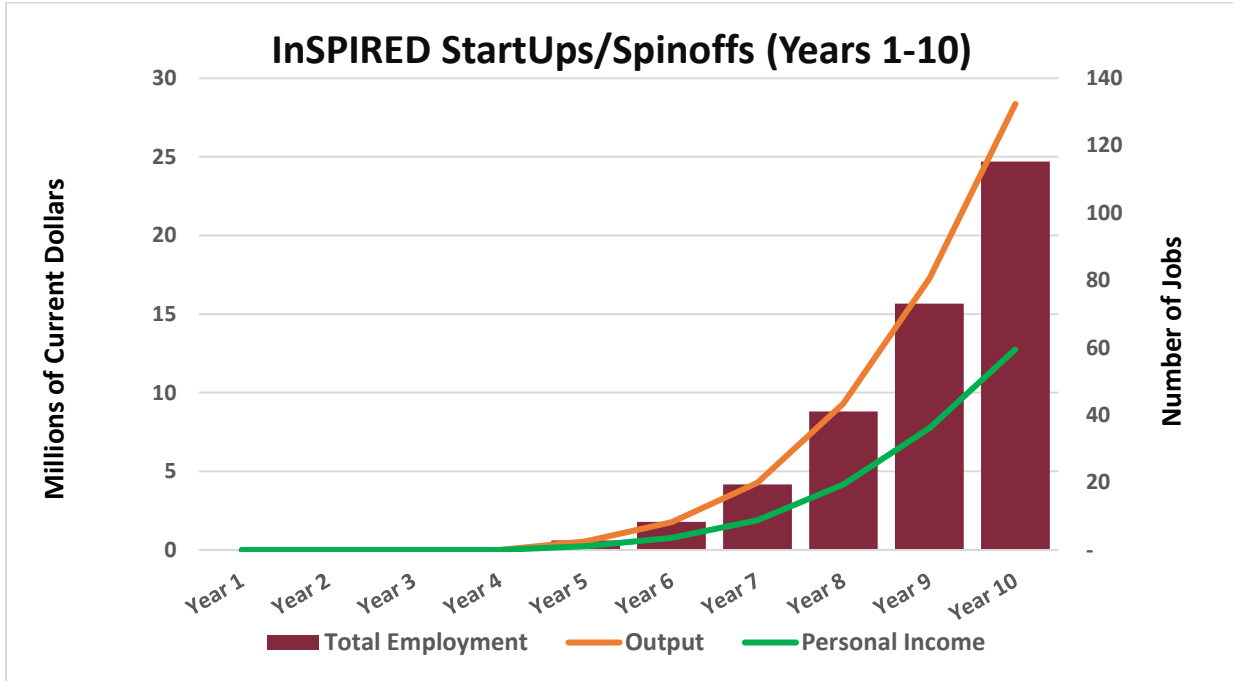


**Figure 1. Total Economic Impacts for Construction and Capital Outlay for Project InSPIRE in Florida (Years 1 to 10)**



**Figure 2. Total Economic Impacts for Personnel and Operating Expenses for Project InSPIRE in Florida (Years 1 to 10)**

**Figure 3. Total Economic Impacts for Spinoffs/Startups for Project InSPIRE in Florida (Years 1 to 10)**



**Figure 4. Total Economic Impacts for Visitors for Project InSPIRE in Florida (Years 1 to 10)**

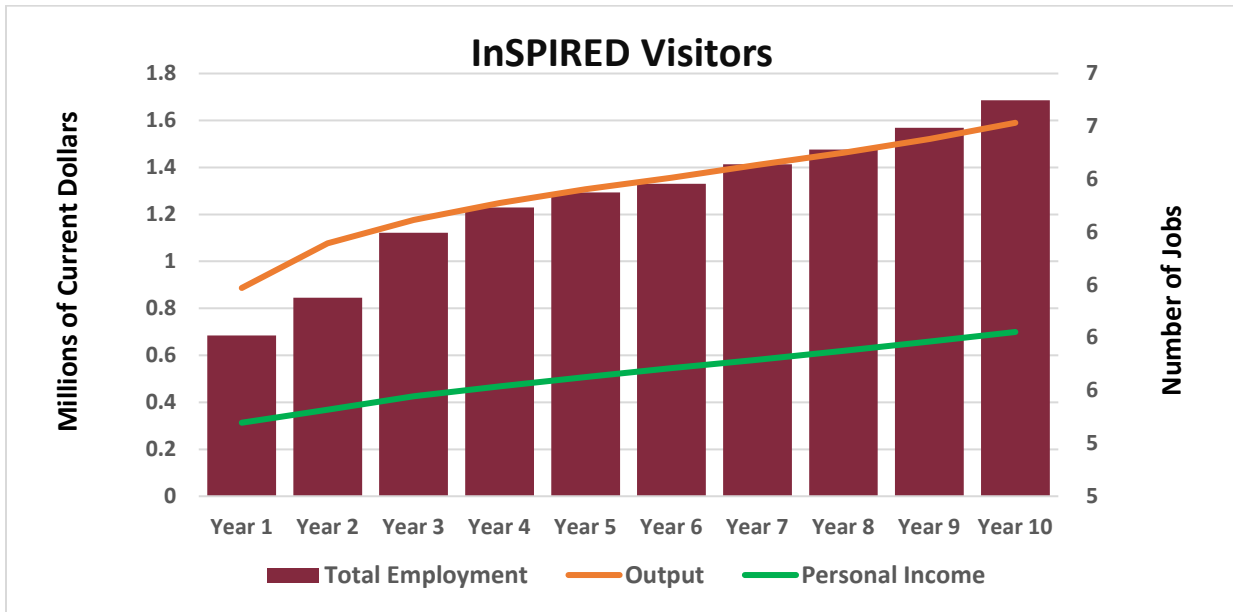
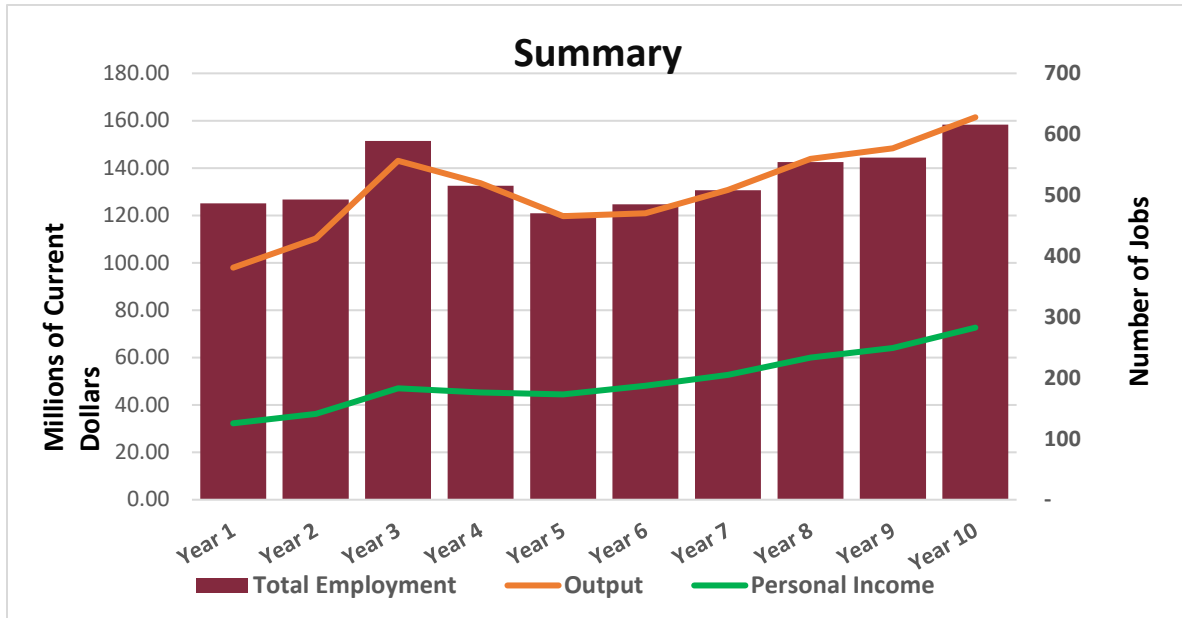


Figure 5. Total Economic Impacts for Project InSPIRE in Florida (Years 1 to 10)



InSPIRE: Becoming the Nation's Aerospace & Advanced Manufacturing Leader

**Appendix G: Timing of Expenditures**

	YEAR 0 (Assessment & Preconstruction )	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
<b>Total Project Costs</b>												
Facilities Lease	\$ -	\$ 2,929,798.02	\$ 3,017,691.96	\$ 3,108,222.71	\$ 3,201,469.40	\$ 3,297,513.48	\$ 3,396,438.88	\$ 3,498,332.05	\$ 3,603,282.01	\$ 3,711,380.47	\$ 3,822,721.88	\$ 33,586,850.86
Equipment	\$ -	\$ 15,425,000.00	\$ 15,497,000.00	\$ 29,200,000.00	\$ 28,875,000.00	\$ 16,500,000.00	\$ 15,000,000.00	\$ 17,000,000.00	\$ 19,500,000.00	\$ 17,500,000.00	\$ 16,500,000.00	\$ 190,997,000.00
Supplies		\$ 2,000,000.00	\$ 3,000,000.00	\$ 3,150,000.00	\$ 3,244,500.00	\$ 3,341,835.00	\$ 3,442,090.05	\$ 3,545,352.75	\$ 3,651,713.33	\$ 3,761,264.73	\$ 3,874,102.68	\$ 33,010,858.55
Personnel		\$ 6,141,589.26	\$ 8,345,885.04	\$ 10,107,182.05	\$ 11,703,347.09	\$ 11,484,937.39	\$ 12,067,856.21	\$ 12,408,262.58	\$ 12,758,881.15	\$ 13,120,018.27	\$ 13,491,989.51	\$ 111,629,948.55
Lease/Rental Fees (special equipment)	\$ -	\$ 500,000.00	\$ 515,000.00	\$ 530,450.00	\$ 546,363.50	\$ 562,754.41	\$ 579,637.04	\$ 597,026.15	\$ 614,936.93	\$ 633,385.04	\$ 652,386.59	\$ 5,731,939.66
Operating Costs	\$ 1,895,000.00	\$ 1,045,000.00	\$ 1,577,250.00	\$ 2,176,112.50	\$ 2,241,395.88	\$ 2,308,637.75	\$ 2,377,896.88	\$ 2,449,233.79	\$ 2,522,710.80	\$ 2,598,392.13	\$ 2,676,343.89	\$ 23,867,973.62
<b>TOTAL</b>	<b>\$ 1,895,000.00</b>	<b>\$ 28,041,387.28</b>	<b>\$ 31,952,827.00</b>	<b>\$ 48,271,967.26</b>	<b>\$ 49,812,075.86</b>	<b>\$ 37,495,678.03</b>	<b>\$ 36,863,919.06</b>	<b>\$ 39,498,207.32</b>	<b>\$ 42,651,524.23</b>	<b>\$ 41,324,440.65</b>	<b>\$ 41,017,544.56</b>	<b>\$ 398,824,571.23</b>
<b>Total Other Funding</b>												
FSU	\$ 1,145,000.00	\$ 5,446,798.02	\$ 5,704,301.96	\$ 9,256,519.71	\$ 8,521,968.80	\$ 5,003,293.10	\$ 7,144,362.42	\$ 5,789,663.81	\$ 5,939,324.25	\$ 5,593,474.51	\$ 5,752,249.27	\$ 65,296,955.84
Private & Public C&G	\$ -	\$ 3,495,000.00	\$ 5,616,000.00	\$ 15,315,000.00	\$ 24,955,000.00	\$ 14,556,000.00	\$ 29,720,000.00	\$ 33,709,000.00	\$ 36,712,000.00	\$ 35,731,000.00	\$ 35,265,000.00	\$ 235,074,000.00
	<b>\$ 1,145,000.00</b>	<b>\$ 8,941,798.02</b>	<b>\$ 11,320,301.96</b>	<b>\$ 24,571,519.71</b>	<b>\$ 33,476,968.80</b>	<b>\$ 19,559,293.10</b>	<b>\$ 36,864,362.42</b>	<b>\$ 39,498,663.81</b>	<b>\$ 42,651,324.25</b>	<b>\$ 41,324,474.51</b>	<b>\$ 41,017,249.27</b>	<b>\$ 300,370,955.84</b>
<b>Triumph Gulf Coast Funding</b>												
	\$ 750,000.00	\$ 19,100,000.00	\$ 20,632,385.00	\$ 23,700,000.00	\$ 16,337,500.00	\$ 17,936,162.65	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 98,453,615.39
<b>TOTAL Funding</b>	<b>\$ 1,895,000.00</b>	<b>\$ 28,041,798.02</b>	<b>\$ 31,952,686.96</b>	<b>\$ 48,271,519.71</b>	<b>\$ 49,814,468.80</b>	<b>\$ 37,495,455.75</b>	<b>\$ 36,864,362.42</b>	<b>\$ 39,498,663.81</b>	<b>\$ 42,651,324.25</b>	<b>\$ 41,324,474.51</b>	<b>\$ 41,017,249.27</b>	<b>\$ 398,824,571.23</b>



**BOARD OF COUNTY COMMISSIONERS**

840 West 11<sup>th</sup> Street  
Panama City, Florida 32401  
Telephone: (850) 248-8140  
Fax: (850) 248-8153

**BOARD OF COUNTY  
COMMISSIONERS**

September 28, 2023

www.baycountyfl.gov

Chairman David Bear  
and Members of the Board of Directors  
Triumph Gulf Coast

Re: Florida State University Application for InSPIRE Project

Dear Chairman Bear and Members of the Board:

840 WEST 11<sup>th</sup> STREET  
PANAMA CITY, FL 32401

On behalf of the Board of County Commissioners of Bay County, I am pleased to write this letter of support for Florida State University's InSPIRE Project, consisting of an advanced and additive manufacturing and aerospace research center to be in Bay County with related workforce education programs, especially related to training of teachers throughout the eight-county Triumph region.

COMMISSIONERS:

TOMMY HAMM  
DISTRICT I

ROBERT CARROLL  
DISTRICT II

WILLIAM T. DOZIER  
DISTRICT III

DOUGLAS MOORE  
DISTRICT IV

CLAIR PEASE  
DISTRICT V

ROBERT J. MAJKA  
COUNTY MANAGER

This project will provide significant support to our efforts to expand the manufacturing base, especially in Bay County. As you are aware, we have been successful in recruiting manufacturing businesses to our region. We can speak with confidence that having a major research university focused on advanced, additive, and aerospace research will lead to additional manufacturing businesses locating in the region, together with the complimentary supply chain businesses. Because of their existing experience in these areas and the strong presence the university already has in Panama City, FSU is the perfect choice for this project.

As we have explored major manufacturing hubs across the United States, a strong university research presence is an important part of the overall environment that makes these regions attractive.

In addition, we are excited about the plans contained in the proposal for the university to work throughout the area on teacher training, especially in the areas that will lead to more residents qualified to work in engineering, manufacturing, and related fields. This is a critical part of enhancing the manufacturing infrastructure in the region.

Please call me if you have any questions.

Sincerely,

Tommy Hamm, Chairman  
Bay County Board of County Commissioners