

*Breaking Barriers in  
Diversity and Innovation*

## Industrial & Manufacturing Engineering Academic Programs

The unique model of the nation's only joint college of engineering affords our department a wonderful opportunity to combine cutting-edge research with shaping the next generation of engineers from across the demographic spectrum.

We've taken this nexus and invested heavily in partnerships and resources that offer an unequalled opportunity for graduate and undergraduate students at both Florida A&M University and Florida State University to delve into complex and exciting research in some of the most innovative labs available. From the National High Magnetic Field Laboratory to the new Institute for Strategic Partnerships, Innovation, Research and Education (InSPIRE), our research takes place in collaborative, multidisciplinary work.

### Active Research Collaborations

- > High-Performance Materials Institute (HPMI)
- > Sandia National Laboratory
- > Oak Ridge National Laboratory
- > NASA

### Degree Programs

**B.S. Industrial Engineering**  
**M.S. Industrial Engineering**  
**M.S. Systems Engineering (non-thesis)**  
**M.S. Engineering Management (non-thesis)**  
**Ph.D. Industrial Engineering**

### Notable Alumni

**Franchesca Bellevu**, McKnight Fellowship  
**Kianna Porter**, Global Quality Corp.



**FAMU-FSU**  
**College of  
Engineering**

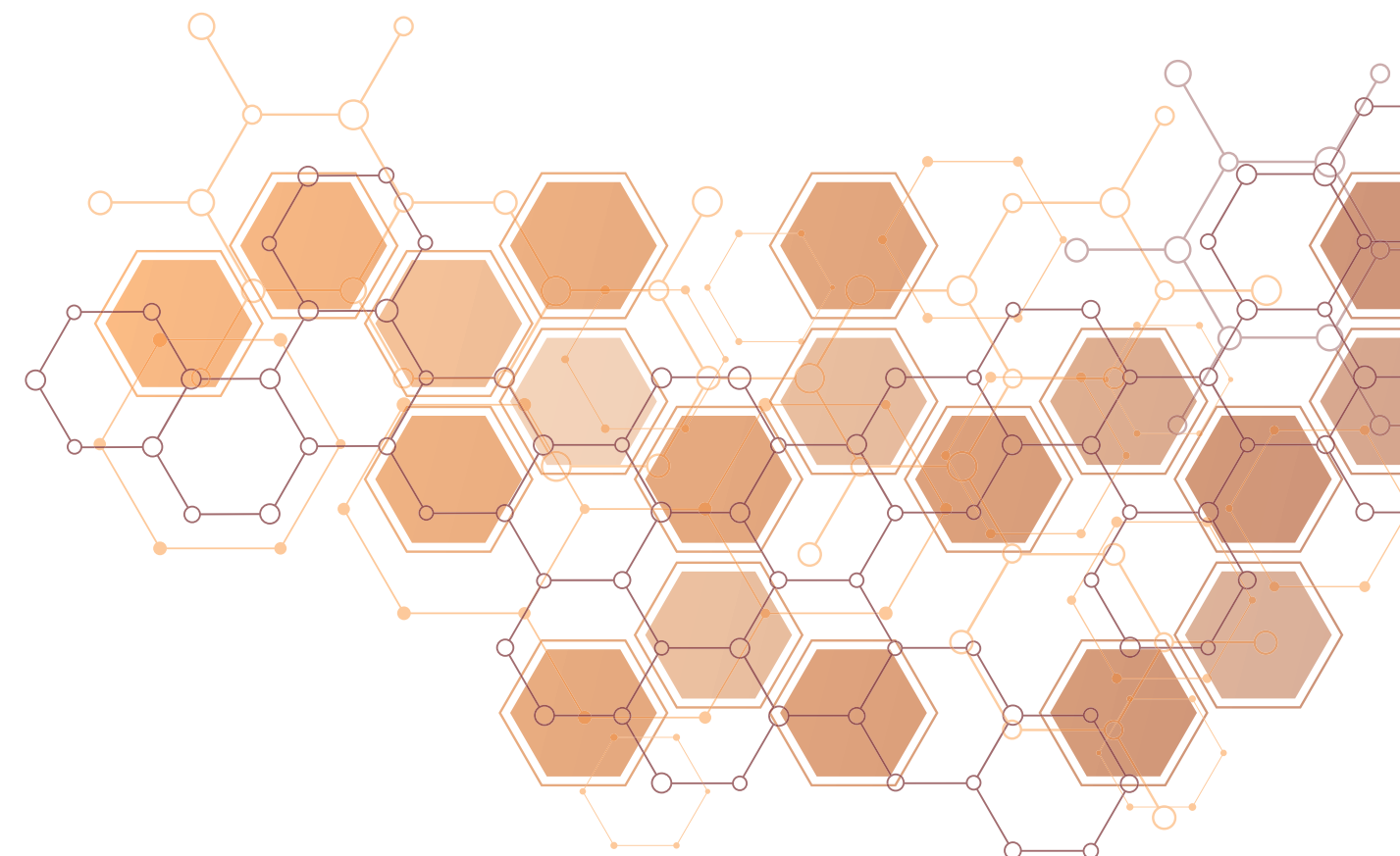
2525 Pottsdamer Street  
Tallahassee, FL 32310  
www.eng.famu.fsu.edu

## Industrial & Manufacturing Engineering Faculty Awards

**Zhiyong (Richard) Liang Ph.D.**  
– National Academy of Inventors

### Research areas:

- > Advanced manufacturing: additive manufacturing, 3D printing, printed sensors and electronics, nanomanufacturing, manufacturing process automation
- > Advanced materials: aerospace composites; polymers; nanomaterials (nanotubes, nanowires, nanocomposites); smart materials; materials for extreme environments; biomaterials and nanobiomaterials for tissue engineering and engineered medicine
- > Data enable/enhanced advanced manufacturing and materials discovery
- > Machine learning and computer vision, deep learning
- > Physics-informed artificial intelligence
- > Cyber-physical systems and manufacturing systems
- > Systems engineering and model-based systems simulation
- > Data science and analytics for health engineering
- > Sustainability and life cycle analysis
- > Transportation systems, logistics, supply chain
- > Infrastructure resilience and disaster/risk management
- > Operations research and mathematical programming, applied optimization
- > Applied industrial statistics, quality engineering and reliability engineering



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, associated research centers and a national laboratory.



**FAMU-FSU**  
**College of  
Engineering**

DEPARTMENT OF  
**INDUSTRIAL &  
MANUFACTURING  
ENGINEERING**



### A Message from

**Changchun (Chad)  
Zeng, Ph.D., P.E.**  
Chair, Department  
of Industrial &  
Manufacturing  
Engineering

On behalf of the faculty, staff and students of the Department of Industrial and Manufacturing Engineering, I'm pleased to present this annual report.

Our outstanding faculty are engaged in areas crucial to national interests and societal advancements, including advanced materials and manufacturing, nanotechnology, smart materials, data science, AI and systems engineering. For instance, faculty are pioneering the development of super-lightweight, high-strength materials for deep-space exploration and smart materials to improve health outcomes. They're also leveraging big data and machine learning to address real-world challenges in the airline industry, storm debris tracking and autonomous additive manufacturing.

Our graduate program thrives, with robust research output and an online Master of Science in Systems Engineering ranked No. 38 among public universities and No. 30 among the best for veterans. Additionally, we've launched a data analytics certificate to meet growing industry demand and have updated our undergraduate curriculum to better prepare our students.

Our students excel across the board, notably winning first place in all categories at the 2023 Composites and Advanced Materials Expo, a first in the competition's history. Committed to diversity, we proudly host two Minority Serving Institute Partnership Programs, supporting underrepresented and female engineers.

With a strong focus on AI and advanced manufacturing, our department is uniquely positioned to tackle some of the world's most pressing challenges. We look forward to expanding our team and welcome you to join us on this exciting journey.

# Department of Industrial & Manufacturing Engineering Annual Report 2024

*Innovating technological  
advances while educating the  
next generation of engineers*



**Fall 2024**



## The Joint College by the Numbers

#60

Public Engineering  
College with  
Doctorate

(U.S. News & World Report 2024)

#49

Industrial & Manufacturing  
Engineering Program Ranking

#54

Materials Science &  
Engineering Program Ranking

#72

Civil & Environmental  
Engineering Program Ranking

## Department by the Numbers (Fall '24)

152

Undergraduate  
Students

142

Graduate  
Students

1400

Alumni

### Enrollment

[Over Past 5 Years]

6%

Increase in URM  
Enrollment in IME

53%

Increase in IME  
Graduate Enrollment

### Research

12

Number of Patents  
Held by IME Faculty

\$399K

Grants & Awards per  
IME Faculty Member

\$519K

Research Expenditure  
per IME Faculty Member

301%

Increase in Research  
Expenditures Over  
Past 5 Years

103%

Increase in Grants and  
Awards Over Past 5 Years

### Outcomes

\$88K

Average Salary for  
Industrial Engineer

\$79K

Average Salary for  
Systems Engineer

## Industrial & Manufacturing Engineering Research Laboratories at the Joint College

### High-Performance Materials Institute

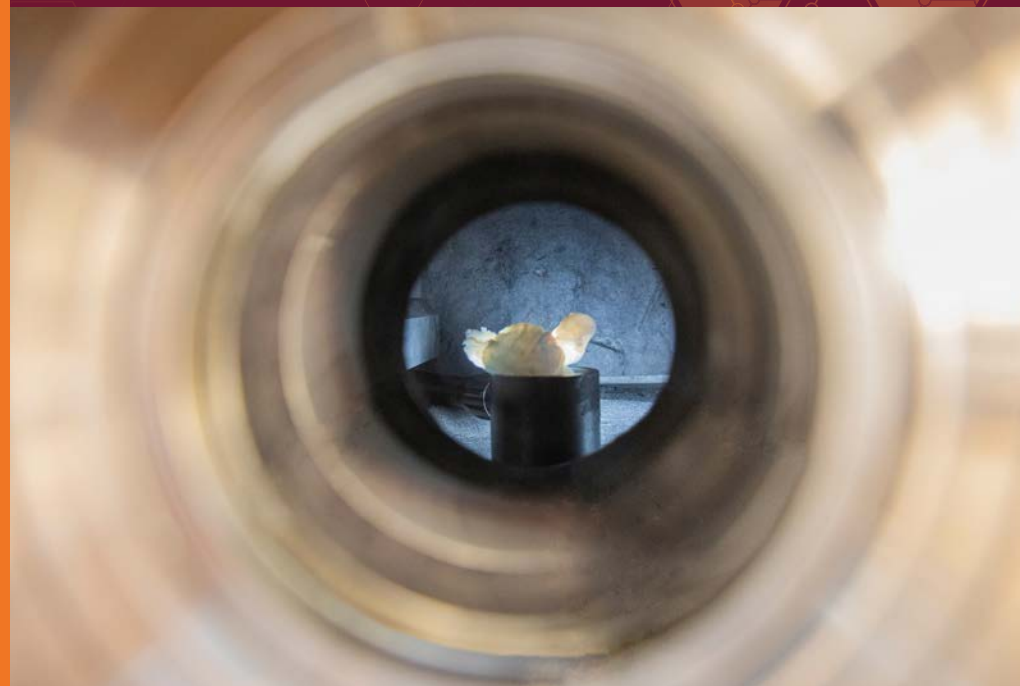
Led by Director **Zhiyong "Richard" Liang**, HPMI focuses on four key areas: high-performance composite materials, structural health monitoring, multifunctional nanomaterials, and advanced manufacturing. They've developed innovative technologies, like nanotube alignment and nanotube-based composites, that bridge the gap between research and real-world applications, offering advancements in mechanical strength, conductivity and radiation protection.

### Complex Materials Design for Multidimensional Additive Processing (CoMand)

**Subramanian Ramakrishnan** heads this center that focuses on advancing additive manufacturing for both traditional and innovative device structures, with key areas including nanostructured materials for magnetic shielding, energy applications, and biological uses like 3D-printed tumor bio-systems on a chip.

### Mobility Equity Research Center

Then newest IME center is seeded by a \$3 million grant to **Yanshuo Sun** from USDOT. This first-of-its-kind initiative is designed to support communities that face transportation challenges, including people with disabilities, older Americans, Tribal Nations and rural and disadvantaged populations. The center's mission aligns with USDOT's goal of enhancing transportation equity by addressing barriers limiting mobility and accessibility



### Nanomaterials for Everything From Deep Space to Drug Delivery

Researchers **Rebekah Sweat** and **Mehul Tank** completed a novel study on the extreme temperature thermal stability of purified boron nitride nanotubes, also known as BNNTs. The discovery has applications in everything from deep space travel to medicine delivery systems, including electronics. Along with space applications, BNNTs have enormous potential to form thermally conductive and electrically insulative layers on circuit boards for efficient heat dissipation in electronics.



### ADDITIVE MANUFACTURING

#### 3-D Printed Polymer Matrix Composites for Low-Cost Optoelectronic Manufacturing

**Zhibin Yu** and **Tarik Dickens** are developing perovskite-polymer composites that can be 3-D printed for high-resolution pixelated radiation detectors and other devices, like detector arrays, and synthesizing new semiconductor-polymer composites with better manufacturing flexibility than current materials. If successful, the composites can be processed into commodity plastics by solution casting, hot pressing, melt extrusion and injection molding—techniques that allow manufacturers to produce radiation detectors of various shapes and sizes.

### FUTURE FACULTY

#### Building Futures, Breaking Barriers, Empowering Female Students in Science

More female graduate students are playing a pivotal role in the traditionally male-dominated fields of science, technology, engineering and mathematics (STEM) fields. Nowhere is this better illustrated than in **Rebekah Sweat's** lab at the FAMU-FSU College of Engineering. Two of her female students produced first-author research publications in just the last month. In addition, her team includes two female rising high school seniors who collaborated on the work and are acknowledged in the papers for their contribution to the research. This is quite remarkable.

### ADVANCED MATERIALS

#### Research at the Extreme Helps Students Forge Careers

A new research program promises to produce a robust, well-trained and diverse workforce for the future—and the high-tech materials needed for harsh new frontiers like deep space. Led by **Tarik Dickens**, the new project funded by the Department of Energy (DOE) is dubbed NNSA Minority Serving Institution Partnership Program (MSIPP) Gulf Coast Consortium: Materials-At-The-Extreme (MATE). It aims to increase research and educational opportunities in advanced materials processing, especially at the high school level and beyond.



### STUDENT SUCCESS

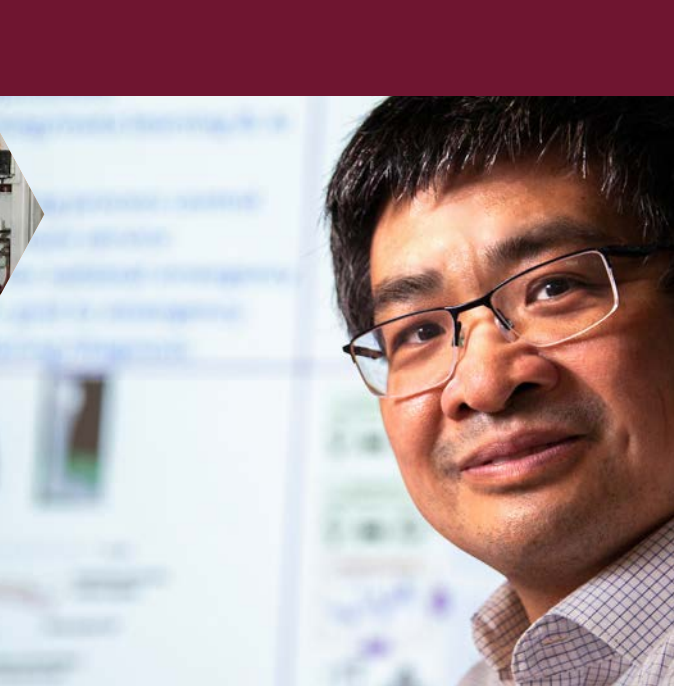
#### Students Make History with a Clean Sweep at SAMPE University Research Symposium

In an unparalleled achievement, students from the joint college emerged as the undisputed champions at the Society for the Advancement of Material and Process Engineering (SAMPE) university research symposium at CAMX last fall. The 2023 SAMPE symposium saw a historic win for the institution as its talented researchers clinched the gold medal in all three categories: Ph.D., M.S., and B.S. The team from the college and HPMI placed at the top of each degree category in the competition—for the first time in its history.

### NANOMATERIALS

#### Creating New Smart Materials for Wearable Technology

Wearable devices use light-emitting diodes (LEDs) to project light onto human tissues and a photodiode to detect the light. The intensities and waveforms of this interaction correlate to cardiovascular changes in the body. Many of these devices use rigid LEDs and photodiodes embedded in a stiff material like a watchband. A research team, including **Zhibin Yu**, developed a soft, stretchable photodiode embedded in an elastic polymer matrix as an alternative. The new photodiode fits securely on the skin because it is soft and pliable like human bodies, giving the user a more precise cardiovascular reading over time.



### Hui Wang

*Associate Professor of Industrial & Manufacturing Engineering*

We create AI capabilities for additive manufacturing systems, allowing printers to learn skills to improve printing quality and productivity autonomously from all available resources, thereby reducing the testing cost and expediting new process development.

*Read more about his work:*

