Thank you for joining us at the Spring 2018 Fulton Undergraduate Research Initiative, or FURI, Symposium.

Research and innovation are a core focus of the Fulton Schools community, from first-year students through advanced doctoral students and faculty. Together, students and faculty collaborate across disciplines to conduct important research that addresses real-world challenges in education, energy, health, security and sustainability.

Four of our signature programs enhance students’ engineering and technology education through hands-on research in the labs of our renowned faculty. Students involved in these programs are invited to present their research at the FURI Symposium.

FURI exposes undergraduate students to the research enterprise — from conceptualizing an idea, developing a plan and investigating the research question to presenting their research outcomes. The Master’s Opportunity for Research in Engineering, or MORE, program provides the same experience for our master’s students. Both programs develop and hone skills that will serve students well in their future pursuits and careers: the ability to innovate, think independently, solve problems and defend their findings.

The entrepreneurial mindset also has a place in research. Our Kern Family Foundation project funds student research that emphasizes entrepreneurial thinking, with a specific focus on highlighting connections and creating value.

In our Grand Challenge Scholars Program, also known as GCSP, students conduct research in one of 14 grand challenge themes set forth by the National Academy of Engineering. Research is one part of their five-part program that additionally challenges them to explore interdisciplinary coursework, gain a global perspective, engage in entrepreneurship and give back to the community through service learning.

These influential programs also provide our students with opportunities beyond the research experience in the laboratory. Undergraduate students can travel to prestigious conferences to present their work — an activity often only available to graduate students. Doors also open to scholarships, internships and further research in graduate school and more.

As you browse the poster session today, be sure to talk with our students about their research. We are proud of what they’ve accomplished and we’re excited to share their work with you.

Sincerely,

Kyle D. Squiller, PhD
Dean, A. J. Fulton Schools of Engineering
Professor, Mechanical and Aerospace Engineering

Kae Sawyer
Associate Director
Student Engagement

On the cover

YiZhuang “JJ” Garrard
ASU Kern Project KEEN supported FURI student researcher  |  Graduation: May 2019  |  Hometown: Tokyo, Japan

Cost-Effective Surveying Using Multiple Unmanned Aerial Vehicles
Mentor: Wenlong Zhang, Assistant Professor
This project focuses on taking advantage of the low cost and ease of use of quadcopters for performing topographical surveys via an unmanned aerial system (UAS) that will autonomously task a fleet of unmanned aerial vehicles (UAVs) to partition and survey a user-designated land area. The researcher has bilateral communication between a quadcopter and an Android tablet that lets the user monitor the status of a quadcopter and send simple commands and missions to the quadcopter. This project is an opportunity for the researcher to develop their technical skills in addition to using the Entrepreneurial Mindset outside of the classroom.
How do you get started?

Step 1: Develop your research interests
Step 2: Identify possible research mentors
Step 3: Prepare to talk with faculty
Step 4: Contact faculty members
Step 5: Make a decision
Step 6: Take the free FURI orientation on Blackboard

The FURI orientation will help you:
• learn how to create research questions
• conduct literature reviews
• maximize library resources
• make undergraduate research a reality for you

Students who take the course will get a #FURIous t-shirt!

For more information, visit undergraduate-research.engineering.asu.edu/students/getting-started

Contact the Fulton Undergraduate Research Initiative office at furi@asu.edu with any questions, or if you need advice on next steps.

“Start early, get involved and pick a topic that you are excited about!”
— Carly Thalman
FURI Summer ’16-Fall ’16
Engineering (Robotics) ’16
Graduate Student, ASU, Intern, Raytheon

Fulton Undergraduate Research Initiative (FURI)
The Fulton Undergraduate Research Initiative enhances an undergraduate student’s engineering experience and technical education by providing hands-on lab experience, independent and thesis-based research and travel to national conferences.

Master’s Opportunity for Research in Engineering (MORE)
The Master’s Opportunity for Research in Engineering is designed to enrich a graduate student’s engineering and technical graduate curriculum with hands-on lab experience, independent and thesis-based research.

ASU Kern Project grants and KEEN support
ASU Kern Project grant recipients and KEEN-supported FURI students receive funding to support research projects or travel that exemplifies an entrepreneurial-minded approach. Funded student researchers apply curiosity and connections to create extraordinary value for stakeholders and present their research at the FURI Symposium.

Grand Challenge Scholars Program (GCSP)
The Fulton Schools Grand Challenge Scholars Program combines innovative curriculum and cutting-edge research experiences into an intellectual fusion that spans academic disciplines and includes entrepreneurial, global and service learning opportunities. Students in the Grand Challenge Scholars Program conduct research in a grand challenge theme and are invited to present their research at the FURI Symposium.

Find research opportunities at undergraduate-research.engineering.asu.edu/research-opportunities

Find out more about the research presented at this semester’s FURI Symposium furi.engineering.asu.edu
Further research will explore the use of heuristics and generalizations to improve the agent's learning methods to reduce the human supervision needed to acquire these knowledge PDDL, the planning domain definition language. The purpose of this research is to explore to develop plans and operate autonomously, robots need knowledge bases encoded in

Mentor: Siddharth Srivastava, assistant professor

Using Stochastic Search Learning Modes for Sequential Decision Making Using Stochastic Search

Mentor: Siddharth Srivastava, assistant professor

Galen Smart Target

Precision Robotic Thrower and a Design and Development of a

Hometown: Scottsdale, Arizona

Electrical Engineering

Andrew Carlson ’19 Engineering (Robotic)

Hometown: Chandler, Arizona

Low-Cost Sensing

Mentor: Daniel Aube, assistant professor

Diana Chen ’19 Computer Science

Hometown: Danden, Oregon

Enhancing Interdisciplinary Thinking in Co-Curricular Programs

Mentors: Trpuljana Marjanovic, assistant dean, and Amy Truthove, senior lecturer

Ryan Christensen ’19 Computer Science

Hometown: Chandler, Arizona

Learning Modes for Sequential Decision Making Using Stochastic Search

Mentor: Siddharth Srivastava, assistant professor

Carolin Cristi’ 18 Electrical Engineering

Hometown: Scottsdale, Arizona

Design and Development of a Precision Robotic Thrower and a Smart Target

Mentor: Armando Rodriguez, assistant professor

Galen Kingsley’ 18 Aerospace Engineering

Hometown: Mesa, Arizona

Aerodynamics of Propulsion

Mentor: Timothy Takahashi, professor of practice

Caroline Kroepoulos ’20 Mechanical Engineering

Hometown: Scottsdale, Arizona

Service Learning and Reflection in Undergraduate Engineering

Mentor: Stephanie Gilguk, lecturer

Cory Kurowiski ’19 Electrical Engineering

Hometown: Tempe, Arizona

Image Processing and Tailoring in Underwater Low-Light Conditions

Mentor: Armando Rodriguez, professor

James Larson ’18 Engineering (Electrical Systems)

Hometown: Indio, California

Adaptive Expertise in Embedded Systems

Mentor: Shawn Jordan, associate professor, and Micah Landis, assistant professor

Kevin Lough ’19 Computer Science

Hometown: Flagstaff, Arizona

Enumeration of Self-avoiding Walks in Self-organizing Particle Systems

Mentor: Andrea Richa, professor

Diego Perozo ’18 Industrial Engineering

Hometown: Caracas, Venezuela

Student Retention Analysis

Mentor: Linda Cheait, principal lecturer

Ashley Salkowski ’19 Computer Science

Hometown: Okinawa, Japan

Spatiotemporal Frameworks for Dynamic Merged Reality Content Creation

Mentor: Robert LiKamWa, assistant professor

Ashley Shalih ’20 Computer Science

Hometown: Cupertino, California

Using Predicting Algorithms to Seamlessly Download Data

Mentor: Robert LiKamWa, assistant professor

Kyle Shumway’ 22 Computer Science

Hometown: Tempe, Arizona

Reinforcement Learning with Randomized Rewards

Mentor: Troy Micaldi, assistant research professor

Jonascl Vilchez ’20 Computer Science

Hometown: Los Angeles, California

The Use of Augmented Reality (AR) and Physical Activity (PA) to Help Students with ADHD Learn

Mentor: Troy Micaldi, assistant research professor

Tristan Wigginton ’18 Computer Science

Hometown: Tempe, Arizona

App Development for Intelligent Interactive Adaptive Learning Systems – Alphagame Mode Wonderful!

Mentor: Armando Rodriguez, professor

ASU Kern Project KEEN supported students

Mike Barden ’20 Electrical Engineering

Hometown: New York, New York

NASA Space Grant Robotics

Mentor: Ryan Mule, lecturer

Lanjam Brook ’18 Biomedical Engineering

Hometown: Phoenix, Arizona

National Association of Engineering Student Councils Engineering Leadership Summit

Mentor: James Cook, vice dean and professor

Ryan Fagan ’19 Aerospace Engineering

Hometown: Pomona, Arizona

Handheld IR Spectrometer

Mentor: Phil Christensen, Regents’ Professor

Jacob Knapp ’18 Engineering (Robotic)

Hometown: Queen Creek, Arizona

Developing an Educational Robotic Platform

Mentor: Daniel Aube, assistant professor

Jui Saasai ’19 Engineering (Mechanical Engineering Systems)

Hometown: Wailuku, Hawaii

Society of Automotive Engineering Bio Competition Mentor: James Conte, senior lecturer

Brent Wallace ’20 Electrical Engineering

Hometown: Phoenix, Arizona

2018 Spaceport America Cup Mentor: Aron Green, lecturer

Gu Cao Paper ’18 Aerospace Engineering

Hometown: Irvine, California

Real-time Illumination Estimation in Undergraduate Engineering

Mentor: Linda Cheait, assistant professor

Aashiq Ali ’18 Electrical Engineering

Hometown: Chandler, Arizona

Interactive Adaptive Learning for Students with ADHD

Mentor: Robert Atkinson, researcher

MORE student researchers

Siddharth Prakash ’18 Computer Science

Hometown: Bhagpati, Bihar, India

Real-time Illumination Estimation for Mobile Augmented Reality

Mentor: Robert LiKamWa, assistant professor

Raghav Siddha ’18 Computer Science

Hometown: Hyderabad, Telangana, India

Are Existing Knowledge Transfer Techniques Effective to Train Deep Networks On Edge Devices?

Mentor: Ming Zhao, associate professor

“Its always good to have an open mind. It keeps you open to new ideas, new opportunities, new innovations, new things that you can do. This is important because you never know when you might need them.”

— Isias Martinez, FURI Spring ’13 Aerospace Engineering ‘14 Mechanical Engineer, Raytheon
The deposition of transparent, porous silica films as thermally insulating coatings on windows has shown to be major hurdles during the development of these coatings and will be the focus of future work.

**Energy**

The urgency to discover and deploy new forms of carbon-reducing energy technologies has become an indispensable part of our economic and environmental landscape. The Fulton Schools' research in renewable and alternative energy sources is multifaceted with efforts in solar and photovoltaic energy, biotechnology, low- and high-power energy storage, power electronics, electric power systems, batteries and hydrogen fuel cells.
FURI student researchers

Spring 2018 FURI Symposium

Biomedical Engineering

Mehdi Alharbi '18
Software Engineering
Hometown: Dubai, United Arab Emirates
Mentor: Maziar Tahoori, assistant professor

MORE

FURI taught me how to deal with failure. "FURITeach taught me how to deal with failure. Breakthrough the feeling is indescribable."

--- Michael Garcia
Fall '18 Fall 119 Aerospace Engineering '09 Lead Mechanical Design Engineer, SpaceX

Courteney DuBois

Fundi students research: 10

Spring 2018 FURI Symposium

Health

The Fulton Schools’ efforts in health innovation range from understanding the causes behind Alzheimer’s disease and improving methods for predicting epileptic seizures to developing advanced biosensors, biosynthetic and lab-on-a-chip devices for clinical diagnostics. Additional areas of research exist in novel biological materials, neural engineering, biomedical informatics, drug-delivery systems, health care systems analysis and modeling, human modeling and human rehabilitation technologies.
Health

Framarz Alam '19 Biomedical Engineering Hometown: Phoenix, Arizona 

Assessment of Microbiome Modulation Modifying Host Metabolism Mentor: Erica Fuentes, associate professor

Conor Yatoes-Koch '18 Computer Science Hometown: Glen Allen, Virginia 

Analysis of Reward-Adaptive Reinforcement Learning Approaches Mentor: Tori McDaniels, assistant research professor

Jumin Zhong '20 Electrical Engineering Hometown: Nanjing, Jiang Su, China 

Cancer Cell Detector Mentor: Jianjun Chen, assistant professor

ASU Kern Project KEEN supported students

Patrick McFarland '18 Biomedical Engineering Hometown: Phoenix, Arizona 

Kiwano: Wearable, Seizure Detection Headband Mentor: Brent Blackwell, executive director, Entrepreneurship + Innovation

GSCP student researchers

Fahima Aliah '18 Biomedical Engineering Hometown: Lagos, Nigeria 

Measuring Failure Load of Lumbar Spine Tissue for Mechanical Testing Mentor: Brian Lombard, assistant professor

Stephanie Lam '19 Biomedical Engineering Hometown: Phoenix, Arizona 

Measuring Osmolality in a Rat Model of Pulmonary Disease Mentor: Jeffery Klein, associate professor

Mike Mabey '19 Biomedical Engineering Hometown: Phoenix, Arizona 

Balancing Bicycle Mentor: Wenlong Zhang, assistant professor

Ethan Marschall '18 Biomedical Engineering Hometown: Mesa, Arizona 

In Vivo Cell Culture Model of the Influence of Advanced Glycation End Products and Type 2 Diabetes Mentor: Julianne Holloway, assistant professor

MORE student researchers

Tanner Bilb '19 Mechanical Engineering Hometown: Abingdon, Oregon 

Modeling the Voluntary Reflex of the Human Ankle Mentor: Hyungjae Lee, assistant professor

Rafael Camarena '18 Industrial Engineering Hometown: Chandler, Arizona 

Stochastic Modeling and Optimization to Improve Identification and Treatment of Alzheimer's Disease Mentor: Guida Pedrick, assistant professor, senior sustainability scientist

Anish Cook '18 Mechanical Engineering Hometown: Phoenix, Arizona 

Evaluating the Effects of a Negativity-Damped Ankle-Foot Orthosis in Gait Mentor: Hyungjae Lee, assistant professor

Andrew D'Angeli '19 Chemical Engineering Hometown: Phoenix, Arizona 

Developing Novel 3D Printed Hydrogel-Based Biomechanical Systems Mentor: Julianne Holloway, assistant professor

Diana Flores '19 Biomedical Engineering Hometown: Gilbert, Arizona 

Haptic Vision Substitution Mentor: Angela Soderman, assistant professor

Bhoomi Gupta '18 Biomedical Engineering Hometown: Phoenix, Arizona 

Computer Science Mentor: Angela Soderman, assistant professor

Jiyash Jawahar '18 Biomedical Engineering Hometown: Hyderabad, Telangana, India 

Mechanical Engineering Mentor: Tori McDaniels, assistant research professor

Vithal Yasani '19 Industrial Engineering Hometown: Ahmedabad, India 

Application of Automatic Distance Calculation for Complete Body Rankings in Gymnastics Mentor: Jeyishri Easo, assistant professor

Guest presenter

Nigeri Zon invoke '20 Mechanical Engineering Hometown: Chandler, Arizona 

Electromagnetic and Optical Properties of Various Hydrazine-Production Catalytic Immobilized at a Polymer-nanodI7 Interface Mentor: Gary Moore, assistant professor

Kishan Mahadevan '18 Electrical Engineering Hometown: Bangalore, Karnataka, India 

Implantable Adjustable Treatrail Mentor: Hyungjae Lee, assistant professor

Daylin Morgan '18 Biomedical Engineering Hometown: Tempe, Arizona 

Large Scale Computational Differentiation of Pluripotent Stem Cell-Derived Neuron Precursor Cell Lines through Lateral Spinal Cord Lesions Mentor: David Brainard, assistant professor

Hariv Muralikrishnan '18 Chemical Engineering Hometown: Glen Allen, Virginia 

Aminoacidic Polymers in Combination Treatment for Triple Negative Breast Cancer (TNBC) Studies Mentor: Kaushal Ronge, professor

Niveditha Muthukrishnan '18 Biomedical Engineering Hometown: Chennai, Tamil Nadu, India 

Evaluation of a Soft Robotic Iow Exosuit for Scar Aector Mentor: Paragkesh Polignan, assistant professor

Katrine Jocelyn Rosas Gomez '18 Biomedical Engineering Hometown: Mexico City, Mexico 

Bioreprocessable Copolymers of Poly (N-acycloxyacyrilmeth) with Enzyme-Dependent Lower Critical Solution Temperature Mentor: Brian Lombard, assistant professor

Guatiris Srivastava '18 Computer Engineering (Electrical Engineering) Hometown: Lucknow, Uttar Pradesh, India 

Training Deep Neural Networks with Quantization and Sparsity Mentor: Jia-San Sen, assistant professor

Yukh Sugumara '18 Biomedical Engineering Hometown: Yokohama, Japan 

Development of a Conductive Injectable Hydrogel for Cardiac Tissue Engineering Mentor: Mohib Nakhla, assistant professor

Vithal Yasani '19 Industrial Engineering Hometown: Ahmedabad, India 

Application of Automatic Distance Calculation for Complete Body Rankings in Gymnastics Mentor: Jeyishri Easo, assistant professor

Mechanical Characterization of 3D Porous Electrospun Nanoscaffolds to Optimize Tissue Regeneration Mentor: Vincent Pizzicato, associate professor

Bringing the cell microenvironment is critical when developing cell-based therapeutic devices for regenerative medicine. The focus of this project is to characterize the microenvironmental properties of 3D porous electrospun nanoscaffolds intended to serve as cell substrates and aimed to match an individual's anatomy and tissue regenerative capacity. Nanoscaffolds electrospun from hydrogel polymer solutions were nonmechanically characterized using a custom test system with specialized grips to determine the “stiffness” of scaffolds of different crosslinking densities. Once fully characterized, scaffolds can then be “tuned” to elicit optimal tissue regeneration in patients. This research is important for the realization of precision medicine's potential.

Maeve Kennedy

SCSP student researcher | Graduation: May 2020 | Hometown: Mesa, Arizona

Chemical Engineering

Mechanical Characterization of 3D Porous Electrospun Nanoscaffolds to Optimize Tissue Regeneration

Mentor: Vincent Pizzicato, associate professor

Bringing the cell microenvironment is critical when developing cell-based therapeutic devices for regenerative medicine. The focus of this project is to characterize the microenvironmental properties of 3D porous electrospun nanoscaffolds intended to serve as cell substrates and aimed to match an individual’s anatomy and tissue regenerative capacity. Nanoscaffolds electrospun from hydrogel polymer solutions were nonmechanically characterized using a custom test system with specialized grips to determine the “stiffness” of scaffolds of different crosslinking densities. Once fully characterized, scaffolds can then be “tuned” to elicit optimal tissue regeneration in patients. This research is important for the realization of precision medicine’s potential.
Hailey Burch
FURI student researcher | Graduation: May 2018 | Hometown: Chandler, Arizona
Gait Optimization for Bio-Inspired Robotics
Mentor: Hamidreza Marvi, assistant professor
A bio-inspired platform for a search and rescue vehicle with optimized stride length and frequency at various saturation levels of sand is the goal of this research. Measurements and observations of the animal, Basiliscus basiliscus or the basilisk lizard, have provided baseline stride length, frequency, weight and gait parameters. Variance of stride length and frequency are tested with the developed robot and optimized results are presented. Future work includes scalability of the platform and application in space exploration.

"As a first-generation student, my understanding of what my career path could be was limited. FURI allowed me to expand my knowledge, apply first-hand engineering concepts and inspired me to keep moving forward." — Mariela Robledo

Mechanical Engineering

FURI student researchers

Clayton Sites '18
Mechanical Engineering
Hometown: Tyrona, New Mexico
How Surface Roughness Affects Interfacial Strength of Steel and Ice
Mentor: Jay Oswald, assistant professor

Brandon Dawson '18
Aerospace Engineering
Hometown: Phoenix, Arizona
Aerodynamic Propulsion Modeling
Mentor: Wenting Zhang, assistant professor

Nicholas Debeurle '18
Computer Science
Hometown: Scottsdale, Arizona
Efficient Hash Family Creation and Implementation
Mentor: Charles Coburn, professor

Audiya Deoattle '18
Computer Science
Hometown: Chandigarh, Maharashtra, India
What’s up with Privacy?: User Preferences and Privacy Concerns in Intelligent Personal Assistants
Mentor: Shibnarayan Kambhampati, professor

Bryan Dotson '18
Aerospace Engineering
Hometown: Anthem, Arizona
Development and Validation of Active Pixel Sensors for Star Tracker Applications
Mentor: Daniel White, lecturer

Michael Durso '19
Materials Science and Engineering
Hometown: Phoenix, Arizona
Synthesis and Characterization of Traditional and Chitosan-Based Nanocomposites
Mentor: Sebastian Temple, assistant professor

Caitlin Foster '18
Mechanical Engineering
Hometown: Tucson, Arizona
Damage Tolerance Design Guidelines for Seamless Carbon Fiber Composite Structures for Pressurized Cylinders
Mentors: Aditi Chattopadhyay, professor, and Mansour Nekooi Fard, assistant research professor

Amita Claire Jordan '19
Mechanical Engineering
Hometown: Gilbert, Arizona
Effects of Thermal Deformation in Constrained Sheet Metal
Mentor: Timothy Sakurai, professor of practice

Brandon Kwan '20
Mechanical Engineering
Hometown: Scottsdale, Arizona
Effect of Flow Rate on Interfacial Fracture between Ice and Steel
Mentor: Jay Oswald, assistant professor

Nicholas Magana '18
Electrical Engineering
Hometown: Scottsdale, Arizona
Modeling, Analysis, Control, and Design of Hypersonic Air Vehicles Using Stealth Technology
Mentor: Armando Rodriguez, professor

Lukas Mains '19
Computer Systems Engineering
Hometown: Phoenix, Arizona
Randomized Construction of Homogeneous Scattering Hash Families
Mentor: Charles Coburn, professor

Zachary Monroe '18
Software Engineering
Hometown: Chandler, Arizona
How Can Machine Learning Improve Password Security?
Mentor: Ayub Bora, assistant professor

Audiya Nalla '19
Mechanical Engineering
Hometown: Amalapuram, Andhra Pradesh, India
Mechanical Analysis of Reinforced Foam Core Composites
Mentor: Aditi Chattopadhyay, professor

Adie Nou '19
Computer Science
Hometown: Mesa, Arizona
Personalized Browser History Anonymization
Mentor: Huan Liu, professor

Bryca Pedroza '19
Computer Science
Hometown: Scottsdale, Arizona
Stock Market Portfolio Optimization
Mentor: Armando Rodriguez, professor

Tanner Rosenthal '19
Electrical Engineering
Hometown: Tempe, Arizona
Precision Following of a Ground Vehicle by a Fully Instrumented Quadrocopter with a Go-Ahead Audio-Visual Support Capability
Mentor: Armando Rodriguez, professor

Muhand Sabet '19
Electrical Engineering
Hometown: Surprise, Arizona
Ground-Based Robotic Vehicle Following and Suspension Control: An Image Processing Approach
Mentor: Armando Rodriguez, professor

Andrew Sherman '18
Computer Science
Hometown: Gilbert, Arizona
Efficient Algorithms for the Construction of Low-Density Parity-Check Codes
Mentor: Charles Coburn, professor

Cesar Tamagno '20
Computer Systems Engineering
Hometown: Havana, Cuba
Deep Predictive Models for Cyber Risk Assessment in Autonomous Eming
Mentor: Hong Lan Amor, assistant professor

Michael Tucker '18
Mechanical Engineering
Hometown: Yardley, Pennsylvania
Developing Fatigue-Resistant 3-phase Nanocomposite Sensors
Mentor: Mansour Nekooi Fard, assistant research professor


MORE student researchers

Sid Duddatla '18
Computer Engineering (Electrical Engineering)
Hometown: Tirupati, Andhra Pradesh, India
Audio-Visual Support Capability
Mentor: Georgios Trichopoulos, assistant professor

Karthik Kambam '18
Electrical Engineering
Hometown: Tenafly, Andhra Pradesh, India
Parallel Computing with OpenMP
Mentor: Huan Liu, professor

Bhavra Kaushyap '19
Electrical Engineering
Hometown: Bangalore, Karnataka, India
Wearable Antenna System for Touchless Gesture Recognition and Interaction
Mentor: Georgia Techepos, assistant professor

Mahmoud Saik '18
Electrical Engineering
Hometown: Cairo, Egypt
Compact Terahertz Real-Time Imaging System
Mentor: Georgia Techepos, assistant professor

Security
As technology develops at a faster rate, there is a growing need to develop engineering systems to keep people and infrastructure secure, including securing cyberspace, developing secure communications, developing self-healing systems resilient to attack and identifying, monitoring and reducing threats. Fulton Schools researchers — faculty and students — are addressing issues of national defense, homeland security, border security, cyber warfare and more, devising technology solutions as well as legal, policy and social implications.

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3D printed samples, scans were conducted to represent the prints as point clouds. While focusing on the rheology parameters of the mix. To analyze the small-scale construction. During the spring 2018 semester, successful prints have been made for its use to be industrialized in the future for faster, cheaper and cleaner concrete. The objective of this research is to advance the current state of 3D printed concrete for its use to be industrialized in the future for faster, cheaper and cleaner concrete.
**Mentors**

**What is a faculty mentor?**

Fulton Schools faculty members guide students through the research process in their role as FURI and MORE research program mentors. Throughout the semester-long program, mentors meet with their student researchers one-on-one and in lab settings for training, professional etiquette coaching, and to serve as their students’ guide for writing abstracts and designing research posters. Faculty mentors provide advice and professional development opportunities, including submitting research to conferences, applying for travel grant funding, submitting papers for publication and discussing career goals.

**How to get involved**

Do you have students conducting research in your lab? Encourage them to apply for FURI or MORE research funding. Faculty members can mentor up to five students in each program per semester.

Students will submit their research proposal, five research references, timeline, budget, personal statement, résumé and unofficial transcript in their FURI or MORE application. Then faculty mentors are prompted to submit a Faculty Mentor Proposal Support Letter. If the application is accepted by the faculty committee, the student and faculty member will receive FURI or MORE funding for the semester.

If you don’t currently have undergraduate or graduate student researchers and would like to find qualified researchers, you can post your research opportunity for students to connect with you.

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**Find out more at furi.engineering.asu.edu**

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“I had the possibility to try new research areas that I had no personnel to work on, the opportunity to return to basic research mentoring and revise my mentoring style, and got to better know our students.”

— François Perreault, assistant professor

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“Encourage your graduate students to also take a mentoring role.”

— Micah Lande, assistant professor

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“Mentoring is an extremely rewarding experience, and it is the biggest reason I became a faculty member. I enjoy reading FURI students’ reflections and seeing their growth in learning the research process.”

— Heather Emady, assistant professor

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“Connect with your faculty mentors every chance you get as you will be invaluable as mentors even after leaving ASU!”

— Abhishek Dharan

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Thurman Lockhart, professor
Joshua Loughman, lecturer, assistant director, Engineering Projects in Community Service
Narisco Macia, associate professor
Hamidreza Marvi, assistant professor
Abdul Maysas, assistant professor
Troy McDaniell, assistant professor
Ryan Moul, lecturer
Gary Moore, assistant professor
Jitendra Nathuswamy, associate professor
Naryanann Neithalath, professor
David Nielsen, associate professor
Mary Niemczyk, associate professor
Mahdi Nikkah, assistant professor
Ja' Oswald, assistant professor
Giulia Pedrelli, assistant professor, senior sustainability scientist
Yale Peet, assistant professor
Pedro Peralta, professor
Francis Perreault, assistant professor
Patrick Phelan, professor
Vincent Pizziconi, associate professor
Panagiotis Polygerinos, assistant professor
Kathira Rege, professor
Fengbo Ren, assistant professor
Yi Ren, assistant professor
Andrea Richa, professor
Bruce Rittmam, Regents’ Professor
Armando Rodriguez, professor
Bradley Rogers, associate professor
Konrad Rykaczewski, assistant professor
Marc Santello, professor
Brent Sebold, executive director, Entrepreneurship + Innovation
Jorge Safair, assistant professor
Jae-Sun Seo, assistant professor
Kari Sieradzki, professor
Michael Sierks, professor
Shahriar Sinha, assistant research professor
Barbare Smith, assistant professor
Angela Sodeman, assistant professor
Sidhurth Srivastava, assistant professor
Sarah Stabenfeld, associate professor
Thomas Sugar, professor
Maxim Sukharev, associate professor
Timothy Tahakashi, professor of practice
Selatun Tongay, assistant professor
César Torres, associate professor
Georgios Trichopoulos, professor
Amy Trowbridge, senior lecturer
Avi Varman, assistant professor
Brent Vernon, associate professor
Chao Wang, professor
Pau Westerhoff, Regents’ Professor
David White, lecturer
Jeffrey Wishart, clinical assistant professor
Masayuki Yekani Fard, assistant research professor
Wenlong Zhang, assistant professor
Ming Zhao, associate professor

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Ronald Adrian, Regents’ Professor
Jean Andino, associate professor
Kamal Ankit, assistant professor
Panagiotis Artemiadis, associate professor
Robert Atkinson, associate professor
Daniele Aukes, assistant professor
Brune Azerd, assistant professor
Alja Bansal, assistant professor
Hugh Barnaby, professor
Hei Ben Amor, assistant professor
Manasa Berthoni, assistant professor
Dhruv Bansal, associate professor
Jennife Blair Christen, associate professor
David Braman, assistant professor
Michael Caplan, associate professor
Janasek Chau, assistant professor
Candace Chan, assistant professor
Andy Chattin, principal lecturer
Adit Chattapadhyay, professor
Anar Chavez, lecturer
Yan Chen, assistant professor
Phil Christensen, Regents’ Professor
Charles Colburn, assistant professor
James Collofello, vice dean and professor
James Conles, senior lecturer
Peter Crozier, professor
Aria Digjado, assistant professor
Shuguang Deng, professor
Heather Emady, assistant professor
Adolfo Escobedo, assistant professor
Erica Forzani, associate professor
Peter Fox, professor
Tijapatalam Ganesh, assistant dean and associate research professor
Sergi Garcia Segura, associate research professor
Emba Gel, associate professor
Stephanie Gillespie, lecturer
David Grau, assistant professor
Matthew Green, assistant professor
Bradley Greger, associate professor
Anny Grewel, lecturer
Stephen Helms-Tillery, associate professor
Jeffrey Klein, assistant professor
Huan Huang, associate professor
Christian Hooper, assistant professor
Kirti Misrolovic, associate professor
Ye Hu, associate professor
Hai-Ping Huang, associate professor
Yang Jiao, associate professor
Nathan Johnson, associate professor
Shawn Jordan, associate professor
Sudarshan Kathiresan, assistant professor
Jennifer Kitchen, assistant professor
Jeffrey Kitchen, assistant professor
Vikram Kodigabagkar, associate professor
Jeffrey La Belle, assistant professor
Mical Lande, associate professor
Huagang Lee, assistant professor
Robert LiKamWa, assistant professor
Mary Laura Lind Thomas, associate professor
Huan Liu, professor
Yongming Liu, professor

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“FUTON’s projects and mentors are diverse and the projects are fun to work on. I had the possibility to try new research areas that I had no personnel to work on, the opportunity to return to basic research mentoring and revise my mentoring style, and got to better know our students.”

— Micah Lande, assistant professor

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“Mentoring is an extremely rewarding experience, and it is the biggest reason I became a faculty member. I enjoy reading FURI students’ reflections and seeing their growth in learning the research process.”

— Heather Emady, assistant professor

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“Connect with your faculty mentors every chance you get as you will be invaluable as mentors even after leaving ASU!”

— Abhishek Dharan

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Where are they now?

Each semester, we invite FURI alumni to share where they are now as they embark on their careers or the pursuit of advanced degrees. They also look back on how FURI helped them build valuable skills, learn about themselves and succeed in their current endeavors. In spring 2018, 145 FURI alumni responded to our survey.

“FURI helped me learn more about my own interests and what path I wanted to pursue after earning my degree. I did my undergraduate research in natural language processing/natural language understanding, and I now work on the Google Assistant. The bit of background I had in NLU has been helpful when working with NLU systems at Google.”

— Amy Baldwin  
FURI Spring ’06–Spring ’09  
Computer Science ’15  
Software Engineer, Google

“FURI was the venue where I first learned how I could advance my own ideas into real, tangible projects.”

— Daniel Bishop  
FURI Spring ’09–Spring ’10  
Biomedical Engineering, Biochemistry ’11  
Emergency Medicine Resident, Mercy St. Vincent’s Medical Center in Toledo, Ohio

“FURI helped me develop a passion for innovative ways to help patients with biomaterials. Many of the ortho cases I saw as a medical student were starting to use concepts I helped study in the lab!”

— Amye Farag  
FURI Fall ’09–Spring ’10  
Biomedical Engineering, Biochemistry ’11  
Emergency Medicine Resident, Mercy St. Vincent’s Medical Center in Toledo, Ohio

Where FURI alumni work

<table>
<thead>
<tr>
<th>Industry</th>
<th>44%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>10%</td>
</tr>
<tr>
<td>Medical school/medicine</td>
<td>7%</td>
</tr>
<tr>
<td>Government</td>
<td>5%</td>
</tr>
<tr>
<td>Startup ventures</td>
<td>4%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
<tr>
<td>Non-profit</td>
<td>1%</td>
</tr>
</tbody>
</table>

FURI alumni also work at

- Amazon, Google, General Mills, the National Renewable Energy Laboratory, Phoenix Children’s Hospital, General Motors, Lockheed Martin, Sandia National Laboratories, Northrop Grumman, NASA, Johnson & Johnson and IBM.

FURI alumni founded 7 startups

- Amazon, Google, General Mills, the National Renewable Energy Laboratory, Phoenix Children’s Hospital, General Motors, Lockheed Martin, Sandia National Laboratories, Northrop Grumman, NASA, Johnson & Johnson and IBM.

Life after FURI

- Obtaining an advanced degree | 26%
- Industry | 44%
- Medical school/medicine | 7%
- Other | 3%
- Government | 5%
- Non-profit | 1%
- Startup ventures | 4%

Want to sponsor undergraduate student research?

- Connect with top undergraduate students interested in research aligned with your industry
- More than 300 students participate annually
- $3,000 will sponsor an individual project for one semester
- Funding support will provide support for project supplies, faculty and student connections

To get started, contact furi@asu.edu
What does it mean to bring an entrepreneurially minded approach to research?

In a dynamic and interconnected world, it is critical for the Fulton Schools to teach a technical skillset along with an entrepreneurial mindset that fosters curiosity, connections and the creation of value (3Cs). Programs such as the Fulton Undergraduate Research Initiative teach students how to apply entrepreneurial thinking to a given career or field, leading to innovative solutions that create extraordinary value.

The entrepreneurial mindset is a problem-solving approach that begins with curiosity about our changing world, connecting information from various research findings, and identifying unexpected opportunities to create value in their project. They synthesize information from multiple sources as well as the discoveries made in their work to develop a deep understanding of the end user involved. Researchers anticipate societal and economic trends to provide valuable solutions for new or improved business opportunities.

KEEN proudly supports FURI and the program’s efforts to instill curiosity, connections and the creation of value into research projects.
“I strongly believe you cannot have a great city without a great school of engineering.”

– Ira A. Fulton

Fueling Innovation

Building Engineers

At Arizona State University, we’ve been educating engineers for Arizona and the world for nearly 60 years. With more than 20,000 students, we are building the engineers of the future and pursuing the discoveries and solutions to challenges facing society.

In 2003, Ira A. Fulton, founder and CEO of Arizona-based Fulton Homes, established an endowment of $50 million in support of ASU’s College of Engineering and Applied Sciences.

His investment served as a catalyst, enabling the development of a dynamic portfolio of strategic initiatives that benefit our students and faculty and the communities where they live and work.

Throughout the years, Ira A. Fulton has remained an active supporter of the school that bears his name. He is a familiar face to students and a regular presence at events such as this semiannual FURI Symposium.