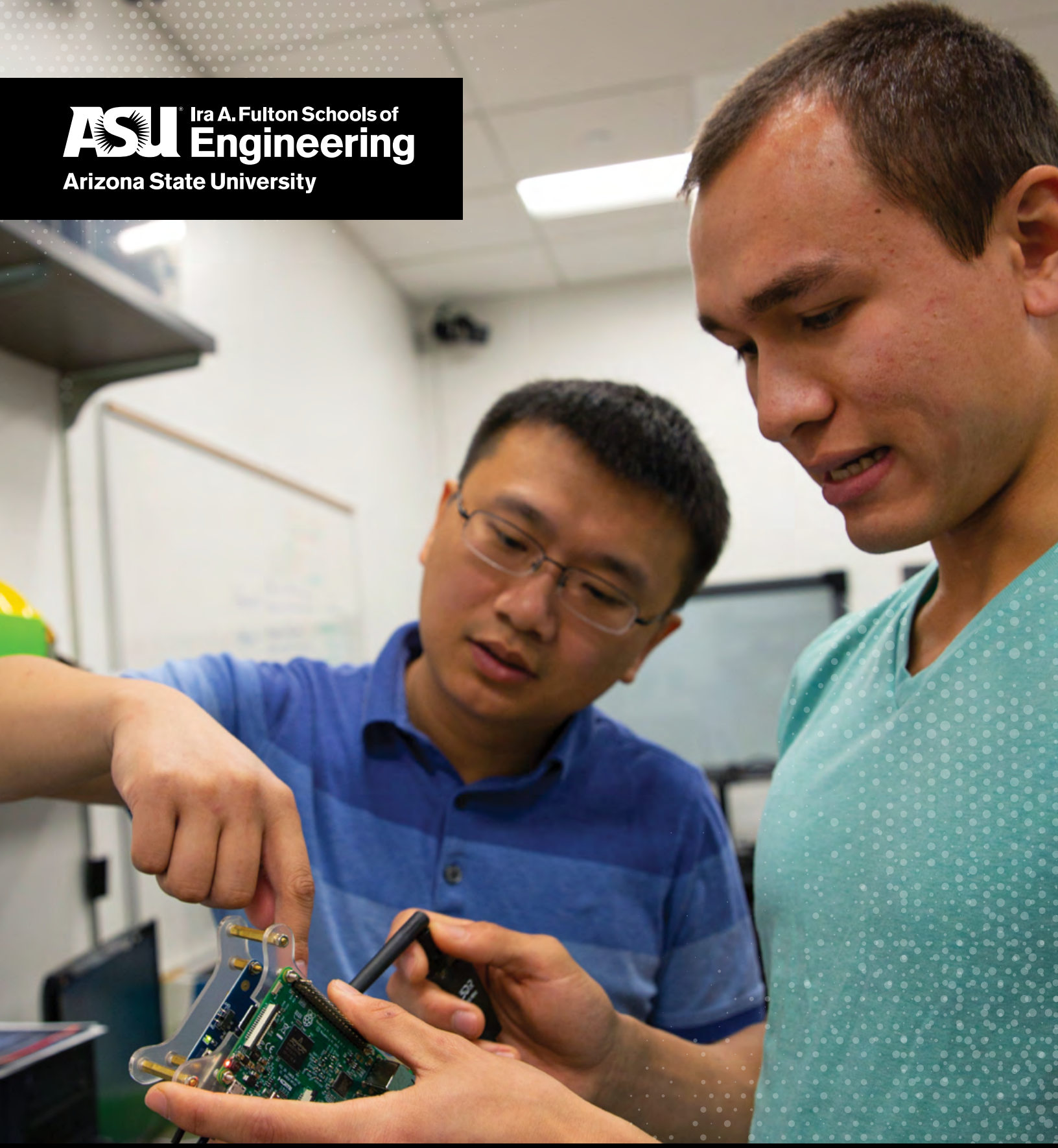


Ira A. Fulton Schools of Engineering
Arizona State University

FURI

Fulton Undergraduate Research Initiative

Spring 2018 Symposium

furi.engineering.asu.edu

The Fulton Difference: Discover. Create. Innovate.

April 20, 2018

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. Squires, PhD
Dean, Ira A. 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

Engineering (Robotics)

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 topological 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.

Snapshot Spring 2018

FURI Mentors 94

FURI Students 155

MORE Mentors 28

MORE Students 33

Majors

45 women

110 men

1 freshman

26 juniors

128 seniors

- Aeronautical Management Technology (UAS) 1
- Aerospace Engineering (Aeronautics) 4
- Aerospace Engineering (Astronautics) 3
- Biomedical Engineering 24
- Chemical Engineering 22
- Civil Engineering 2
- Civil Engineering (Environmental Engineering) 3
- Computer Science 15
- Computer Science (Information Assurance) 1
- Computer Science (Software Engineering) 1
- Computer Systems Engineering 5
- Electrical Engineering 15
- Engineering (Automotive Systems) 2
- Engineering (Electrical Systems) 2
- Engineering (Mechanical Engineering Systems) 1
- Engineering (Robotics) 8
- Engineering Management 1
- Environmental Engineering 1
- Environmental Resource Management 1
- Industrial Engineering 5
- Materials Science and Engineering 7
- Mechanical Engineering (Computational Mechanics) 2
- Mechanical Engineering (Energy/Environment) 1
- Mechanical Engineering 25
- Software Engineering 3

Majors

13 women

20 men

32 master's

- Biomedical Engineering MS 6
- Chemical Engineering MS 5
- Civil/Environmental/Sustainable Engineering MS 3
- Computer Engineering (Computer Systems) MS 1
- Computer Engineering (Electrical Engineering) MS 1
- Computer Science MCS 1
- Computer Science MS 2
- Electrical Engineering MS 4
- Electrical Engineering MSE 1
- Engineering MS 1
- Industrial Engineering MS 2
- Mechanical Engineering MS 6

> **"Involve as many disciplines as you can in your research. Innovation grows on a foundation of interdisciplinary research."**
>
> **— Ramesh Tadayon**
> FURI Spring '15
> **Biomedical Engineering '16**
> *Graduate Student, ASU*

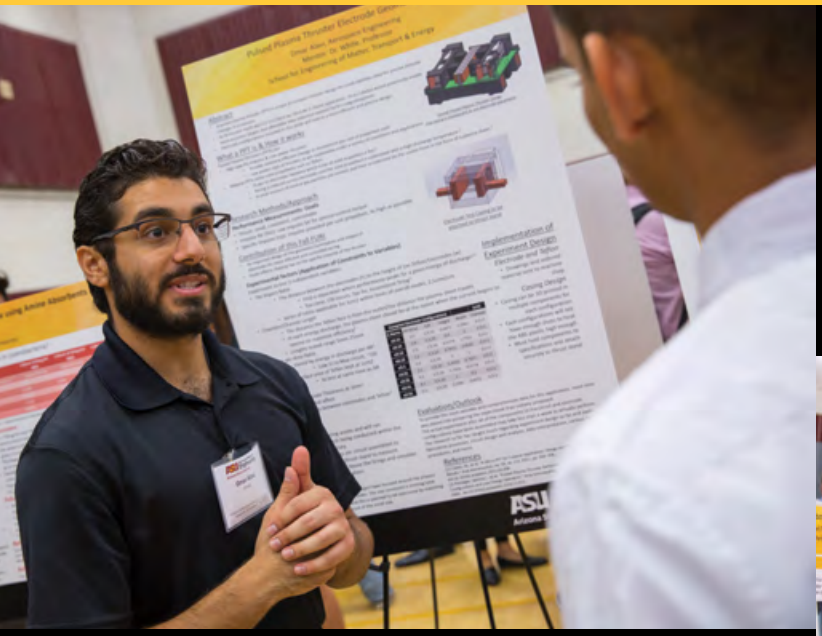
FURI

The Fulton Undergraduate Research Initiative is a signature Fulton Schools program for undergraduate students to conduct research, work in the lab and travel to conferences.

MORE

The Master's Opportunity for Research in Engineering program augments graduate students' engineering education with research and lab experience.

Research opportunities



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.

Grand Challenge Scholars Program (GCSP)

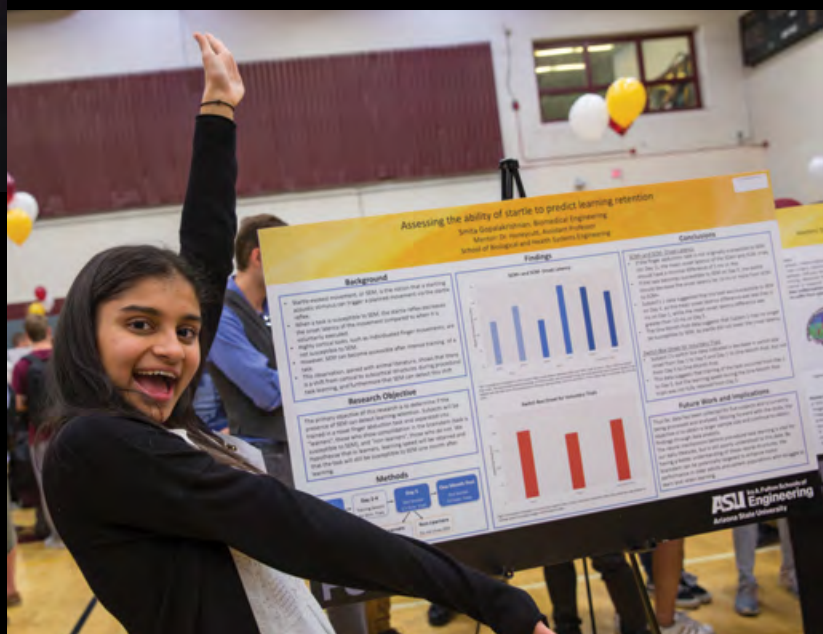
The Fulton Schools Grand Challenge Scholars Program combines innovative curriculum and cutting-edge research experiences into an intellectual fusion that spans academic disciplines and includes entrepreneurial, global and service learning opportunities. Students in the Grand Challenge Scholars Program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

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.

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.



How do you get started?

"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

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.

What you'll learn from FURI orientation:

- Understand 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
links.asu.edu/undergrad-research

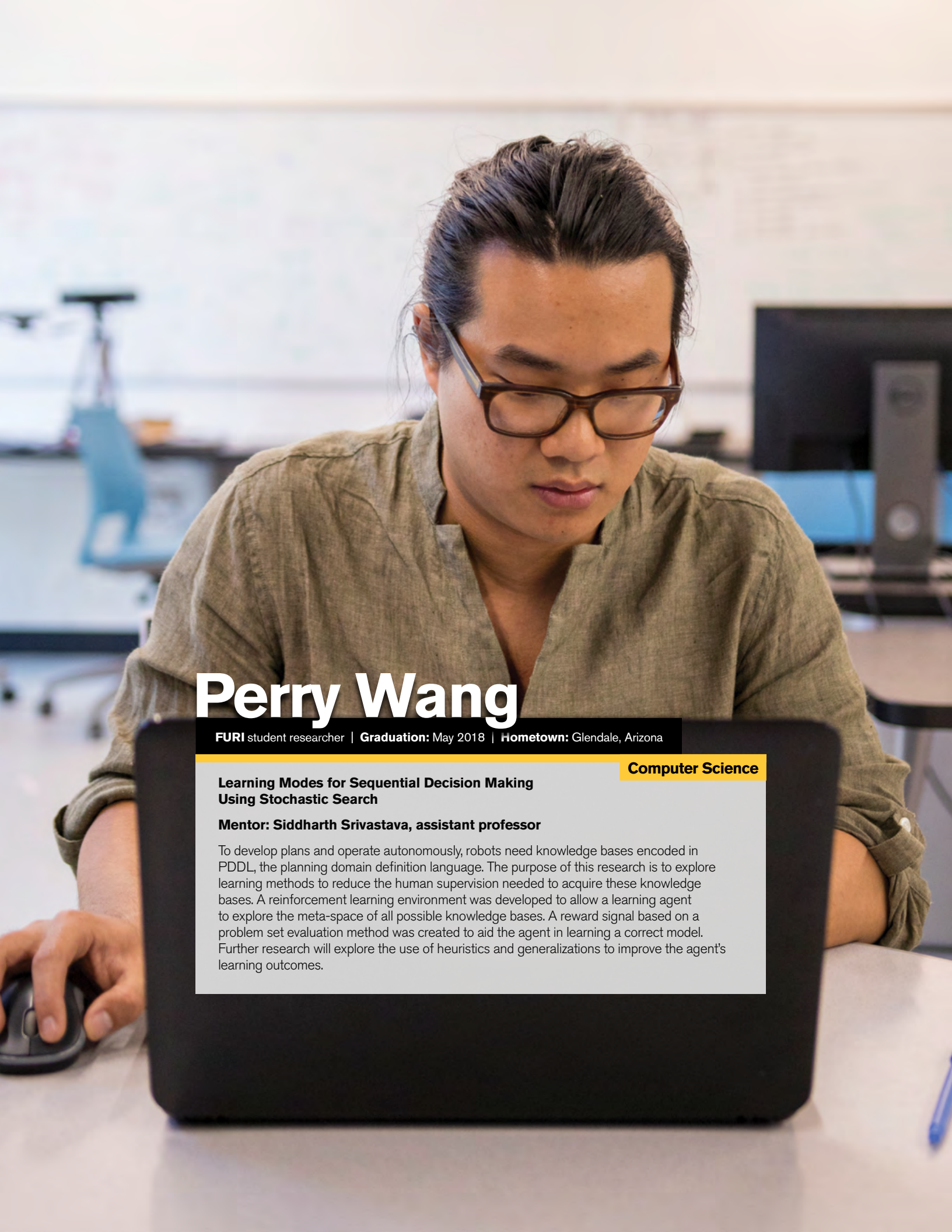
Contact the Fulton Undergraduate Research Initiative office at **furi@asu.edu** with questions or if you need advice on next steps.

Find research opportunities at

links.asu.edu/ FURI-research

Find out more about the research presented at this semester's FURI Symposium

furi.engineering.asu.edu



Perry Wang

FURI student researcher | **Graduation:** May 2018 | **Hometown:** Glendale, Arizona

Computer Science

Learning Modes for Sequential Decision Making Using Stochastic Search

Mentor: Siddharth Srivastava, assistant professor

To develop plans and operate autonomously, robots need knowledge bases encoded in PDDL, the planning domain definition language. The purpose of this research is to explore learning methods to reduce the human supervision needed to acquire these knowledge bases. A reinforcement learning environment was developed to allow a learning agent to explore the meta-space of all possible knowledge bases. A reward signal based on a problem set evaluation method was created to aid the agent in learning a correct model. Further research will explore the use of heuristics and generalizations to improve the agent's learning outcomes.

Education

Society needs more engineers. We are engaged in advancing the ways we educate engineering students. The Fulton Schools' research focuses on learning methods, cognitive theory and best teaching practices, as well as the integration of engineering concepts in K-12 educational programs to engage students early and educate our community about the impact that engineering has on everyday life.

FURI student researchers

Anas **Arafat '18**
Industrial Engineering
Hometown: Al-Hudaydah, Yemen
Student Retention
Mentor: Linda Chattin, principal lecturer

Austin **Armstrong '19**
Engineering (Robotics)
Hometown: Phoenix, Arizona
Camera Positional Robotic Arm
Mentor: Angela Sodemann, assistant professor

Alireza **Bahremand '18**
Software Engineering
Hometown: Detroit, Michigan
Inside-Out Tracking with Redirected Walking for Free World Mobile Virtual Reality Navigation
Mentor: Robert LiKamWa, assistant professor

Andrew **Carlson '19**
Engineering (Robotics)
Hometown: Chandler, Arizona
Low-Cost Sensing
Mentor: Daniel Aukes, assistant professor

Diana **Chen '19**
Computer Science
Hometown: Darien, Illinois
Enhancing Interdisciplinary Thinking in Co-Curricular Programs
Mentors: Tirupalavanam Ganesh, associate research professor, and Amy Trowbridge, senior lecturer

Ryan **Christensen '19**
Computer Science
Hometown: Chandler, Arizona
Learning Modes for Sequential Decision Making Using Stochastic Search
Mentor: Siddharth Srivastava, assistant professor

Carolyn **Christie '18**
Electrical Engineering
Hometown: Scottsdale, Arizona
Design and Development of a Precision Robotic Thrower and a Smart Target
Mentor: Armando Rodriguez, professor

Galen **Kingsley '18**
Aerospace Engineering
Hometown: Mesa, Arizona
Aerodynamics of Propulsion
Mentor: Timothy Takahashi, professor of practice

Caroline **Kireopoulos '20**
Mechanical Engineering
Hometown: Scottsdale, Arizona
Service Learning and Retention in Undergraduate Engineering
Mentor: Stephanie Gillespie, lecturer

Corey **Kurowski '19**
Electrical Engineering
Hometown: Tolleson, Arizona
Image Processing and Tracking in Underwater Low-Light Conditions
Mentor: Armando Rodriguez, professor

James **Larson '18**
Engineering (Electrical Systems)
Hometown: Incline Village, Nevada
Adaptive Expertise in Embedded Systems Design
Mentors: Shawn Jordan, associate professor, and Micah Lande, 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 Chattin, principal lecturer

Ashley **Satkowski '19**
Computer Science
Hometown: Okinawa, Japan
Spatiotemporal Framework for Dynamic Merged Reality Content Creation
Mentor: Robert LiKamWa, assistant professor

Aashiq **Shaikh '20**
Computer Science
Hometown: Cupertino, California
Using Prefetching 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 McDaniel, assistant research professor

Jonacarl **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 McDaniel, assistant research professor

Trae **Waggoner '18**
Computer Science
Hometown: Tempe, Arizona
App Development for Intelligent Interactive Adaptive Learning Systems: Algebra Made Wonderful!
Mentor: Armando Rodriguez, professor

ASU Kern Project KEEN supported students

Alex **Bertram '20**
Electrical Engineering
Hometown: New York, New York
NASA Space Grant Robotics
Mentor: Ryan Meuth, lecturer

Lemlem **Brook '18**
Biomedical Engineering
Hometown: Phoenix, Arizona
National Association of Engineering Student Councils Engineering Leadership Summit
Mentor: James Collofello, professor

Ryan **Fagan '19**
Aerospace Engineering
Hometown: Peoria, Arizona
Handheld IR Spectrometer
Mentor: Phil Christensen, professor

Jacob **Knaup '19**
Engineering (Robotics)
Hometown: Queen Creek, Arizona
Developing an Educational Robotic Platform
Mentor: Daniel Aukes, assistant professor

Jun **Sasaki '19**
Engineering (Mechanical Engineering Systems)
Hometown: Wailuku, Hawaii
Society of Automotive Engineering Baja Competition
Mentor: James Contes, senior lecturer

Brent **Wallace '20**
Electrical Engineering
Hometown: Phoenix, Arizona
2018 Spaceport America Cup
Mentor: Anoop Grewal, lecturer

GCSP student researcher

Kiana **Ghazouli '18**
Computer Science
Hometown: Redwood City, California
Impact of Time Constraints on HackerRank Assessments
Mentor: Robert Atkinson, associate professor

MORE student researchers

Siddhant **Prakash '18**
Computer Science
Hometown: Bhagalpur, Bihar, India
Real-time Illumination Estimation for Mobile Augmented Reality
Mentor: Robert LiKamWa, assistant professor

Ragini **Sistla '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

"Doing research on a subject outside of my major helped me keep an open mind about the different opportunities in engineering."

— Isaias Martinez
FURI Spring '13
Aerospace Engineering '14
Mechanical Engineer, Raytheon

Nathan Rodkey

FURI student researcher | **Graduation:** May 2018 | **Hometown:** Tempe, Arizona

Electrical Engineering

Porous Silica Films as Thermally Insulating Coatings on Windows

Mentor: Zachary Holman, assistant professor

The deposition of transparent, porous silica films as thermally insulating coatings on windows will help reduce energy costs in buildings and homes. Ninety percent porous silica has been characterized by its thermal and optical properties showing surprisingly low conductivities compared to estimates. Film adhesion, stress and transparency have shown to be major hurdles during the development of these coatings and will be the focus of future work.

FURI student researchers

Omar **Alavi '20**
Aerospace Engineering
Hometown: Houston, Texas
Pulsed Plasma Thruster Magnetic Field Study
Mentor: Daniel White, lecturer

Alexander **Bravenec '18**
Materials Science and Engineering
Hometown: Huachuca City, Arizona
Building a Vapor Phase Photoreactor for Photocatalytic Water Splitting
Mentor: Peter Crozier, professor

Ci **Brouillard '18**
Chemical Engineering
Hometown: Wuhan, Hubei, China
Characterization of Flow Properties of Wet Particle Using the FT4 Powder Rheometer
Mentor: Heather Emady, assistant professor

Nicolas **Campbell '18**
Mechanical Engineering
Hometown: Phoenix, Arizona
Ultrasound-Enhanced Desorption
Mentor: Patrick Phelan, professor

Sam **Deadrick '19**
Mechanical Engineering
Hometown: Scottsdale, Arizona
Design of a Fully Actuated Self-Driving Car
Mentor: Yan Chen, assistant professor

Timoteo **Diaz '18**
Materials Science and Engineering
Hometown: Mesa, Arizona
Computational Pathways to the Optimal Design of Polymer Processing Routes
Mentor: Kumar Ankit, assistant professor

Anna **Hu '19**
Mechanical Engineering
Hometown: Manhattan, New York
Adhesion of Octopus Bimaculoides
Mentor: Hamidreza Marvi, assistant professor

Everett **Johnson '18**
Electrical Engineering
Hometown: Tempe, Arizona
Novel Solar Array Interface Electronics for Maximum PV Power Extraction
Mentor: Jennifer Kitchen, assistant professor

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.

Mark **Kapron '19**
Electrical Engineering
Hometown: Chandler, Arizona
Suns-VOC Measurements of Semi-Transparent Perovskite Solar Cells
Mentor: Zachary Holman, assistant professor

Kyle **Kingston '18**
Engineering Management
Hometown: Mesa, Arizona
Centrifugal Compressor with Thrust Vector Control for UAV Propulsion
Mentor: Mary Niemczyk, associate professor

Sara **Lee '19**
Chemical Engineering
Hometown: Gilbert, Arizona
Enhancing Inorganic Carbon Absorption and Fixation by Cyanobacteria using Amine Absorbents
Mentor: David Nielsen, associate professor

Leo **Lin '19**
Mechanical Engineering
Hometown: Chandler, Arizona
The Effects of Shear Modulus on Fouling Rates
Mentor: Konrad Rykaczewski, assistant professor

Nikki **Lopez '19**
Mechanical Engineering
Hometown: Glendale, Arizona
Development of a Ground Robot with a Simultaneous Localization and Mapping (SLAM) Capability
Mentor: Armando Rodriguez, professor

Trevor **Lucero '19**
Mechanical Engineering Systems
Hometown: Lakewood, Colorado
Optimizing Control Strategies for Hybrid Electric Vehicles to Reduce Fuel Consumption and Idling Times
Mentor: Abdel Mayyas, assistant professor

Karim **Mardambek '19**
Civil Engineering
Hometown: Gilbert, Arizona
Fracture Toughness vs. Salt Content of Ice
Mentor: Christian Hoover, assistant professor

Miles **Miller '18**
Engineering (Automotive Systems)
Hometown: Ramona, California
CoP Fleet Performance and Environmental Impact Evaluation
Mentor: Jeffrey Wishart, clinical assistant professor

Philip **Mulford '19**
Aerospace Engineering
Hometown: Warrenton, Virginia
Viability Study for a 2-Degree-of-Freedom Canfield Joint for Spacecraft Attitude Control Application
Mentor: Daniel White, lecturer

Corbin **Ott '18**
Electrical Engineering
Hometown: Indianapolis, Indiana
Perovskite Surface Analysis
Mentor: Zachary Holman, assistant professor

Neil **Rastogi '19**
Chemical Engineering
Hometown: Chandler, Arizona
Selective Electro-Fermentation of Scenedesmus Acutus
Mentor: Bruce Rittmann, professor

Thembelihle **Shongwe '18**
Chemical Engineering
Hometown: Manzini, Swaziland
Converting Industrial Combustion Byproducts to Liquid Transportation Fuels and Environmentally Friendly Nitrogen-containing Compounds
Mentor: Jean Andino, associate professor

Andrew **Swedler '18**
Chemical Engineering
Hometown: Scottsdale, Arizona
Convective Heat Transfer in a Rotary Drum
Mentor: Heather Emady, assistant professor

William Frieden **Templeton '18**
Chemical Engineering
Hometown: Scottsdale, Arizona
Effects of Plasticizers on Solid Rocket Propellant Adhesion
Mentor: Matthew Green, assistant professor

Nicholas **Theut '19**
Chemical Engineering
Hometown: Phoenix, Arizona
Development of ZnSnON as a Potential Earth Abundant Solar Cell Material
Mentor: Mariana Bertoni, assistant professor

Yida **Tong '18**
Mechanical Engineering
Hometown: Xiangyang, Hubei, China
Finite Element Modeling of Micro-scale Bending Testing of Nuclear Reactor Materials
Mentor: Pedro Peralta, professor

Ariana **Tse '19**
Materials Science and Engineering
Hometown: Tempe, Arizona
Nanoporous Morphology of Dealloyed Parent Phase Ordered and Disordered Cu3Au Alloys
Mentor: Karl Sieradzki, professor

Paulo **Vasconcelos '19**
Aerospace Engineering
Hometown: Recife, Pernambuco, Brazil
Using CFD Tools to Determine Aerodynamic Forces and Moments of Floating Objects in Engineering Applications
Mentor: Huei-Ping Huang, associate professor

Justin **Whetten '19**
Materials Science and Engineering
Hometown: Mesa, Arizona
Next-Generation Composite Polymer Solid Electrolytes
Mentor: Candace Chan, assistant professor

GCSP student researcher

Alyssa **Nazareno '18**
Mechanical Engineering
Hometown: Scottsdale, Arizona
In situ SEM Testing for Fatigue Crack Growth: Mechanical Investigation of Titanium
Mentors: Yongming Liu, professor, and Yang Jiao, assistant professor

MORE student researchers

Connor **Copp '18**
Chemical Engineering
Hometown: Queen Creek, Arizona
Process Gas Analysis on Hydrothermal Liquefaction of Algae
Mentor: Shuguang Deng, professor

Daniel **Coxe '18**
Mechanical Engineering
Hometown: Niantic, Connecticut
Turbulent Drag Reduction in Pipes by Spanwise Wall Oscillations
Mentors: Yulia Peet, assistant professor, and Ronald Adrian, professor

Sami **Mian '18**
Computer Engineering (Electrical Engineering)
Hometown: Phoenix, Arizona
Development of a Battery Management and Charging System for Autonomous UAVs
Mentor: Troy McDaniel, assistant research professor

Uyen **Tong '18**
Chemical Engineering
Hometown: Dong Nai, Vietnam
ZIF-71/PDMS Mixed Matrix Membranes for Acetone-Butanol-Ethanol Separations by Pervaporation
Mentor: Mary Laura Lind Thomas, associate professor

Guest presenter

Simol **Shah '18**
Chemical Engineering
Hometown: Mesa, Arizona
Photochemical Transformation on Plasmonic Nanoparticles Via Resonant Radiated-Induced Heating
Mentor: Maxim Sukharev, associate professor

"Try to use your research topic as a launching point into the broader field. You never know where you might end up."

— James Jensen
FURI Fall '13–Spring '14
Aerospace Engineering '14
Research Engineer, NASA

Courtney DuBois

MORE student researcher | **Graduation:** May 2018 | **Hometown:** Chandler, Arizona

Biomedical Engineering

Point-of-Care Mutation Detection in Navajo Neurohepatopathy

Mentor: Michael Caplan, Associate Professor

Navajo neurohepatopathy (NNH) is a fatal genetic disorder often caused by 149G>A mutation in the MPV17 gene. NNH (affecting 1-in-1,600 Navajo babies) is characterized by brain damage and liver disease/failure. Phoenix Children's Hospital currently uses gene sequencing to identify the 149G>A mutation. While this process is conclusive, there are limitations, as it requires both time (three to four weeks) and money (more than $700). Ultimately, these factors create barriers that can directly impact a patient's quality of life. Thus, the researchers propose using Tentacle Probe technology (TP) to develop a sensitive and specific rapid diagnostic tool for accurately detecting the 149G>A mutation.

FURI student researchers

Mahdi **Alharbi '18**
Software Engineering
Hometown: Dhi Qar, Nasiriyah, Iraq
Virtual Reality (VR) for Rehabilitation Therapy of Stroke Parkinson's Disease and Athlete Patients
Mentor: Wenlong Zhang, assistant professor

Mayar **Allam '19**
Biomedical Engineering
Hometown: Cairo, Egypt
Effect of Cancer-Associated Fibroblasts on Breast Cancer Cell Migration Parameters
Mentor: Mehdi Nikkhah, assistant professor

Azza **Amer '20**
Mechanical Engineering
Hometown: Cairo, Egypt
Stability of Ankle Motion in Eversion and Inversion Motion
Mentor: Hyunglae Lee, assistant professor

Jun **An '19**
Mechanical Engineering
Hometown: Chicago, Illinois
Thermal Conductivity of Crystalline Polypyrrole
Mentor: Jay Oswald, assistant professor

James **Arnold '20**
Mechanical Engineering
Hometown: Phoenix, Arizona
The Response of the Human Ankle to Variable Negative Damping
Mentor: Hyunglae Lee, assistant professor

Sara **Belko '18**
Biomedical Engineering
Hometown: Chandler, Arizona
Nanoparticle Delivery through a Resection-Disrupted Blood-Brain Barrier for the Treatment of Glioblastoma
Mentor: Sarah Stabenfeldt, associate professor

Amber **Bennett '18**
Computer Science
Hometown: Fairport, New York
Evaluating the Effect of Visual Stimuli on the Intelligibility of Dysarthric Speech
Mentor: Troy McDaniel, assistant research professor

Jayden **Booth '19**
Electrical Engineering
Hometown: Mesa, Arizona
Wearable Sensor System to Aid in Ankle Rehabilitation
Mentor: Junseok Chae, professor

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, bioassays 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, health monitoring devices and human rehabilitation technologies.

Blake **Browning '19**
Biomedical Engineering
Hometown: Scottsdale, Arizona
Side-Viewing Photoacoustic and Ultrasound Imaging Probe
Mentor: Barbara Smith, assistant professor

Kimberly **Bui '19**
Mechanical Engineering
Hometown: Phoenix, Arizona
Developing Prosthesis for Children with Disabilities to Participate in Sports
Mentor: Armando Rodriguez, professor

Abigail **Call '20**
Chemical Engineering
Hometown: Scottsdale, Arizona
Comparative Assessment of DARPin and scFv for Neurodegenerative Disease Diagnostics
Mentor: Michael Sierks, professor

Andy **Chang '18**
Chemical Engineering
Hometown: Tempe, Arizona
Adaptation of Laser Activated Sutures for Intestinal Surgeries via Chemical Cross-linking
Mentor: Kaushal Rege, professor

Matthew **Chrest '19**
Biomedical Engineering
Hometown: Murrieta, California
Photoacoustic Flow Cytometry
Mentor: Barbara Smith, assistant professor

Bryce **Copenhaver '20**
Engineering (Robotics)
Hometown: Tucson, Arizona
Development of an Independent Compact Air Compression System for Soft Robotic Actuation
Mentor: Panagiotis Polygerinos, assistant professor

Nguyen **Dang Xuan '18**
Environmental Resource Management
Hometown: Hanoi, Vietnam
Potential Effect of Prolonged Weathering on Heavy Metal Leaching from Heavy-Metal-Treated-Wood
Mentor: Kiril Hristovski, associate professor

Samjhana **Devkota '18**
Computer Science
Hometown: Glendale, Arizona
Perception of Emotions Based on Tactile Facial Action Units by Individuals Who are Blind
Mentor: Troy McDaniel, assistant research professor

Carlye **Frisch '20**
Biomedical Engineering
Hometown: Scottsdale, Arizona
Progerin-Induced Aging to Develop a Human-Induced Pluripotent Stem Cell Model of Alzheimer's Disease
Mentor: David Brafman, assistant professor

Aundre **Garcia '19**
Engineering (Robotics)
Hometown: Woolwich, England
A Higher-Quality Haptic Display
Mentor: Angela Sodemann, assistant professor

Tiffany **Gong '18**
Biomedical Engineering
Hometown: Mesa, Arizona
The Development of a Multi-Marker Sensor for Patients with Diabetes Mellitus
Mentor: Jeffrey La Belle, assistant professor

Smita **Gopalakrishnan '20**
Biomedical Engineering
Hometown: Tempe, Arizona
Assessing the Ability of Startle to Predict Learning Retention
Mentor: Claire Honeycutt, assistant professor

Shannon **Grassi '19**
Biomedical Engineering
Hometown: Gilbert, Arizona
Human Neural Progenitor Cell Transplantation Sustainment and Maturation with Immunodeficient Mice
Mentors: Sarah Stabenfeldt, associate professor, and David Brafman, assistant professor

Xianfan **Gu '18**
Electrical Engineering
Hometown: Guangzhou, Guangdong, China
Energy-Free Personal Security Wristband
Mentor: Yi Ren, assistant professor

Hawley **Helmbrecht '18**
Chemical Engineering
Hometown: Phoenix, Arizona
Diagnostic Methods for Detecting Microvillus Inclusion Disease
Mentor: Michael Caplan, associate professor

Joshua **Hsu '19**
Biomedical Engineering
Hometown: Tempe, Arizona
Integrated Sensing for a Soft Neuroprosthetic
Mentor: Panagiotis Polygerinos, assistant professor

Zachary **Humphreys '19**
Biomedical Engineering
Hometown: Corvallis, Oregon
Clinical Imaging Post-Processing to Improve Surgery in Focal Cortical Dysplasia Cases
Mentor: Vikram Kodibagkar, associate professor

Ladan **Kamali Sarvestnai '18**
Biomedical Engineering
Hometown: Shiraz, Iran
Quantifying Post-Surgical Brain Shift to Improve Multi-Modal Imaging Application in Surgical Treatment of Epilepsy
Mentor: Vikram Kodibagkar, associate professor

Itai **Kreisler '18**
Biomedical Engineering
Hometown: Tucson, Arizona
Analyzing Gait Perturbations to Assess Variability in Dynamic Stability for Fall Risk Assessment
Mentor: Thurmon Lockhart, professor

Minh **Le '18**
Chemical Engineering
Hometown: Long Khanh, Vietnam
Chemical Gradient Fabrication through Electrospinning
Mentor: Julianne Holloway, assistant professor

Lynsey **Lehmann '20**
Mechanical Engineering
Hometown: Phoenix, Arizona
Investigating Leg Prosthesis Kinematics for Walking on Surfaces of Different Compliance
Mentor: Panagiotis Artemiadis, associate professor

Kyle **Lewis '19**
Engineering (Robotics)
Hometown: Phoenix, Arizona
Soft Robotics: A Quasi-Passive Knee Brace to Assist in Lifting
Mentor: Thomas Sugar, professor

Jinglin **Liu '18**
Biomedical Engineering
Hometown: Xi'an, China
Data Process Methods in the Design of Pressure Monitoring System for Scoliosis Fusion Surgery
Mentor: Jeffrey La Belle, assistant professor

Christopher **Lue Sang '18**
Electrical Engineering
Hometown: Mesa, Arizona
Soft Robotic Control System
Mentor: Junseok Chae, professor

James **Lyon '19**
Engineering (Robotics)
Hometown: Rockford, Illinois
All in the Hips: Exoskeletal Design for Occupational Lift-Support and Rehabilitation
Mentor: Thomas Sugar, professor

Adriana **Moya '19**
Chemical Engineering
Hometown: Tempe, Arizona
The Effects of Advanced Glycation End-Products and Type 2 Diabetes on Bone Regeneration
Mentor: Julianne Holloway, assistant professor

Andrew **Nelson '19**
Biomedical Engineering
Hometown: Albuquerque, New Mexico
Active Temperature Management for Transtibial Prosthetic Sockets
Mentor: Jeffrey La Belle, assistant professor

Elliot **Nester '20**
Computer Systems Engineering
Hometown: Tempe, Arizona
A Deep Learning Autoencoder for EMG Changepoint Recognition in Robotic Applications
Mentor: Heni Ben Amor, assistant professor

"FURI taught me how to deal with failure. Research is tough, but once you make a breakthrough, the feeling is indescribable."

— Michael Garcia
Fall '08–Fall '09
Aerospace Engineering '09
Lead Mechanical Design Engineer, SpaceX

Health

Gerrit **Orthlieb '18**
Biomedical Engineering
Hometown: San Jose, California
The Effect of Vibrotactile Stimulation on Upper Limb Proprioceptive Map Characteristics
Mentor: Stephen Helms-Tillery, associate professor

Christopher **Pina '18**
Biomedical Engineering
Hometown: Dover, Delaware
Design and Development of a Safe and Effective Upper Gastrointestinal Foreign Body Extraction Device
Mentors: Barbara Smith, assistant professor, and Bradley Greger, associate professor

Luc **Reboulet '18**
Electrical Engineering
Hometown: Chandler, Arizona
MYO Integrated Hand Prosthesis
Mentor: Chao Wang, assistant professor

Levi **Riley '19**
Biomedical Engineering
Hometown: Yuma, Arizona
Norepinephrine and Adenosine Infused Microparticles for Brown Adipose Tissue Stimulation
Mentor: Brent Vernon, associate professor

Wei Wei **Robinson '18**
Chemical Engineering
Hometown: San Tan Valley, Arizona
Modeling Extracellular Matrix (ECM) Reorganization Due to Cell-ECM Mechanical Interactions
Mentor: Yang Jiao, assistant professor

Aashiq **Shaikh '20**
Computer Science
Hometown: Cupertino, California
Using Prefetching Algorithms to Seamlessly Download Data
Mentor: Robert LiKamWa, assistant professor

Fangchi **Shao '19**
Biomedical Engineering
Hometown: Linyi, China
Cortical Contributions of Sensory Gaiting to Voluntary Movement: A Somatosensory Evoked Potential Study
Mentor: Marco Santello, professor

Nandini **Sharma '20**
Biomedical Engineering
Hometown: Phoenix, Arizona
Managing Respiratory Disease with Wearable Devices
Mentor: Jennifer Blain Christen, associate professor

David **Shumate '18**
Biomedical Engineering
Hometown: Phoenix, Arizona
The Effects of Electrotactile Stimulation over Multiple Feedback Sites through Proprioceptive Mapping
Mentor: Stephen Helms-Tillery, associate professor

Casey **Silva '19**
Biomedical Engineering
Hometown: Tempe, Arizona
Elucidation of Stromal Fibroblast and Antifibrotic Drug on Chemo Resistance Within a 3D Model
Mentor: Mehdi Nikkhah, assistant professor

Esther **Sim '20**
Biomedical Engineering
Hometown: Scottsdale, Arizona
Generation of an Inducible CRISPR/dCas9-KRAB System to Modulate Gene Expression
Mentor: David Brafman, assistant professor

Sean **Slamka '18**
Computer Systems Engineering
Hometown: Gilbert, Arizona
Design and Implementation of an Internet-of-Things (IoT) Based Activity Tracker for Pet Care
Mentor: Fengbo Ren, assistant professor

Bhavica **Soni '19**
Engineering Management
Hometown: Somerton, Arizona
Development of Multi-Sensor Intelligent Embedded System to Assist the Blind with Mobility and Environmental Awareness
Mentor: Armando Rodriguez, professor

Curtis **Sparks '19**
Engineering (Robotics)
Hometown: Libertyville, Illinois
Development of an Assistive Soft Robotic Device
Mentor: Panagiotis Polygerinos, assistant professor

Mark **Sprowls '18**
Chemical Engineering
Hometown: Tempe, Arizona
Acetone: A Promising Biomarker for Human Fat Metabolism
Mentor: Erica Forzani, associate professor

Bradley **Taylor '20**
Biomedical Engineering
Hometown: Scottsdale, Arizona
Parallel Exo-Skeletal Vehicle
Mentor: Jeffrey La Belle, assistant professor

Robert **Tichy '19**
Mechanical Engineering
Hometown: Chicago, Illinois
Soft Robotic Mobility Device
Mentor: Panagiotis Polygerinos, assistant professor

Jaffalie **Twaibu '19**
Biomedical Engineering
Hometown: Lilongwe, Malawi
Blood-Based Mass Spectrometry Assay for Rapid Diagnosis and Treatment Monitoring of Tuberculosis
Mentor: Ye Hu, associate professor

Conor **Yates-Koch '18**
Computer Science
Hometown: Glendale, Arizona
Development and Analysis of Reward-Adaptive Reinforcement Learning Agents
Mentor: Troy McDaniel, assistant research professor

Junmin **Zhong '20**
Electrical Engineering
Hometown: Nanjing, Jiangsu, China
Cervical Cancer Detector
Mentor: Junseok Chae, professor

ASU Kern Project KEEN supported students

Patrick **McFarland '18**
Biomedical Engineering
Hometown: Peoria, Arizona
Korwave: Wearable, Seizure Detection Headband
Mentor: Brent Sebold, lecturer

GCSP student researchers

Framarz **Alam '18**
Biomedical Engineering
Hometown: Phoenix, Arizona
Measuring Failure Load of Lumbar Spinous Processes to Transverse Mechanical Forces
Mentor: Jitendran Muthuswamy, associate professor

Stephen **Lane '19**
Biomedical Engineering
Hometown: Marietta, Georgia
Vagus Nerve Stimulation To Treat Oromotor Dysfunction in a Rat Model of Parkinson's Disease
Mentor: Jeffrey Kleim, associate professor

Miles **Mabey '19**
Engineering (Robotics)
Hometown: Prescott, Arizona
ASU Rise Lab's Self Balancing Bicycle
Mentor: Wenlong Zhang, assistant professor

Ethan **Marschall '18**
Biomedical Engineering
Hometown: Mesa, Arizona
Sensor Efficacy in Measuring Bone Depth for Neurosurgical Applications
Mentor: Jitendran Muthuswamy, associate professor

MORE student researchers

Tanner **Bitz '19**
Mechanical Engineering
Hometown: Albany, Oregon
Modeling the Voluntary Reflex of the Human Ankle
Mentor: Hyunglae Lee, assistant professor

Raquel **Camarena '18**
Industrial Engineering
Hometown: Chandler, Arizona
Stochastic Modeling and Optimization to Improve Identification and Treatment of Alzheimer's Disease
Mentor: Giulia Pedrielli, assistant professor, senior sustainability scientist

Andrew **Cook '18**
Mechanical Engineering
Hometown: Phoenix, Arizona
Evaluating the Effects of a Negatively-Damped Ankle-Foot Orthosis on Gait
Mentor: Hyunglae Lee, assistant professor

Andrew **D'Arcangelis '19**
Chemical Engineering
Hometown: Phoenix, Arizona
Developing Novel 3D Printed Hydrogel-based Bioinks
Mentor: Julianne Holloway, assistant professor

Diane **Flores '18**
Engineering
Hometown: Gilbert, Arizona
Haptic Vision Substitution
Mentor: Angela Sodemann, assistant professor

Bineeta **Gupta '18**
Computer Science
Hometown: Gorakhpur, Uttar Pradesh, India
Chat-Box as Mood Analyzer for Individuals with Social Interaction Disabilities
Mentor: Troy McDaniel, assistant research professor

Vaibhav **Jhawar '18**
Mechanical Engineering
Hometown: Hyderabad, Telangana, India
Design of Compact Lower Limb Exoskeleton for Gait Assistance
Mentor: Wenlong Zhang, assistant professor

Lindsey **Macias '18**
Biomedical Engineering
Hometown: Gilbert, Arizona
In Vitro Cell Culture Model on the Influence of Advanced Glycation End-Products and Type 2 Diabetes
Mentor: Julianne Holloway, assistant professor

Kishen **Mahadevan '18**
Electrical Engineering
Hometown: Bangalore, Karnataka, India
Implementation of Self Adjustable Treadmill
Mentor: Hyunglae Lee, assistant professor

Daylin **Morgan '18**
Biomedical Engineering
Hometown: Tempe, Arizona
Large Scale Expansion and Differentiation of Pluripotent Stem Cell-Derived Neural Progenitor Cells from Amyotrophic Lateral Sclerosis Patients
Mentor: David Brafman, assistant professor

Harini **Muralikrishnan '18**
Chemical Engineering
Hometown: Glen Allen, Virginia
Aminoglycoside Polymers in Combination Treatments for Triple Negative Breast Cancer (TNBC) Studies
Mentor: Kaushal Rege, professor

Niveditha **Muthukrishnan '18**
Biomedical Engineering
Hometown: Chennai, Tamilnadu, India
Evaluation of a Soft-Robotic Knee Exosuit for Stair ascent
Mentor: Panagiotis Polygerinos, assistant professor

Karime **Jocelyn Rosas Gomez '18**
Biomedical Engineering
Hometown: Mexico City, Mexico
Bioresponsive Copolymers of Poly (N-isopropylacrylamide) with Enzyme-Dependent Lower Critical Solution Temperatures
Mentor: Brent Vernon, associate professor

Gaurav **Srivastava '18**
Computer Engineering (Electrical Engineering)
Hometown: Lucknow, Uttar Pradesh, India
Training Deep Neural Networks with Quantization and Structured Sparsity
Mentor: Jae-Sun Seo, assistant professor

Yuka **Sugamura '18**
Biomedical Engineering
Hometown: Yokohama, Japan
Development of a Conductive Injectable Hydrogel for Cardiac Tissue Engineering
Mentor: Mehdi Nikkhah, assistant professor

Vishwa **Vasani '19**
Industrial Engineering
Hometown: Ahmedabad, India
Application of Axiomatic Distance Calculation of Incomplete Rankings in Genomics
Mentor: Adolfo Escobedo, assistant professor

Guest presenter

Yegor **Zenkov '20**
Materials Science and Engineering
Hometown: Chandler, Arizona
Electrocatalytic and Optical Properties of Various Hydrogen-Production Catalysts Immobilized at a Polymer-nanoITO Interface
Mentor: Gary Moore, assistant professor

Maeve Kennedy

GCSP student researcher | **Graduation:** May 2020 | **Hometown:** Mesa, Arizona

Chemical Engineering

Mechanical Characterization of 3D Porous Electrospun Nanoscaffolds to Optimize Tissue Regenerative Response

Mentor: Vincent Pizziconi, associate professor

Bioengineering the cell microenvironment is critical when developing cell-based therapeutic devices for regenerative medicine. The focus of this project is to characterize the micromechanical 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 nanomechanically 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

Mechanical Engineering

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.

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, cyberwarfare and more, devising technology solutions as well as legal, policy and social implications.

FURI student researchers

Clayton **Bliss '20**
Mechanical Engineering
Hometown: Tijeras, New Mexico
How Surface Roughness Affects Interfacial Strength of Steel and Ice
Mentor: Jay Oswald, assistant professor

Brandon **Dawson '18**
Aerospace Engineering
Hometown: Peoria, Arizona
Aerodynamic Propeller Modelling
Mentor: Wenlong Zhang, assistant professor

Nicholas **Debeurre '18**
Computer Science
Hometown: Scottsdale, Arizona
Efficient Hash Family Creation and Implementation
Mentor: Charles Colbourn, professor

Aditya **Deotale '18**
Computer Science
Hometown: Chandrapur, Maharashtra, India
What's up with Privacy?: User Preferences and Privacy Concerns in Intelligent Personal Assistants
Mentor: Subbarao Kambhampati, professor

Breydan **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 Chalcogenide Nanocomposites
Mentor: Sefaattin Tongay, assistant professor

Collin **Foster '18**
Mechanical Engineering
Hometown: Tucson, Arizona
Damage Tolerant Design Guidelines for Seamless Carbon Fiber Composite Structures for Pressurized Cylinders
Mentors: Aditi Chattopadhyay, professor, and Masoud Yekani Fard, assistant research professor

Arminta Claire **Jordan '19**
Mechanical Engineering
Hometown: Gilbert, Arizona
Effects of Thermal Deformation in Constrained Sheet Metal
Mentor: Timothy Takahashi, 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

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

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

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

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

Bryce **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 Quadcopter with a Go-Ahead Audio-Visual Support Capability
Mentor: Armando Rodriguez, professor

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

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

Cesar **Tamayo '20**
Computer Systems Engineering
Hometown: Havana, Cuba
Deep Predictive Models for Collision Risk Assessment in Autonomous Driving
Mentor: Heni Ben Amor, assistant professor

Michael **Tucker '18**
Mechanical Engineering
Hometown: Yardley, Pennsylvania
Developing Fatigueless 3-phase Nanocomposite Sensors
Mentor: Masoud Yekani Fard, assistant research professor

MORE student researchers

Sai **Doddalla '18**
Computer Engineering (Electrical Engineering)
Hometown: Tenali, Andhra Pradesh, India
Around the Corner Imaging at Terahertz
Mentor: Georgios Trichopoulos, assistant professor

Karthik **Kambam '18**
Electrical Engineering
Hometown: Tirupati, Andhra Pradesh, India
Algorithms for Learning, Cooperation and Coordination of Multi-Agent Systems in the Presence of Uncertainties
Mentor: Wenlong Zhang, assistant professor

Bharath **Kashyap '18**
Electrical Engineering
Hometown: Hassan, Karnataka, India
Wearable Antenna System for Touchless Gesture Recognition and Interaction
Mentor: Georgios Trichopoulos, assistant professor

Mahmoud **Sakr '18**
Electrical Engineering
Hometown: Cairo, Egypt
Compact Terahertz Real-Time Imaging System
Mentor: Georgios Trichopoulos, assistant professor

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

— Mariela Robledo
FURI Summer '11–Spring '13
Chemical Engineering '13
Senior Manufacturing Supervisor, Medtronic

Emily Alcazar

FURI student researcher | **Graduation:** May 2019 | **Hometown:** Gilbert, Arizona

Civil Engineering

3D Printed Concrete

Mentor: Narayanan Neithalath, professor

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 construction. During the spring 2018 semester, successful prints have been made while focusing on the rheology parameters of the mix. To analyze the small-scale 3D printed samples, scans were conducted to represent the prints as point clouds. MATLAB was used to compare the actual prints to the CAD model through identifying the location of the defects. The next step is to develop a perfected printing process for the technology's expansion.

FURI student researchers

Katherine **Adams '18**
Industrial Engineering
Hometown: Arujá, São Paulo, Brazil
An Optimization-Based Tool to Assist Conservation Planning Decisions
Mentor: Jorge Sefair, assistant professor

Alissa **Albrecht '18**
Civil Engineering
Hometown: Sebastian, Florida
Controlling the Selectivity and Permeability of Graphene-based Membrane by Changing the Oxygen Content of Graphene Oxide Sheets
Mentor: Francois Perreault, assistant professor

Alex **Buffington '19**
Chemical Engineering
Hometown: Cape May, New Jersey
The Utilization of Cross-linked Polymer Mesh in Water Filtration to Increase Efficiency
Mentor: Matthew Green, assistant professor

Charles **Cederstrom '19**
Civil, Environmental and Sustainable Engineering
Hometown: Chandler, Arizona
Modeling, Analysis and Decision Making for Coupled Water Systems in the Presence of Significant Uncertainty
Mentor: Armando Rodriguez, professor

Justin **Edberg '19**
Materials Science and Engineering
Hometown: Tempe, Arizona
Pressure Differential Sequestration of Ambient Humidity
Mentors: Paul Westerhoff, professor, and Sergi Garcia Segura, assistant research professor

Nathaniel **Fink '19**
Materials Science and Engineering
Hometown: Baltimore, Maryland
Utilizing Biopolymers with Incorporations of Nanoclays to Develop Sustainable Bioplastics
Mentor: Francois Perreault, assistant professor

Zakk **Giacometti '19**
Computer Systems Engineering
Hometown: Mesa, Arizona
Computer Vision Navigation for Robotic Campus Guide
Mentor: Armando Rodriguez, professor

Don **Hull '19**
Mechanical Engineering
Hometown: Scottsdale, Arizona
Modular Household Aquaponics for Low-Income Families
Mentor: Narciso Macia, associate professor

Arik **Jacobson '18**
Engineering (Automotive Systems)
Hometown: Veradale, Washington
Automotive OEM ESS Evaluation
Mentor: Jeffrey Wishart, clinical assistant professor

Brielle **Januszewski '20**
Civil, Environmental and Sustainable Engineering
Hometown: Phoenix, Arizona
Heavy Hydrocarbon Removal using Ozonation Techniques
Mentor: Bruce Rittmann, professor

Sustainability

The central thrust behind sustainability is the capacity of metropolitan areas to grow and prosper without destroying or depleting natural resources. The Fulton Schools' research focuses on restoring and improving urban infrastructure, access to clean water and air, advanced construction techniques and management, environmental fluid dynamics, transportation planning, as well as geotechnical and geoenvironmental engineering.

Eunsol **Ko '18**
Mechanical Engineering
Hometown: Seoul, South Korea
Drivability Optimization of Continuously Variable Transmission (CVT) for Automobiles by Additional Sensory Inputs: Experimental
Mentor: Anoop Grewal, lecturer

Andrea **Kraetz '19**
Chemical Engineering
Hometown: Scottsdale, Arizona
Leaching and Attrition of Layered Double Hydroxide Sorbents for Selenium Oxoanions
Mentor: Candace Chan, assistant professor

Sonia **Malek '19**
Chemical Engineering
Hometown: Tempe, Arizona
Waste Stream Map of the Phoenix Metropolitan Area
Mentor: Joshua Loughman, lecturer

Alisha **Menon '18**
Electrical Engineering
Hometown: Portland, Oregon
Utilization of Neuromorphic Computing Principles for Designing Biological Neurons in CMOS ICs
Mentor: Hugh Barnaby, professor

Paul **Moon '18**
Mechanical Engineering
Hometown: Mill Creek, Washington
A Productivity Assessment of Pre-Fabrication in Construction
Mentor: David Grau, assistant professor

Lincoln **Mtemeri '19**
Chemical Engineering
Hometown: Sanyati, Zimbabwe
An Investigation to Find and Characterize an Effective Catalyst for the Microbial Fuel Cell (MFC) Cathode That Maximizes the Efficiency of Hydrogen Peroxide Production and Reduces its Decomposition Rate
Mentor: César Torres, associate professor

Ben **Nauroth '20**
Chemical Engineering
Hometown: Cave Creek, Arizona
Metabolically Engineering D-Lactate from Corynebacterium Glutamicum
Mentor: Arul Varman, assistant professor

Njideka **Nnorom '18**
Chemical Engineering
Hometown: Cave Creek, Arizona
Electromagnetic Ion-Exchange Water Treatment
Mentor: Peter Fox, professor

Ozkan **Ozcan '18**
Industrial Engineering
Hometown: Chandler, Arizona
Soybean Robustness Modeling
Mentor: Esma Gel, associate professor

Suparva **Paruthy '18**
Mechanical Engineering
Hometown: New Delhi, India
Effects of Manufacturing Methods on Piezoresistive Properties in Advanced Carbon Nanotube-Based Sensors
Mentor: Masoud Yekani Fard, assistant research professor

Eric **Probst '18**
Mechanical Engineering
Hometown: Chandler, Arizona
Fabrication of Buckypaper Using 3D Printing Technology
Mentor: Masoud Yekani Fard, assistant research professor

Suzanne **Schadel '19**
Environmental Engineering
Hometown: Portland, Oregon
Simulating Interdependent Infrastructure Vulnerability to Projected Demand Increases in Phoenix
Mentor: Nathan Johnson, assistant professor

Gabriella **Schweska '18**
Engineering (Electrical Systems)
Hometown: Tucson, Arizona
An Arizona-Specific, Real-World Driving Emissions Testing Methodology
Mentor: Jeffrey Wishart, clinical assistant professor

Run **Si '18**
Mechanical Engineering
Hometown: Zhengzhou, Henan, China
Tomographic Damage Detection
Mentor: Yongming Liu, professor

Richard **Simpson '19**
Engineering (Robotics)
Hometown: Bountiful, Utah
Micromilling Testbed Interface
Mentor: Angela Sodemann, assistant professor

Steven **Smith '19**
Industrial Engineering
Hometown: Scottsdale, Arizona
Connectivity-Based Reserve Planning Tool
Mentor: Jorge Sefair, assistant professor

Andrew **Sweeney '18**
Mechanical Engineering
Hometown: New Brighton, Minnesota
Shape Memory Polymers Fabricated with Recycled Thermoplastics in 3D Printing
Mentor: Masoud Yekani Fard, assistant research professor

Yugansh **Virmani '18**
Mechanical Engineering
Hometown: Faridabad, Haryana, India
In-Situ ABI Testing of Pipeline Materials
Mentor: Yongming Liu, professor

Tham **Vo '19**
Chemical Engineering
Hometown: Mesa, Arizona
Fouling Performance of ZIF-71/PDMS Membrane
Mentor: Mary Laura Lind Thomas, associate professor

Bassil **Wali '20**
Chemical Engineering
Hometown: Chandler, Arizona
Investigating the Effects of Photocatalytic Cementitious Material on NO
Mentor: Jean Andino, associate professor

Nan **Xu '18**
Aerospace Engineering
Hometown: Chongqing, China
Microstructure-Based Multiaxial Fatigue Analysis
Mentor: Yongming Liu, professor

ASU Kern Project KEEN supported students

Luis **Castillo '18**
Mechanical Engineering Systems
Hometown: Mesa, Arizona
3D Printing Plastic Recycling Machine
Mentor: Aram Chavez, lecturer

YiZhuang "JJ" **Garrard '19**
Engineering (Robotics)
Hometown: Tokyo, Japan
Cost-Effective Surveying Using Multiple Unmanned Aerial Vehicles
Mentor: Wenlong Zhang, assistant professor

Ishan **Pannala '19**
Finance
Hometown: Mesa, Arizona
AZLoop: Arizona SpaceX Hyperloop Competition Team
Mentor: Bradley Rogers, associate professor

Dhruv **Rajani '21**
Computer Science
Hometown: India
Swachh-X: Sustainable Recycling Sorter
Mentor: Ryan Meuth, lecturer

James **Tobin '19**
Engineering (Robotics)
Hometown: Lake Havasu City, Arizona
Lightweight Electric Motorcycle Battery
Mentor: Angela Sodemann, assistant professor

GCSP student researcher

Daniel **Sinclair '20**
Materials Science and Engineering
Hometown: Phoenix, Arizona
Silicon Nanoparticle Layers for Use as Glass Insulation
Mentor: Zachary Holman, assistant professor

MORE student researchers

Rohith **Mathews '18**
Mechanical Engineering
Hometown: Kerala, India
Scalable Manufacturing Processes for Functionalized UV Transparent Nano-Porous Filament
Mentor: Bruno Azeredo, assistant professor

Dillon **Nys '19**
Civil, Environmental and Sustainable Engineering
Hometown: Chandler, Arizona
Disinfection of Water with a UV-Catalyzed TiO2 Reactor
Mentors: Paul Westerhoff, professor, and Shahnawaz Sinha, assistant research professor

Aide **Robles '18**
Engineering
Hometown: Glendale, Arizona
Reductive Dechlorination of Trichloroethene Sustained by Microbial Chain Elongation
Mentor: Anca Delgado, assistant professor

Bharath **Santhanam '18**
Mechanical Engineering
Hometown: Madurai, Tamil Nadu, India
Parametric Design Optimization of Multi-Functional Honeycomb Structures for Additive Manufacturing
Mentor: Dhruv Bhate, associate professor

John **Tindell '18**
Chemical Engineering
Hometown: Gilbert, Arizona
Strain and Process Development for Detoxifying Biomass
Mentor: David Nielsen, associate professor

Zhiwei **Xiao '18**
Civil, Environmental and Sustainable Engineering
Hometown: Shenzhen, China
Sunlight-Induced Structural and Functional Changes in Graphene-Based Composite Materials
Mentor: Francois Perreault, assistant professor

Guest presenter

Aditya **Khuller '19**
Aerospace Engineering
Hometown: New Delhi, India
Mapping Variability in the Medusae Fossae Formation
Mentor: Phil Christensen, professor

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.

Find out more at furi.engineering.asu.edu

Ronald **Adrian**
professor

Jean **Andino**
associate professor

Kumar **Ankit**
assistant professor

Panagiotis **Artemiadis**
associate professor

Robert **Atkinson**
associate professor

Daniel **Aukes**
assistant professor

Bruno **Azeredo**
assistant professor

Ajay **Bansal**
assistant professor

Hugh **Barnaby**
professor

Heni **Ben Amor**
assistant professor

Mariana **Bertoni**
assistant professor

Dhruv **Bhate**
associate professor

Jennifer **Blain Christen**
associate professor

David **Brafman**
assistant professor

Michael **Caplan**
associate professor

Junseok **Chae**
professor

Candace **Chan**
assistant professor

Linda **Chattin**
principal lecturer

Aditi **Chattopadhyay**
professor

Aram **Chavez**
lecturer

Yan **Chen**
assistant professor

Phil **Christensen**
professor

Charles **Colbourn**
professor

James **Collofello**
professor

James **Contes**
senior lecturer

Peter **Crozier**
professor

Anca **Delgado**
assistant professor

Shuguang **Deng**
professor

Heather **Emady**
assistant professor

Adolfo **Escobedo**
assistant professor

Erica **Forzani**
associate professor

Peter **Fox**
professor

Tirupalavanam **Ganesh**
associate research professor

Sergi **Garcia Segura**
assistant research professor

Esma **Gel**
associate professor

Stephanie **Gillespie**
lecturer

David **Grau**
assistant professor

Matthew **Green**
assistant professor

Bradley **Greger**
associate professor

Anoop **Grewal**
lecturer

Stephen **Helms-Tillery**
associate professor

Julianne **Holloway**
assistant professor

Zachary **Holman**
assistant professor

Claire **Honeycutt**
assistant professor

Christian **Hoover**
assistant professor

Kiril **Hristovski**
associate professor

Ye **Hu**
associate professor

Huei-Ping **Huang**
associate professor

Yang **Jiao**
assistant professor

Nathan **Johnson**
assistant professor

Shawn **Jordan**
associate professor

Subbarao **Kambhampati**
professor

Jennifer **Kitchen**
assistant professor

Jeffrey **Kleim**
associate professor

Vikram **Kodibagkar**
associate professor

Jeffrey **La Belle**
assistant professor

Micah **Lande**
assistant professor

Hyunglae **Lee**
assistant professor

Robert **LiKamWa**
assistant professor

Huan **Liu**
professor

Yongming **Liu**
professor

Thurmon **Lockhart**
professor

"Connect with your faculty mentors every chance you get as they will be invaluable as mentors even after leaving ASU."

— Abhishek Dharan
FURI Fall '13–Spring '14
Electrical Engineering '14
Medical Student, Paul L. Foster School of Medicine at Texas Tech University Health Sciences Center El Paso

Joshua **Loughman**
lecturer

Narciso **Macia**
associate professor

Hamidreza **Marvi**
assistant professor

Abdel **Mayyas**
assistant professor

Troy **McDaniel**
assistant professor

Ryan **Meuth**
lecturer

Gary **Moore**
assistant professor

Jitendran **Muthuswamy**
associate professor

Narayanan **Neithalath**
professor

David **Nielsen**
associate professor

Mary **Niemczyk**
associate professor

Mehdi **Nikkhah**
assistant professor

Jay **Oswald**
assistant professor

Giulia **Pedrielli**
assistant professor, senior sustainability scientist

Yulia **Peet**
assistant professor

Pedro **Peralta**
professor

Francois **Perreault**
assistant professor

Patrick **Phelan**
professor

Vincent **Pizziconi**
associate professor

Panagiotis **Polygerinos**
assistant professor

Kaushal **Rege**
professor

Fengbo **Ren**
assistant professor

Yi **Ren**
assistant professor

Andrea **Richa**
professor

Bruce **Rittmann**
professor

Armando **Rodriguez**
professor

Bradley **Rogers**
associate professor

Konrad **Rykaczewski**
assistant professor

Marco **Santello**
professor

Brent **Sebold**
lecturer

Jorge **Sefair**
assistant professor

Jae-Sun **Seo**
assistant professor

Karl **Sieradzki**
professor

Michael **Sierks**
professor

Shahnawaz **Sinha**
assistant research professor

Barbara **Smith**
assistant professor

Angela **Sodemann**
assistant professor

Siddharth **Srivastava**
assistant professor

Sarah **Stabenfeldt**
associate professor

Thomas **Sugar**
professor

Maxim **Sukharev**
associate professor

Timothy **Takahashi**
professor of practice

Mary Laura Lind **Thomas**
associate professor

Sefaattin **Tongay**
assistant professor

César **Torres**
associate professor

Georgios **Trichopoulos**
assistant professor

Amy **Trowbridge**
senior lecturer

Arul **Varman**
assistant professor

Brent **Vernon**
associate professor

Chao **Wang**
senior lecturer

Paul **Westerhoff**
professor

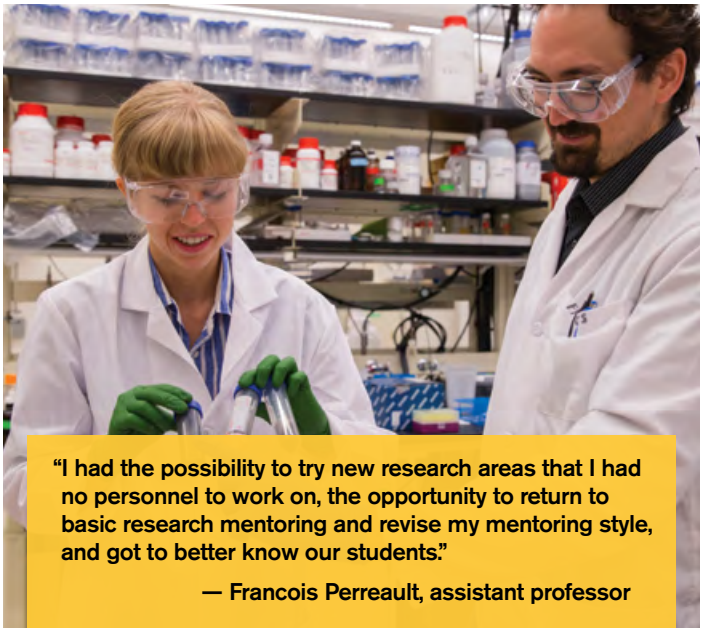
Daniel **White**
lecturer

Jeffrey **Wishart**
clinical assistant professor

Masoud **Yekani Fard**
assistant research professor

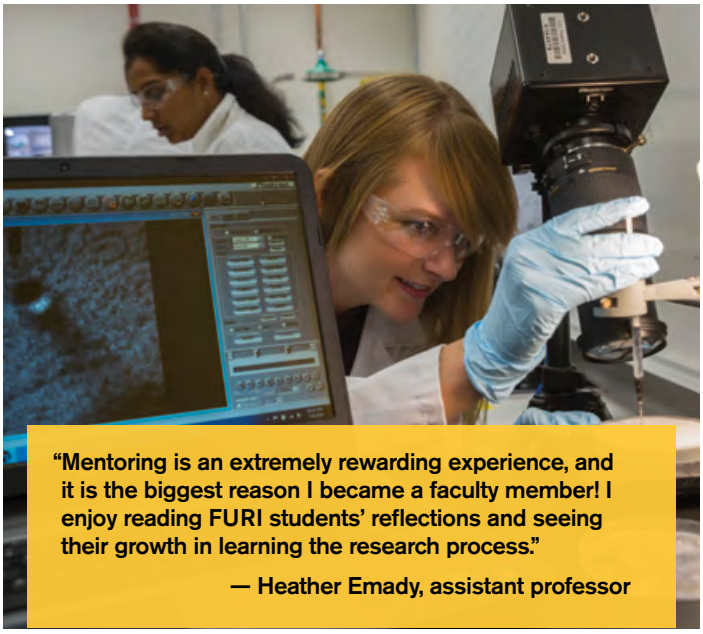
Wenlong **Zhang**
assistant professor

Ming **Zhao**
associate professor



"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."

— Francois Perreault, assistant professor



"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

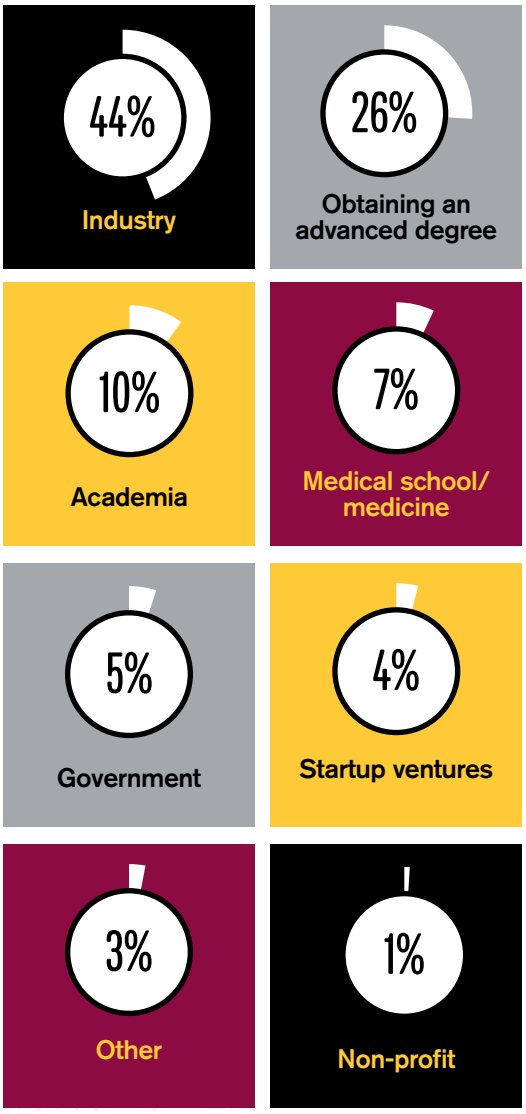
"Encourage your graduate students to also take a mentoring role."

— Micah Lande, assistant professor, Diane and Gary Tooker Professorship for Effective Education in Science, Technology, Engineering and Math (STEM)

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.

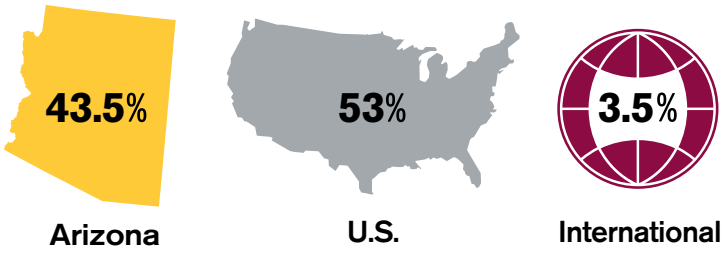
Life after FURI



"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 '14–Spring '15
Computer Science '15
Software Engineer, Google

Where FURI alumni work



FURI alumni founded 7 startups

"Participating in FURI laid the foundation for the research work I am now pursuing in energy engineering. The core research skills I developed as a FURI student — for example critical reading, concise writing, formulating research questions, collaboration, learning to operate technical equipment and presenting — are proving invaluable in my work."

— Ngoni Mugwisi
FURI Summer '14–Spring '15
Electrical Engineering '17
Rhodes Scholar; DPhil Candidate, University of Oxford

Top companies employing our alumni

Apple	Boeing
Dell	Facebook
Ford Motor Company	Honeywell Aerospace
Intel Corporation	Mayo Clinic
Medtronic	ON Semiconductor
Orbital ATK	PepsiCo
Raytheon	Reddit
SpaceX	Stryker
U.S. Air Force and Navy	W. L. Gore & Associates

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

— Daniel Bishop
FURI Spring '06–Spring '09
Bioengineering '09
CEO and Co-founder, Qualaris Healthcare Solutions, Inc.

"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

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 david.wahls@asu.edu

Acknowledgments

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Susan **Baldi**
Srividya **Bansal**
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Luis **Bocanegra**
Kevin **Buck**
Tamera **Cameron**
Selcuk **Candan**
Michael **Caplan**
Bridgett **Cantu**
Oswald **Chong**
Scotty **Craig**
Arnaud **Ehgner**
Peter **Fox**
Jhanaye **Glynn**
Michael **Goryll**
Debra **Gower**
Stephen **Helms Tillery**
Sharon **Hsiao**
Usha **Jagannathan**
Cheryl **Jennings**
Jessica **Jensen**
Nathan **Johnson**
Lina **Karam**
Suzanna **Kirkham**
Jing **Li**
Cortney **Loui**
JoAnne **McDermand**
Ann **McKenna**
Kelley **McManus**
Barbara **Minich**
Cynthia **Moayedpardazi**
Bin **Mu**
Beverly **Naig**
Jay **Oswald**
Mariah **Pacey**
Joe **Palais**
Yulia **Peet**
Kristen **Peña**
Francois **Perreault**
Deb **Prewitt**
Yueming **Qiu**
Cheryl **Roberts**
Martin **Reisslein**
Layla **Reitmeier**
Carrie **Robinson**
Arthur **Sainz**
Wesley **Scruggs**
Barbara **Smith**
Jenna **Snowberger**
Angela **Sodemann**
Sohum **Sohoni**
Tomi **St John**
Alicia **Stiers**
Sefaattin **Tongay**
Shane **Underwood**
Veronica **Venable**
Brent **Vernon**
Gary **Waissi**
Xiao **Wang**
Qing Hua **Wang**
Wenlong **Zhang**

Ready to solve society's biggest challenges?

Become a Grand Challenge Scholar!

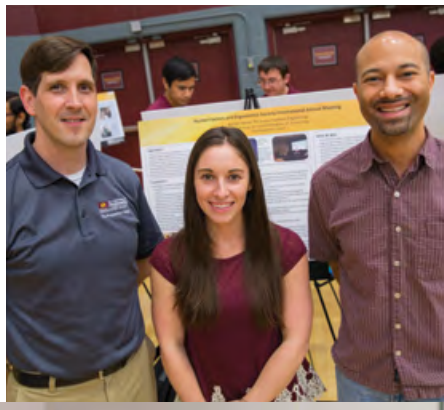
Our scholars are preparing to solve global challenges by combining academic and extracurricular experiences at ASU as part of the **Grand Challenge Scholars Program,** recognized by the National Academy of Engineering.

As a Grand Challenge Scholar, you pursue research in a grand challenge theme — such as health, energy, security, education or sustainability. In addition, you complete related interdisciplinary coursework, gain a global perspective, engage in entrepreneurship and give back to the community through service learning.

As a scholar, you will gain unique opportunities and experiences through mentorship by faculty, access to funding for research opportunities and enrollment in FSE 150: Perspectives on Grand Challenges for Engineering — with specially designed curriculum and exclusive access to guest speakers.

If you share our focus on the societal impact of engineering or want to dive into an innovative educational environment, join the Grand Challenge Scholars Program.

Apply today: links.asu.edu/Apply-for-GCSP



The Entrepreneurial Mindset

What does it mean to bring an entrepreneurially minded approach to research?

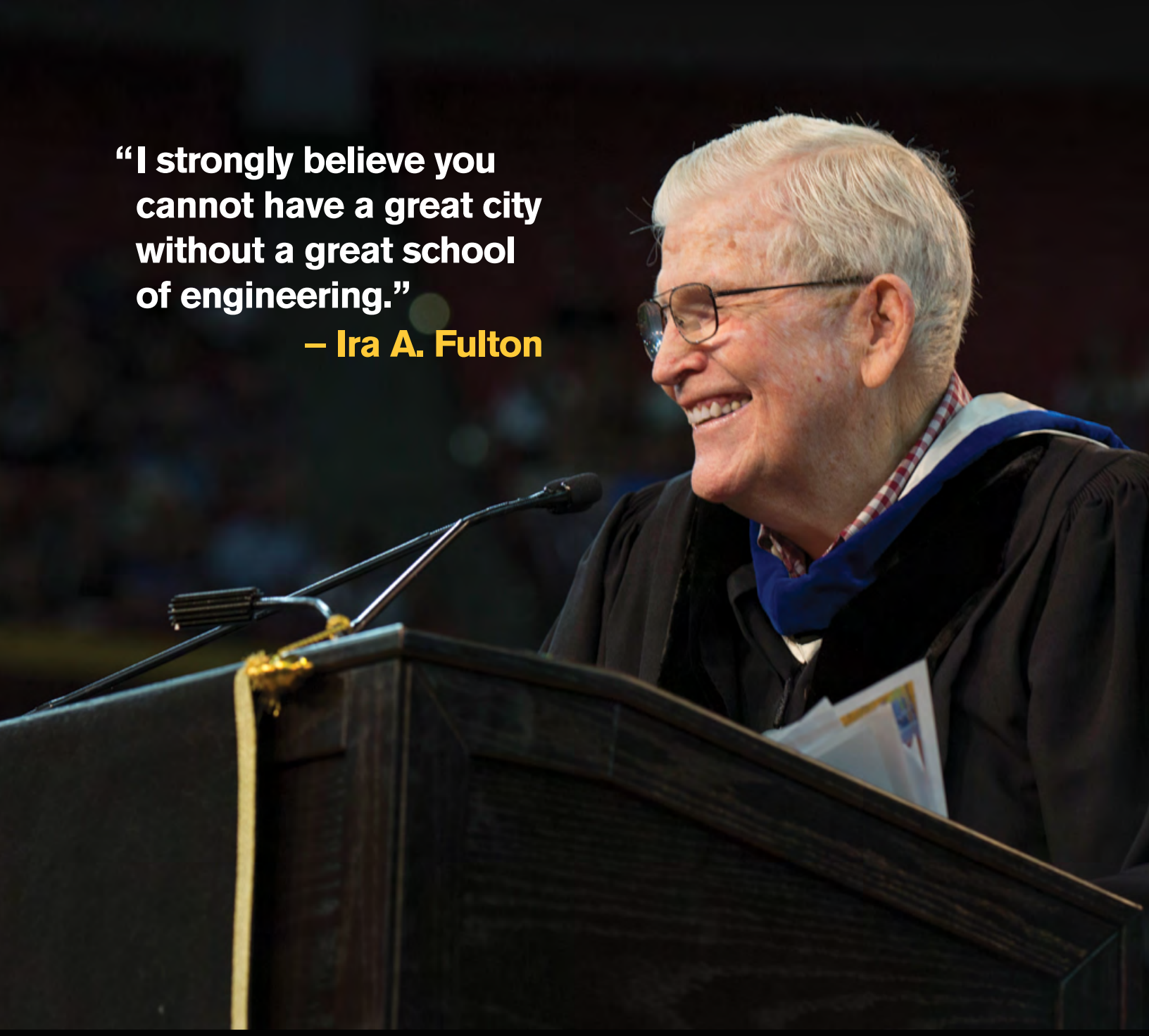
In a dynamic and interconnected world, it is critical for the Fulton Schools to teach a technical skillset along with an entrepreneurial mindset that fosters curiosity, connections and the creation of value (3Cs). Programs such as the Fulton Undergraduate Research Initiative teach students how to apply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

Learn more about KEEN and the 3Cs at links.asu.edu/keenstudentgrant

KEEN
ENGINEERING UNLEASHED



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.