



JOHNS HOPKINS

WHITING SCHOOL
of ENGINEERING

Research Experience for Undergraduates in Computational Sensing and Medical Robotics

CSMR REU 2018 Cohort

Almost 350 students applied for the CSMR REU Summer program at JHU. Out of that group, 14 were chosen to participate.



They came from all over the country and converged on our campus to do research with professors from Electrical & Computer Engineering, Mechanical Engineering, and Biomedical Engineering.



We are pleased to introduce these 14
intelligent, gifted, and driven
individuals to you...

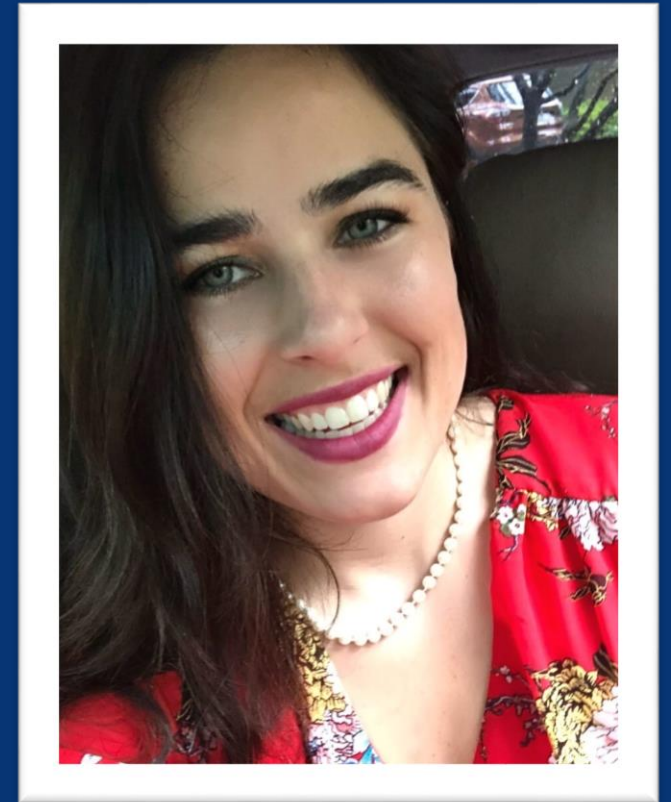


Brittany Nixon, '20

Howard Community College/
University of Maryland, College Park
Mechanical Engineering

- REU Mentor: Prof. Noah Cowan @ the LIMBS Lab
- Project 4: Active Sensing in Biological Systems

Brittany is collecting and analyzing active sensing behavior in electric fish so that quantitative mathematical models of active sensing can be developed.



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

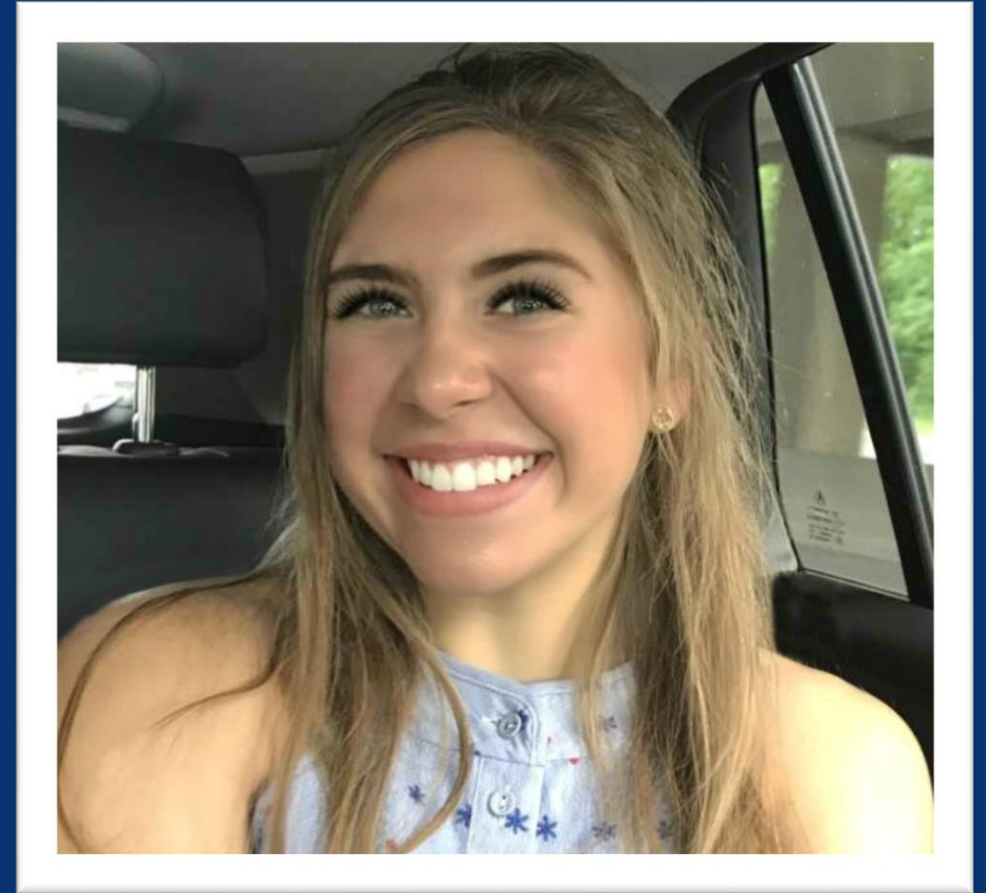
Colette McGarvey, '17

Tulane University

*Biomedical Engineering w/ a
minor in Mathematics*

- REU Mentor: Prof. Jeremy Brown @ Haptics and Medical Robotics (HAMR) Laboratory
- Project 9: Bimanual Haptic Feedback for Robotic Surgery Training

This project is about refining and evaluating the current haptic feedback system. Colette is working to select clinically appropriate training tasks and will help to design, conduct, and analyze a human-subject experiment to evaluate the system.



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Duha Awad, '20

Baltimore City Community
College/University of Maryland, College Park
Electrical Engineering & Physics

- REU Mentor: Prof. Archana Venkataraman
@ the Malone Center
- Project: Detecting Epileptic Seizures from
Electroencephalography

The goal of Duha's project is to implement different machine learning techniques to detect epileptic seizures from multichannel EEG. She will be working with data acquired at Boston Children's Hospital and Johns Hopkins Hospital.



Evan Frenklak, '19

University of California, Berkeley
Electrical Engineering & Computer Science

- REU Mentor: Professor Rene Vidal @ the Vision, Dynamics, & Learning Lab
- Project 28: Accelerated Non-Smooth Optimization

Evan is working on the cutting-edge frontier between math and computer science, combining both approaches with the goal of studying accelerated algorithms for non-smooth problems from mathematical and applied perspectives. He is implementing code for accelerated optimization algorithms in Python, and running them against real datasets.



Josue Rodriguez, '19

Inter American University of Puerto Rico
Computer Engineering

- REU Mentor: Prof. Jerry Prince @ Image Analysis and Communications Lab
- Project 1: Cerebellum Parcellation and Data Analysis of the Baltimore Longitudinal Study of Aging

This project is to run an existing cerebellum parcellation algorithm on a cohort of healthy aging controls. Josue is using statistical methods to first determine whether there are algorithm failures in the processed data, then looking for relationships in the data that may relate to cognitive decline.



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Katie Mao, '20

Purdue University

Mechanical Engineering

- REU Mentor: Prof. Louis Whitcomb @ the Dynamical Systems & Control Lab
- Project 7: Development of a New Remotely Operated Underwater Vehicle

Katie is back for her second year, working on the mechanical design and fabrication of a new ROV that will be used for research in navigation, dynamics, and control of underwater vehicles. This neutrally buoyant tethered vehicle will be capable of agile six degree-of freedom motion with six marine thrusters.



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Kelley Kempski, '18

University of Delaware
Biomedical Engineering

- REU Mentor: Prof. Muyinatu Bell @ the PULSE Lab
- Project 13: Photoacoustic Image Guidance for Pancreatic and Liver Surgery

This project explores the use of photoacoustic imaging to detect blood vessels behind bone and other tissues during minimally invasive surgery. Kelley is building and testing tissue-mimicking phantoms, experimenting on porcine models, and preparing the photoacoustic imaging system for clinical studies.

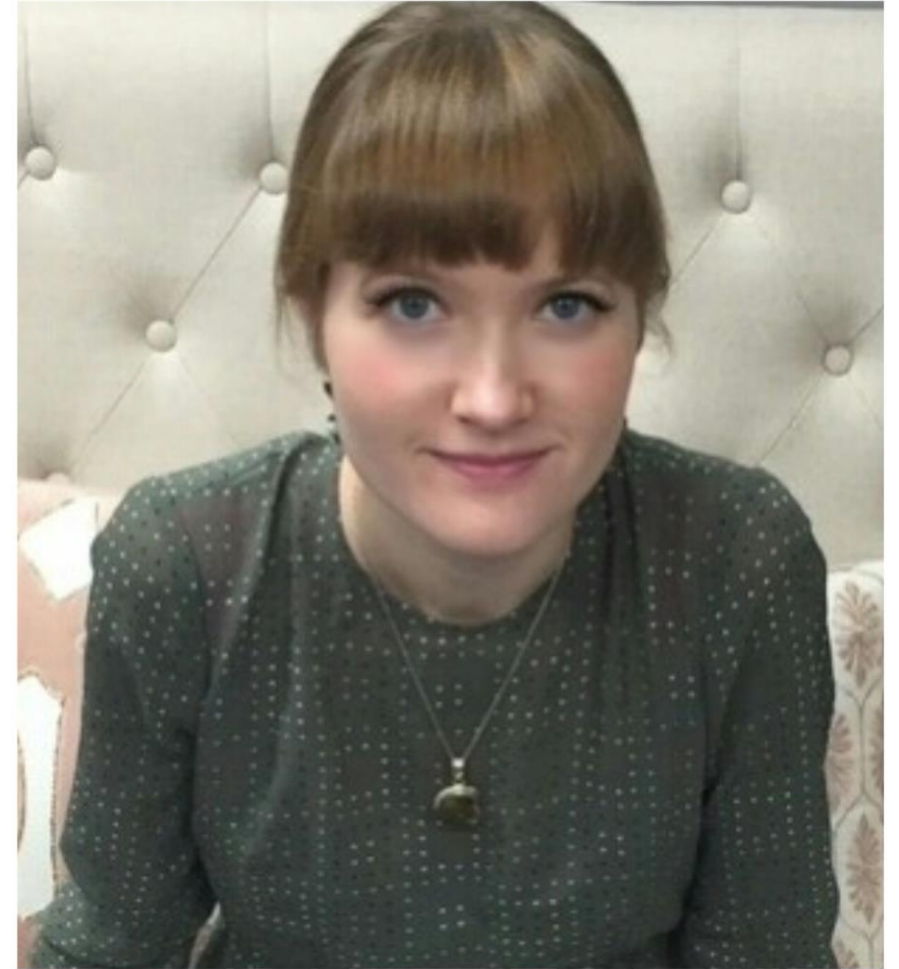


Ksenia Lekomtceva, '18

Montgomery College
Computer Science

- REU Mentor: Prof. Rene Vidal @ Vision, Dynamics, and Learning Lab
- Project 27: Activity Recognition

Ksenia is developing novel algorithms for recognizing human actions in unstructured and dynamically changing environments. The activity recognition tasks include fine-grained temporal activity segmentation and recognition and action detection localization.

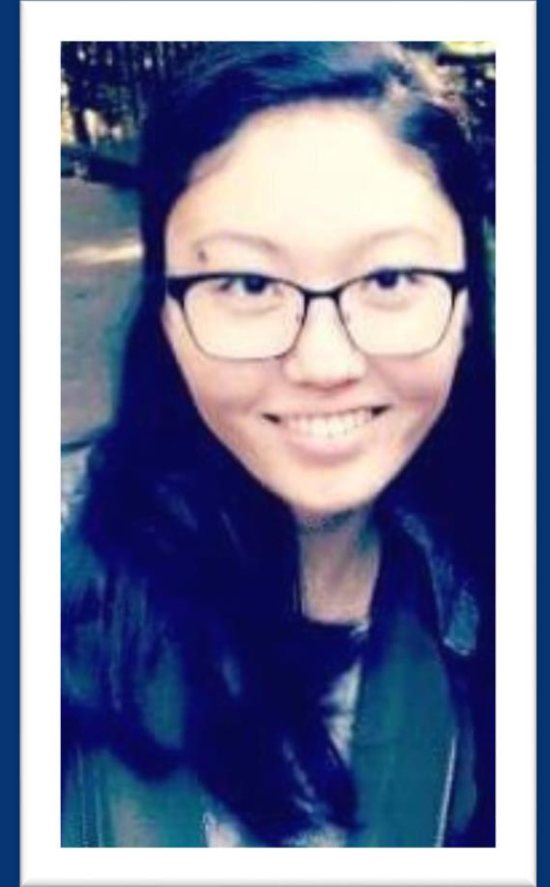


Laura Shimabukuro '20

Sacramento City College/UCLA
Electrical Engineering

- REU Mentor: Prof. Susanna Thon @ NanoEnergy Lab
- Project 29: Flexible Transparent Electrode Development for Infrared Optoelectronics

Laura is doing optical measurements and simulations using software to characterize and optimize new transparent electrode materials. By the end of the summer Laura will fabricate thin –film transparent electrodes on flexible substrates, and will help graduate students with colloidal materials synthesis and device testing.



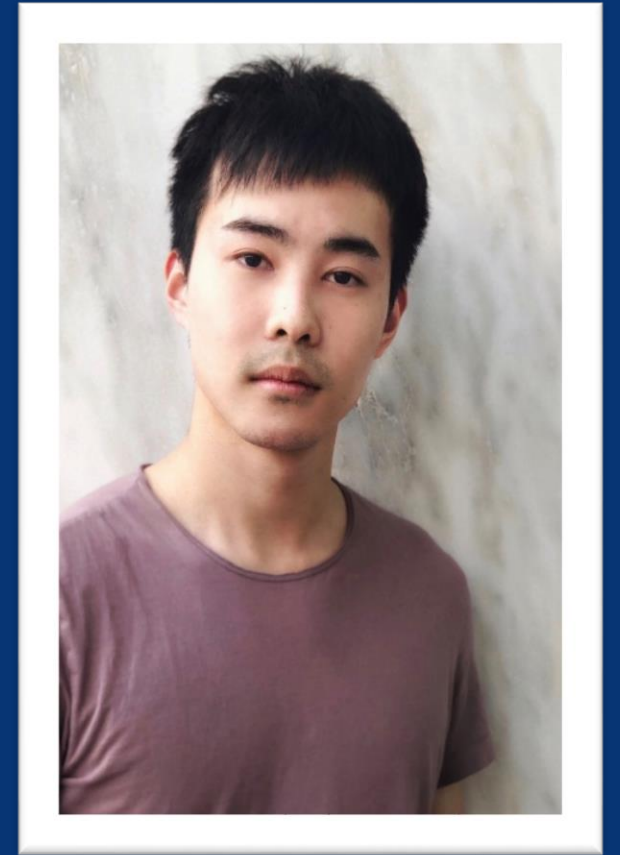
JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Max Lu, '19

Johns Hopkins University
Biomedical Engineering

- REU Mentor: Prof. Rene Vidal @ the Vision, Dynamics, & Learning Lab
- Project 24: Object Recognition

Max is engrossed in the research surrounding computer vision, deep learning, and machine learning. This summer, he is enhancing the framework for object recognition by improving the model to extend across different data modalities and design algorithms to utilize these models for various tasks.

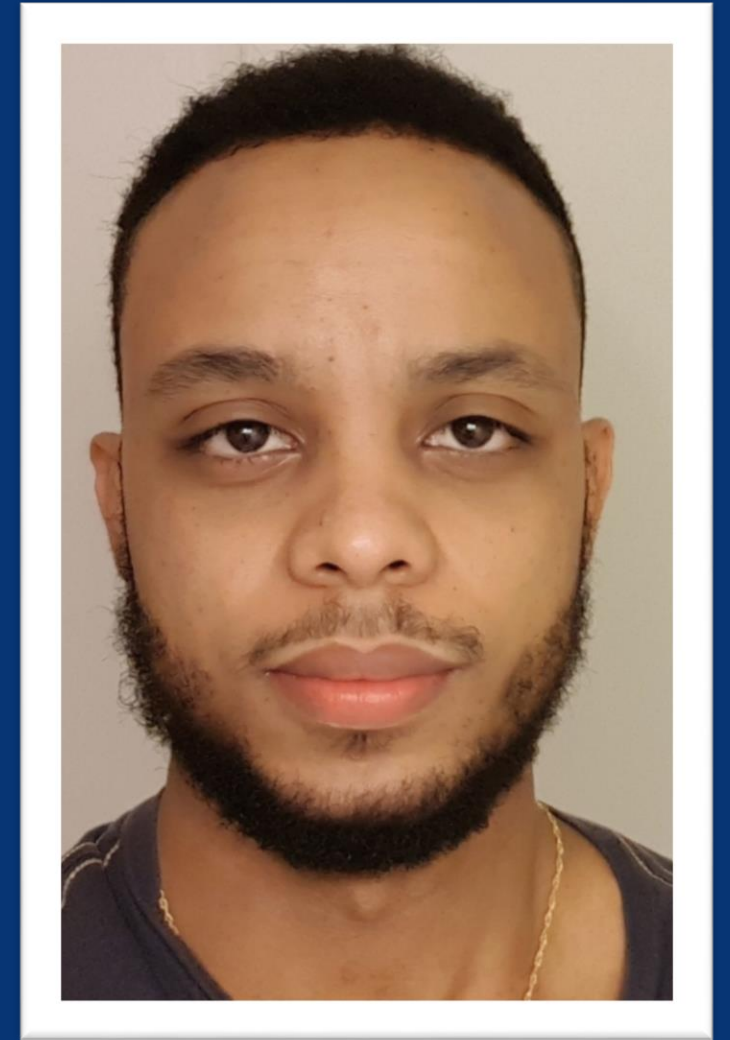


Mikiyas Bokan, '18

Howard Community College
Computer Engineering

- REU Mentor: Prof. Peter Kazanzides @ Laboratory for Computational Sensing and Robotics
- Project: FPGA Firmware Development for the da Vinci Research Kit

Mike is implementing a digital filter on a field-programmable gate array (FPGA) to improve the performance of the da Vinci Research Kit (dVRK), which is an open research platform currently installed at 30 institutions worldwide. His initial task is to filter the potentiometer feedback. If time permits, he will apply the digital filter to the motor current feedback to create a closed-loop motor current controller for the dVRK-S (next generation of the dVRK).



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Nathaniel Olsen, '20

University of Utah

Biomedical Engineering

- REU Mentor: Prof. Jeremy Brown @ the Haptics and Medical Robotics (HAMR) Laboratory

Project: Improving Human Robot Interaction

Nathan is using a motion capture system, electromyography data, audio, and video to evaluate how humans interact with one another. He will then use this as a model to improve Human Robot interaction.



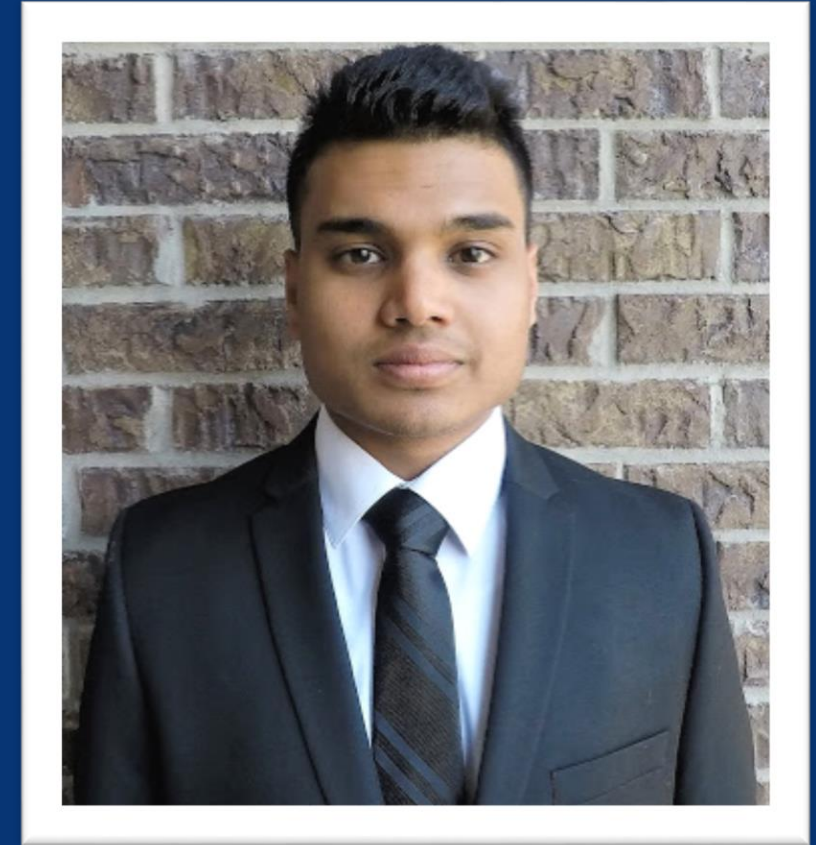
JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Taaha Kamal, '21

University of Texas @ Dallas
Computer Science

- REU Mentor: Prof. Iulian Iordachita
- Project: Robot Force Control Algorithms for Retinal Vein Cannulation

This project aims to build and optimize the force-sensing tool and modify the Eye Robot (ER) control algorithms for assisting retinal vein cannulation (RVC). Taaha is working on predicting sclera forces with a recurrent neural network (Python). He is also working on new control mode(s) that use the predicted forces to define the robot's admittance control (C++)



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

Tim Greco, '19

Swarthmore College
Engineering

- REU Mentor: Prof. Chen Li @ the PULSE Lab
- Project 10: Multi-functional Animal and Robot Locomotion in Complex Terrain

Tim is working on the design, fabrication, and refinement of novel, bio-inspired robots. He is using biological insights gleaned from studying and analyzing animal movement to develop a robot capable of performing multi-functional locomotion.

