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### **FACULTY MENTOR**

Karcher Morris

### **PROJECT TITLE**

Bringing ECE 5 to High School

### **PROJECT DESCRIPTION**

Very few high school students have the opportunity to know what ECE has to offer. AP Calculus, AP Computer Science, and AP Physics... but there is not yet an AP ECE! This project will effectively transplant ECE 5 into the high school arena to share this wonderful world of circuits, signals, programming, controls, soldering, filtering, etc.

ECE 5 content, including labs, workshops, and lectures, will predominantly remain equivalent to the ECE 5 curriculum at UCSD. High Schools allow for ~70 in-class hours for each course per semester (~20 hour total increase compared with ECE 5 at UCSD). This extra contact time allows for significant creative and supportive additions that can cater to the aspiring high school student engineer. ECE 5 will be taught at a high school in Chula Vista this spring 2024 semester. (Note: you will not be required to travel to the high school.) We will be evaluating the effectiveness of our work, and then we will make necessary changes to improve and increase our reach into the high school setting.

This project will be in person.

### **INTERNS NEEDED**

➤ 2

### **PREREQUISITES**

- Completed ECE 5 and interested in teaching, hands-on curriculum, teaching at a high school level, developing a high school engineering community/culture, and/or ECE educational technologies.



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#### **FACULTY MENTOR**

Karcher Morris

#### **PROJECT TITLE**

Tools for Marine Robotics Engineering Education

#### **PROJECT DESCRIPTION**

We treasure our oceans, but we certainly can treat them better. A wave of “blue tech” has swept across San Diego. Industry and academic researchers are trying to answer tough questions using novel marine robotic systems in order to understand and improve our ocean ecosystem. Our team is working with industry and the Scripps Institution of Oceanography to create educational technologies in this field, from cephalopod robot STEM education kits for middle school students to coordinating deployment of autonomous surface vehicles and analyzing sensory data at a college level, for example. We are working to create these technologies, translate them into educational settings, and even commercialize the kits in some cases to increase their reach and impact.

This project will be in person.

#### **INTERNS NEEDED**

➤ 2

#### **PREREQUISITES**

- Completed ECE 5 (or equivalent hands-on experience). Interested in applied ocean sciences and educational technologies.



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### **FACULTY MENTOR**

Karcher Morris

### **PROJECT TITLE**

Medical Device Design, Manufacturing and Testing

### **PROJECT DESCRIPTION**

The primary goals of this research project are to develop and translate two different medical devices.

1. Wearable ergonomic measurement system that objectively captures neck motion and analyzes IMU data to improve a surgeon's ergonomic performance. This project incorporates signal processing, data analysis, machine learning, and app development.
2. Pressurized dilator control system for cervical cancer patients recovering from radiation therapy. This project incorporates embedded systems, pressure and flow sensors, pumps, and control logic into a medical device to work with medical collaborators at Moores Cancer.

This project will be in person.

### **INTERNS NEEDED**

➤ 2

### **PREREQUISITES**

- Completed ECE 5 (or hands-on equivalent) and interested in PCB design & assembly, SolidWorks/CAD, Arduino C, MATLAB or Python Data Analysis, and/or medical device technologies.