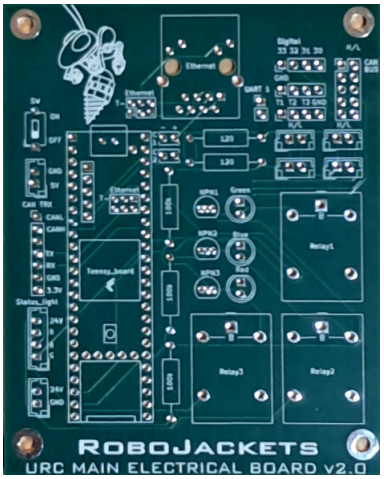
SOMIL JOSHI

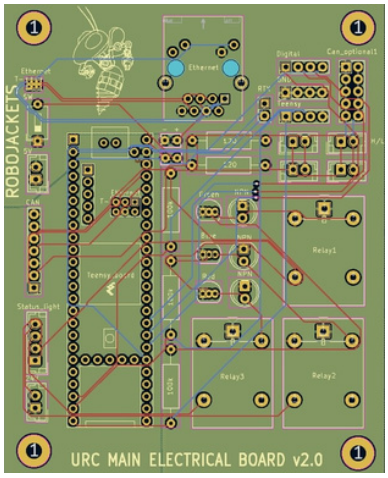
ELECTRICAL ENGINEERING AT THE GEORGIA INSTITUTE OF TECHNOLOGY

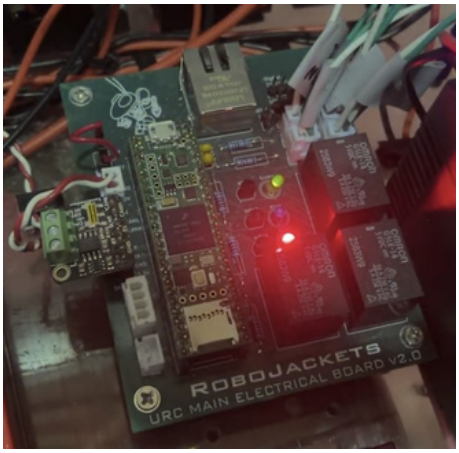
somiljoshi7@gmail.com

linkedin.com/in/somil-joshi

MAIN CONTROL BOARD - ROBOJACKETS







What?

- Design a **PCB** to house the Teensy 4.1 that controls devices in the main electrical box
- Relay circuit controls status lights
- Interfaces with devices via **Ethernet**, **CAN**, **I2C**, and **UART**

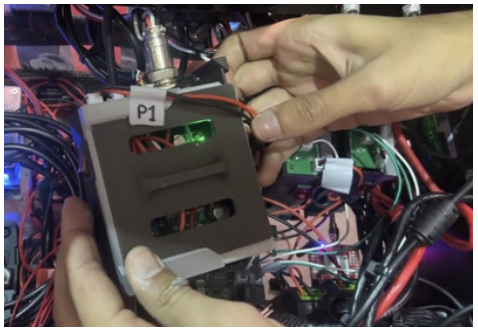
How?

- Preformed schematic capture and layout in **KiCAD**
- Soldered on components and performed **validation**
- Added CAN controller module

Results

- The design worked as a robust replacement to the protoboard version in the rover
- Connectors on board improved wire management and board has 50% less failures

MOTOR CONTROLLER MODULE - ROBOJACKETS



What?

- New motor controller housing for rover
- Previous design was flimsy, had poor wire management, and made repairs cumbersome
- Added wiring interface port, ON/OFF switch, and sliding door for access

How?

- Designed housing in **Fusion 360**
- Designed the interface board in **KiCAD**
- Implemented **DFA principles** to reduce product assembly complexity and cost
- Installed motor controller and soldered connections between controller and board

Results

- Modular design reduce repair times by 75%
- Interface board make wiring more robust and easier to debug

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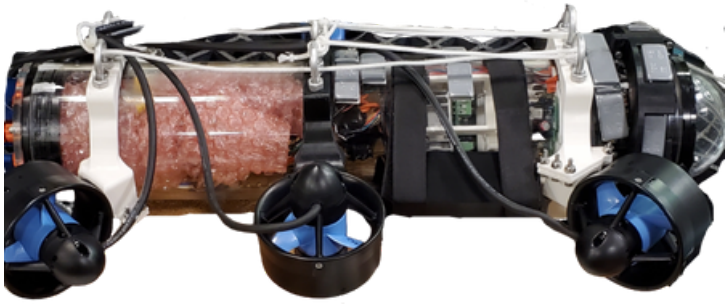
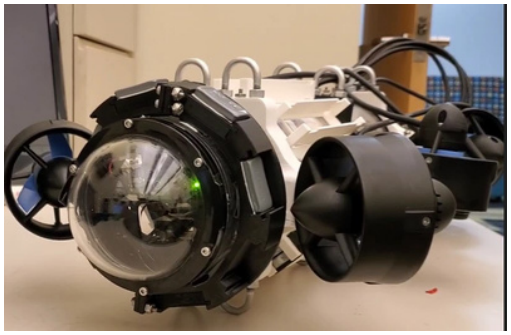
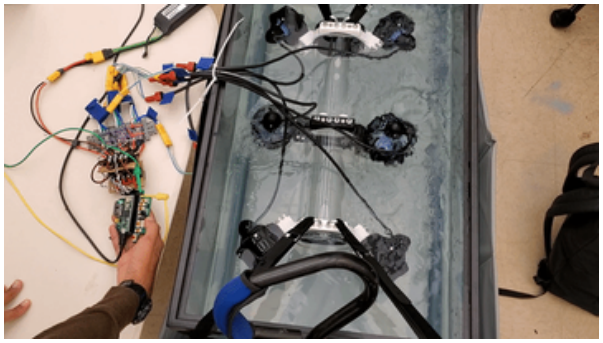
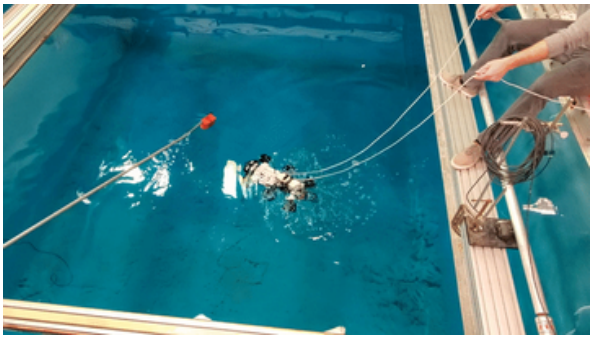
MINIATURE UNDERWATER ROBOT(MUR) - GT SYSTEMS RESEARCH LAB









What?

- Autonomous six thruster submarine
- Designed for open source use in robotics research projects

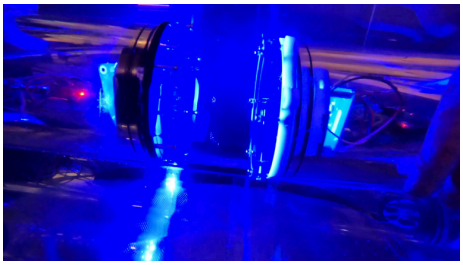
How?

- Assembled and **tested** prototype electronics in lab
- Programmed control code in **Arduino**
- Programmed **Raspberry Pi** for OpenCV object tracking in **Python**

Results

- Autonomous object tracking of MUR deployed in pool

DIVELINK - SENIOR DESIGN PROJECT



What?

- Optical based communications system for divers to automatically relay critical information to the surface.
- System involves 1 transmitter per diver, 1 receiver on surface, and computer for processing

How?

- Programmed **Arduino** to perform FSK modulation on LED transmitter for data transmission
- Custom receiver board uses **photodiode circuit** to detect and amplify received light signals
- Developed sliding window filter in **Python** to demodulation data

Results

- Developed a prototype system which serves as a functional proof of concept
- Achieved real time underwater communication with **2000 bps** at **1ft** range