

Portfolio

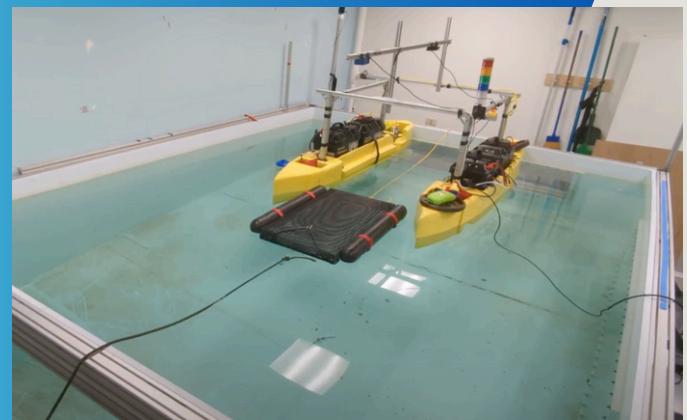
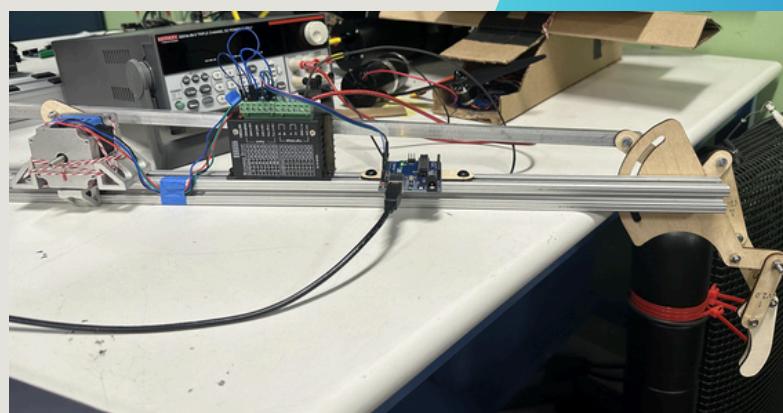
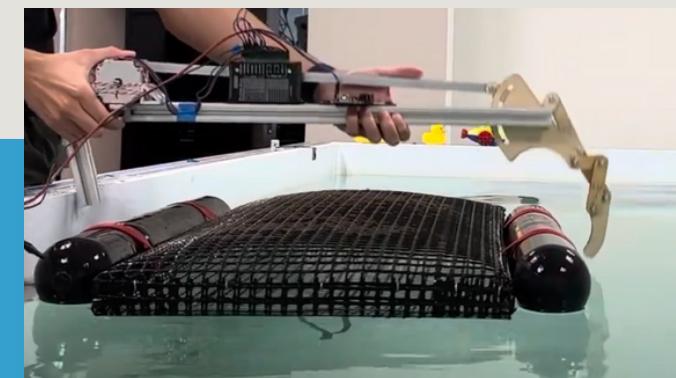
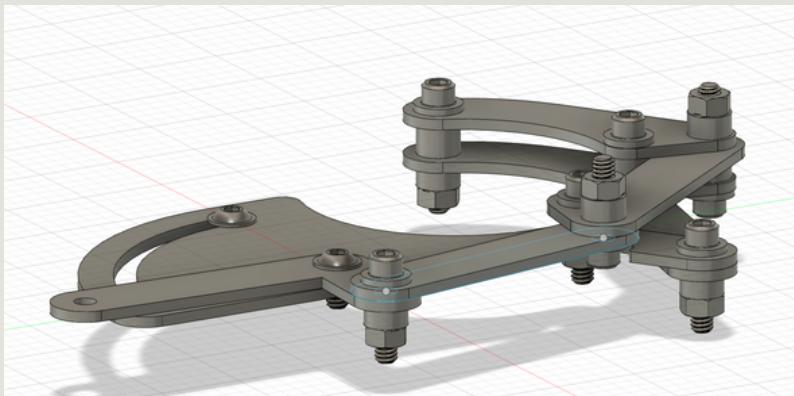
SEBASTIAN
MONSALVO

2022-2024

4 TH YEAR UNDERGRADUATE AT MIT
MECHANICAL ENGINEERING

Actuated Hook Manipulator

Jun. 2023 - Present | Research MIT Sea Grant



Objective: Design a retractable hook able to grip one side of a floating oyster basket in order to flip it.

Technical Details: The geometry of hook took 7 weeks to design. The hook had to precisely grip the 4 in. diameter black floaters and be easily actuated by a DC motor.

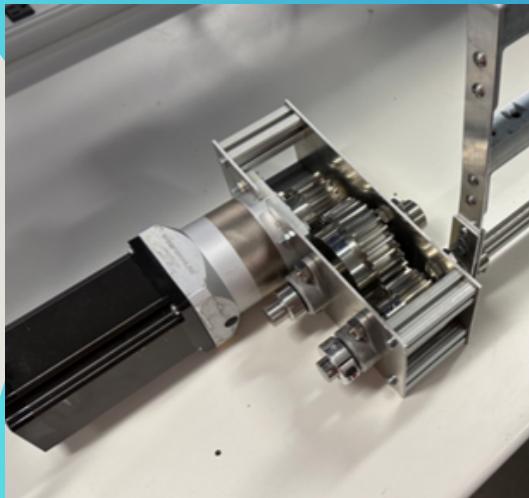
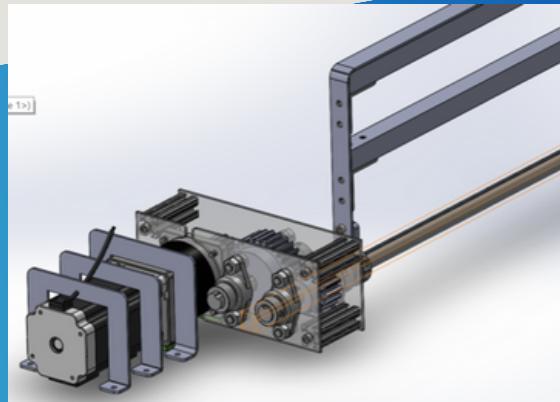
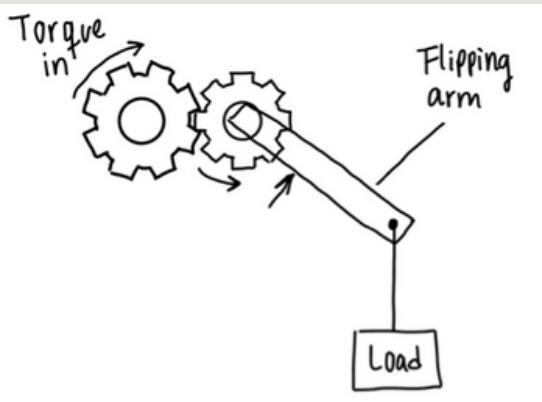
Results: The design has been finalized but the project is still ongoing. The current motor lacked the torque necessary to grip and lift a basket, so in the following video the hook will be manually actuated.

[Video here](#)

[Another video where only actuation is shown.](#)

Actuated Oyster Basket Flipping Mechanism

Jun. 2022 - Feb. 2023 | Research MIT Sea Grant



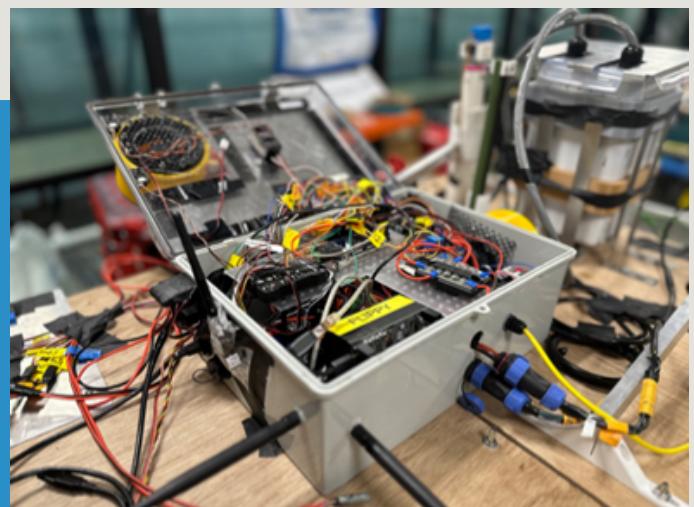
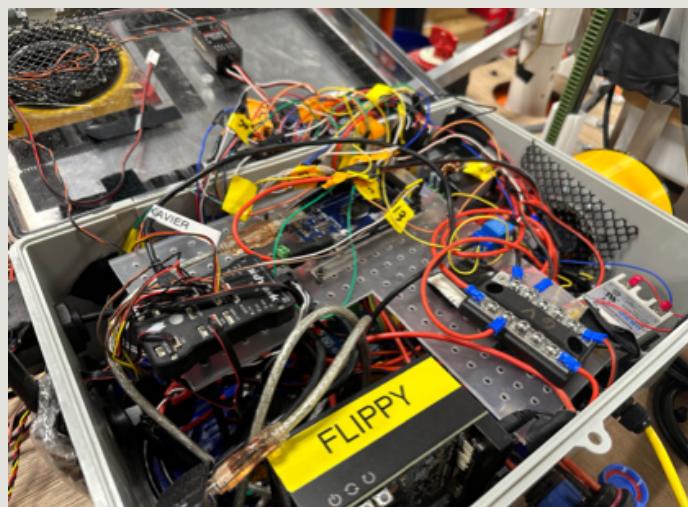
Objective: Design and build a mechanism able to lift 40 lbs. out of the water.

Technical Details: The mechanism consists of a Nema 34 Stepper motor, 3 gears, and a long steel shaft with an aluminum arm.

Results: Testing the mechanism revealed it could lift up to 50 lbs!

Electronics for Autonomous Surface Vehicle (ASV)

May 2022 - Apr. 2023 | Arcturus Robotics Team



Objective: Make electronics system to control the navigation of an ASV through remote control (RC).

Technical Details: Used a *PixHawk 4* autopilot to read PWM from RC receiver and input into thrusters. Navigation software is MissionPlanner. Also had to step down voltage and power sensors + mechanisms.

Results: ASV was able to be fully controlled through RC on the lake up to ~30m away. Electromechanical systems and sensors were powered as needed.

Manufactured 100 yo-yo's

Sep 2023 - Dec. 2023 | 2.008 Manufacturing Class



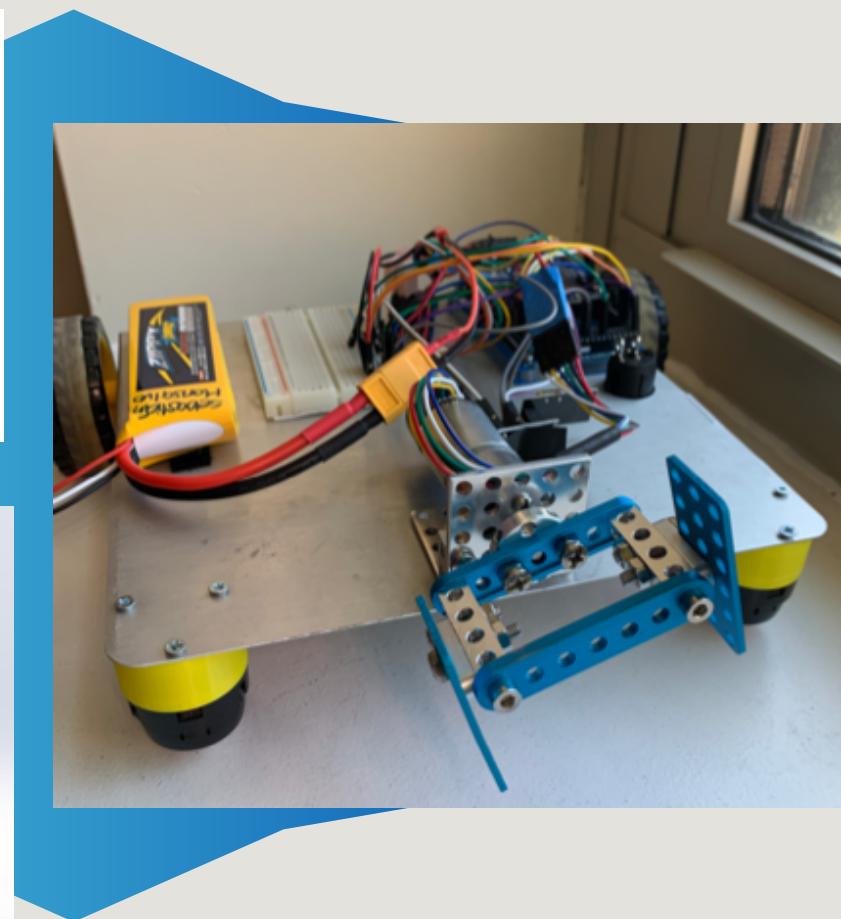
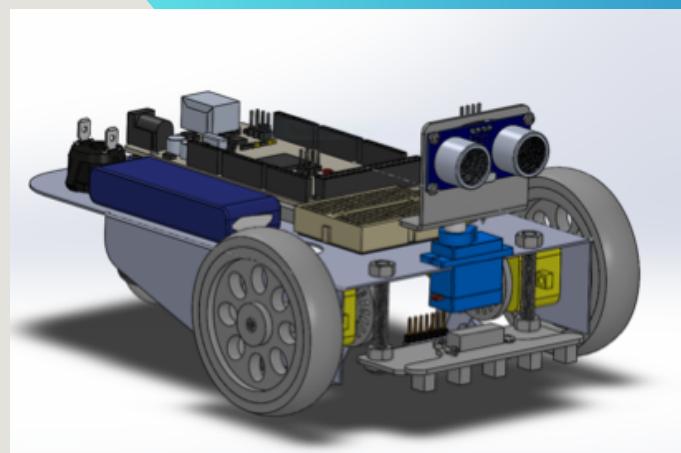
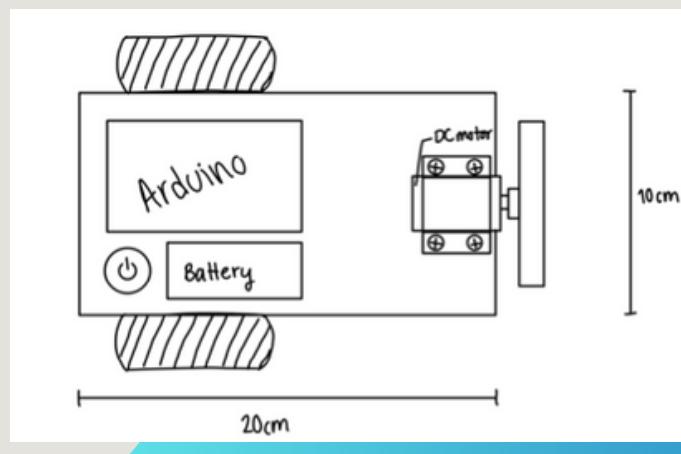
Objective: In a team of 6, mass produce 100 yo-yo's in 3 months

Technical Details: Used Fusion360 CAD and CAM to design injection molding molds for 2 of the 3 parts of yo-yo. CNC milled molds and injection molded ourselves. The last part was thermoformed, so we also had to design and make the mold for thermoforming.

Results: We made upwards of 180 yo-yo's. Our process was so accurate that the standard deviation of the yo-yo radii was of 0.025 mm.

Line-Following Robot

Feb - May. 2022 | 2.S007 Class



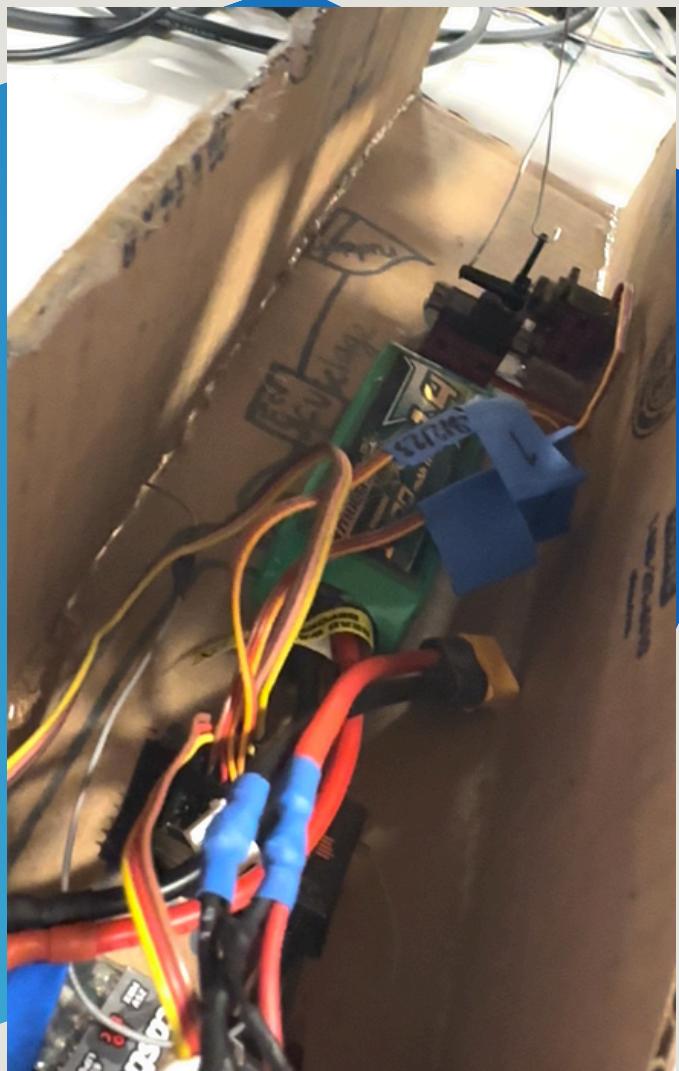
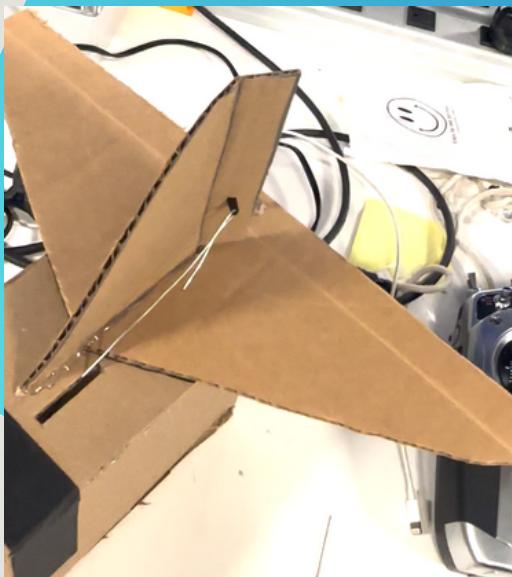
Objective: Build a robot able to follow a black line drawn on the floor.

Technical Details: The main body was a chassis made from sheet metal. Parts such as wheels, sensors, and batteries were bought/provided. Robot is powered and controlled by Arduino Mega and AdaFruit motor driver.

Results: Robot was able to successfully follow a black line on white and colored background.

Remote Control (RC) Plane

Jul. - Aug. 2023 | For fun, love planes



Objective: Build an RC plane that can fly and turn in yaw and pitch.

Technical Details: Fuselage made from cardboard and hot glue. Used *Spektrum* RC Receiver, LiPo Battery, ESC, and Servos. 12V brushless motor on nose for propulsion and 5V servos for elevators and rudder.

Results: Main propulsion, elevator, and rudder work as intended. Plane crashed on test 1, yet to be repaired and hopefully fly someday. Project is on hold.