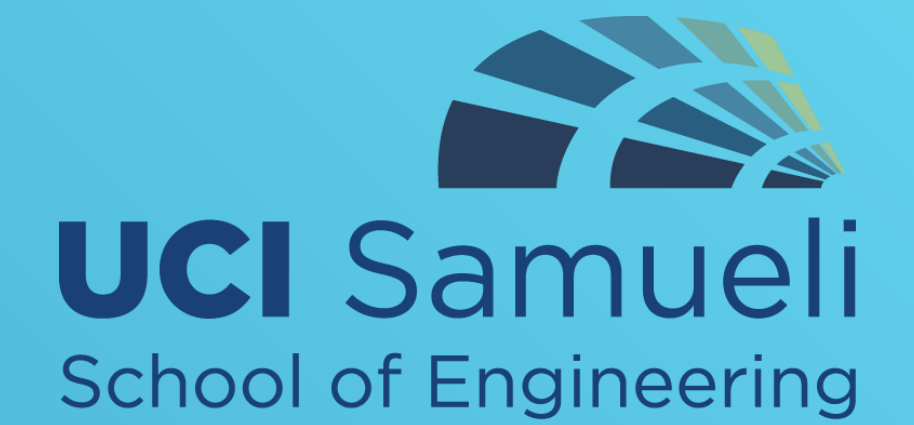




AquaLoco

Efficiency of Aquatic Locomotion Using Flippers



What is AquaLoco?

Traditional aquatic propellers cause a lot of noise disturbances and pollution in aquatic life and uses a great deal of fuel. AquaLoco will use a biomimetic propulsion system to increase the efficiency of mechanical propulsions from 50%-90% and decrease noise disturbances and propellers.

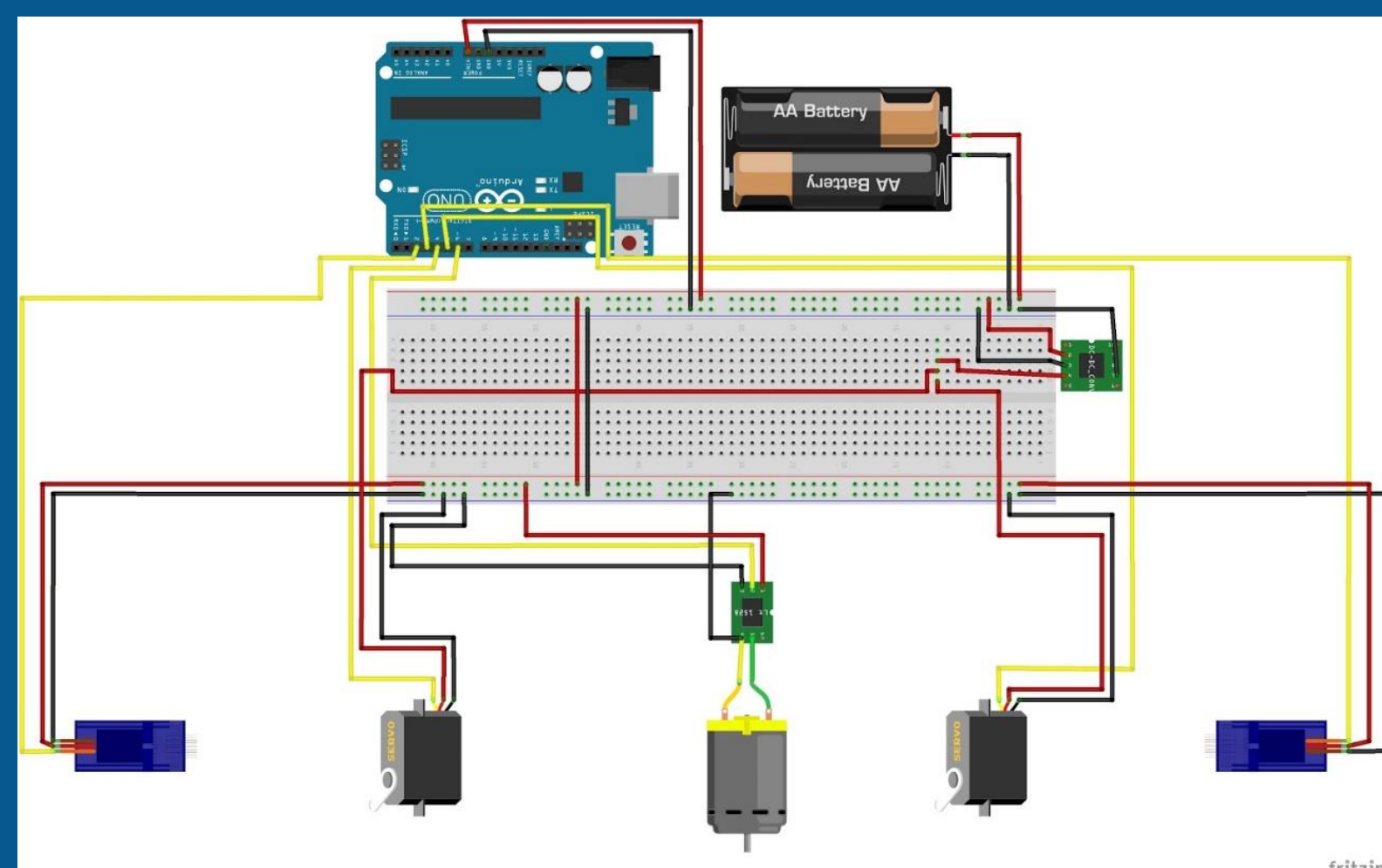


Goal and Requirements

The goal of this research project is to engineer a multi-joint biomimetic propulsion system inspired by the evolution of propulsion mechanisms observed in aquatic animals.

Design Features

- ❖ Arduino
- ❖ Two multi-axis propulsion tails
- ❖ Four servomotors
- ❖ Prototype fin
- ❖ Epoxied water tank
- ❖ Brushless motor with ESC (to compare)



Tank Design

Plywood Water Tank 2'x2'x1'
Epoxy paint

Paddlewheel
3D Printed (Flow Measurement)

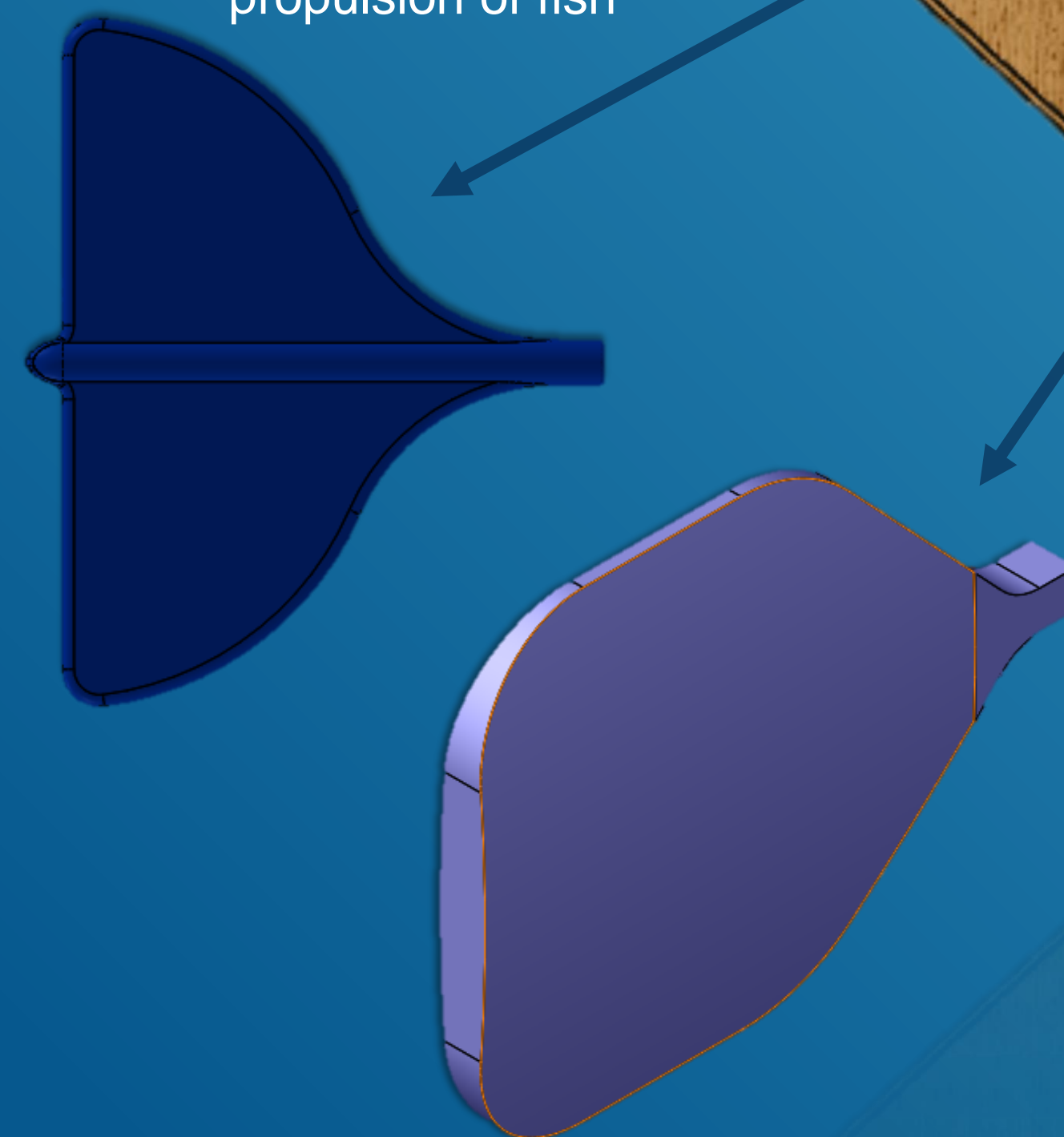
Corners Rounded with
PVC quarter

Fin Rail/Motor Mounts

Control Box

Fin Design

- ❖ Two Fin Designs
 - ❖ Compare efficiency of both designs
 - ❖ Geometry based from biomimetic propulsion of fish



Smart material for fin

- ❖ Elastic Fin = produce a strong propulsive force
- ❖ Material with low elastic modulus
- ❖ Impermeable
- ❖ Possible materials: Neoprene, Delrin Sheet, SLS Nylon

February:
Build and Complete
Tank Design

March (week 3-4):
Run Initial Tests

May 20th:
UROP Symposium

March (week 1-2):
Electrical Controls and
Finalize Fin Design

April-May:
Optimize/Complete
Design

Next Steps

Design different fins varying by geometry, material, and stiffness. Then, test the efficiency of the fins and compare them against conventional propellers.

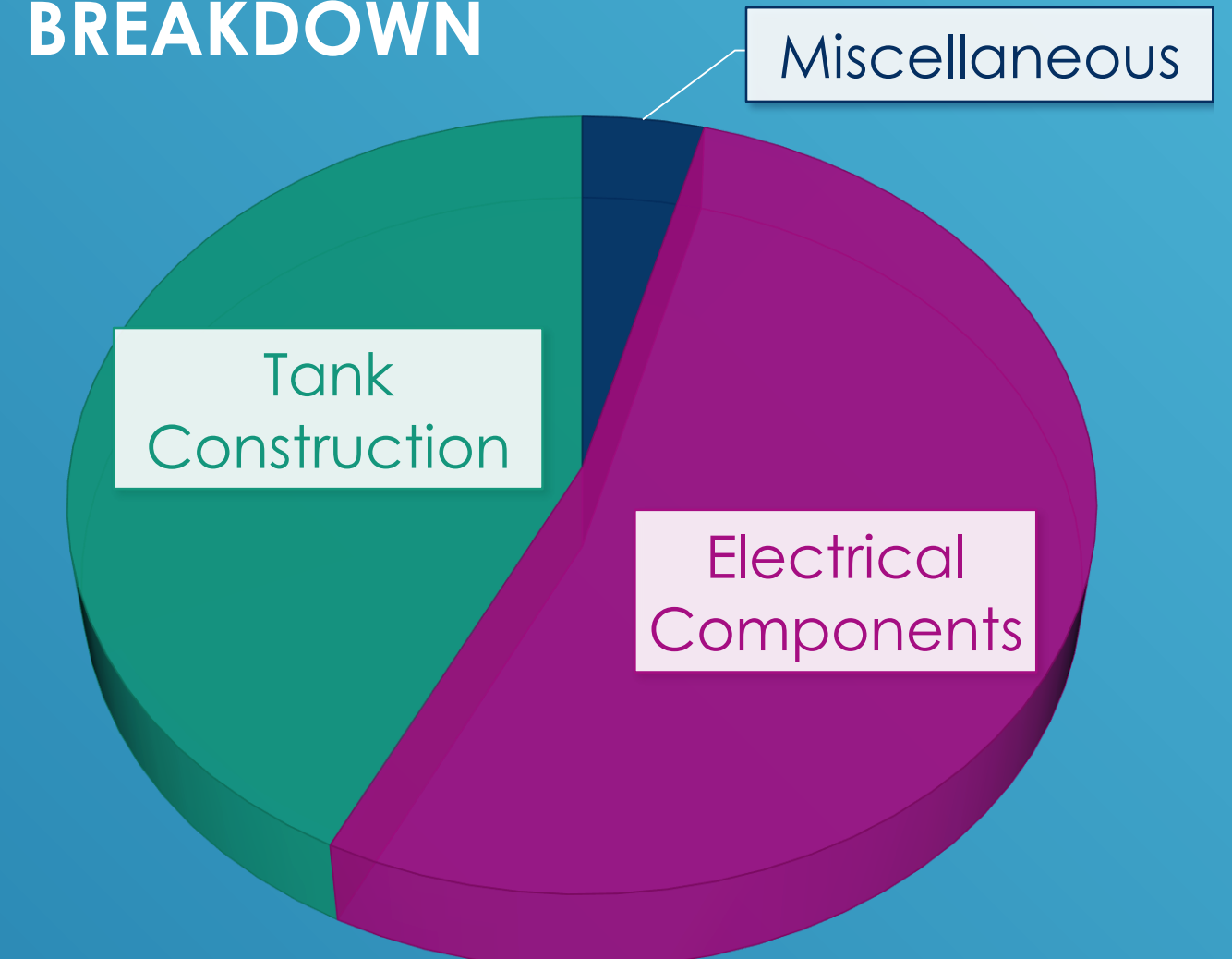
Budget

- ❖ UROP awarded \$600
- ❖ \$100 from each member
- ❖ Remaining \$200 from last quarter
- ❖ Total of \$1400 spending budget
- ❖ \$600 more expected next quarter

Materials/Amount Spent:

1. Total Spent on Construction of Tank: \$300
2. Electrical Components: \$500
3. Miscellaneous: \$40
4. Leftover Budget: \$560

BREAKDOWN



The Bigger Picture

Currently, there is not much research complete on aquatic locomotion using fins. This project will cut costs of aquatic locomotion, such as cruise and shipping costs, and reduce noise pollution in marine environments and maritime contribution of CO2 emissions.