

Printable Robotic Boat Swarms with Actuation and Sensing Capabilities

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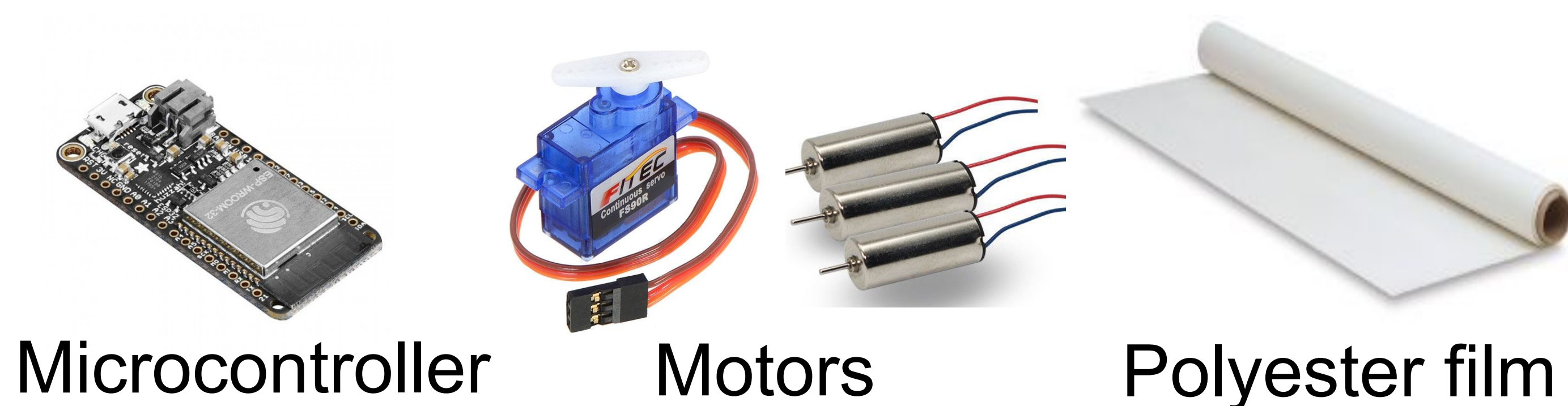
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Introduction

We build upon a framework for foldable robotic designs in order to allow users to build printable robotic boats with driven propellers, paddle-wheels, and rudders.

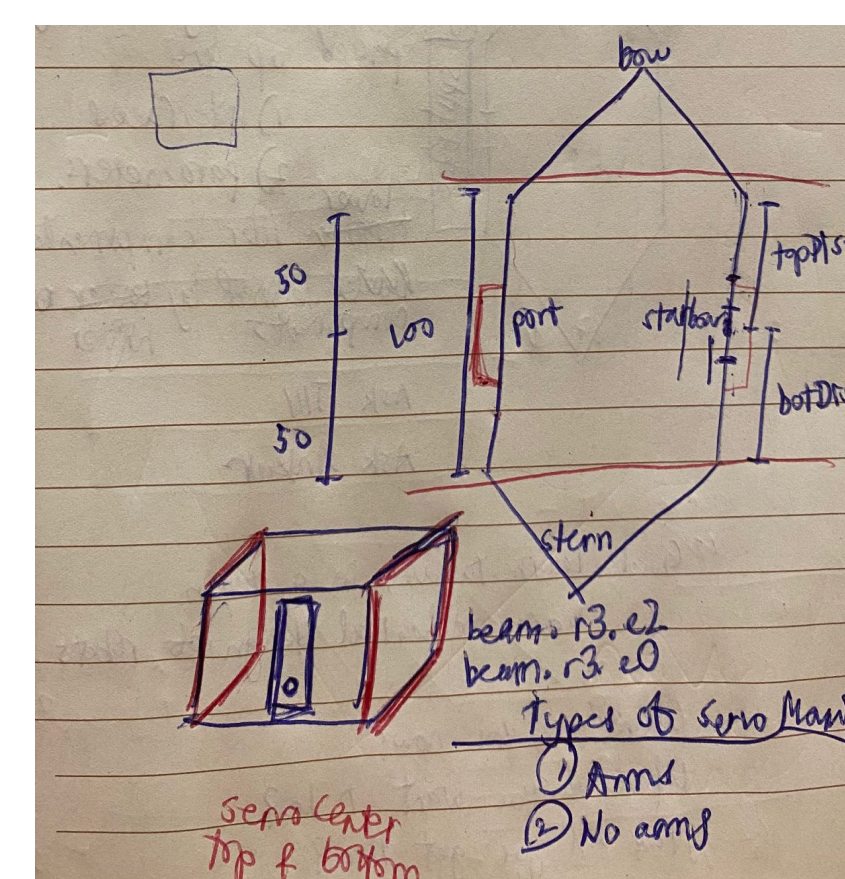
Materials



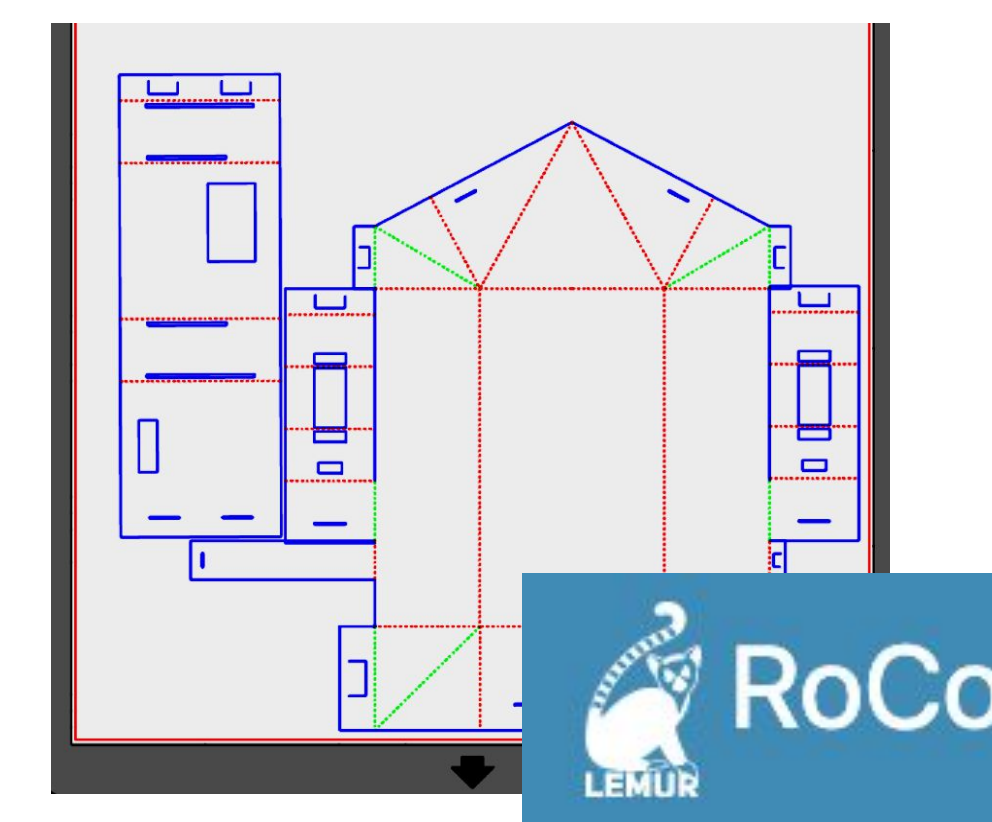
Source: adafruit.com, eplastics.com

Design Process

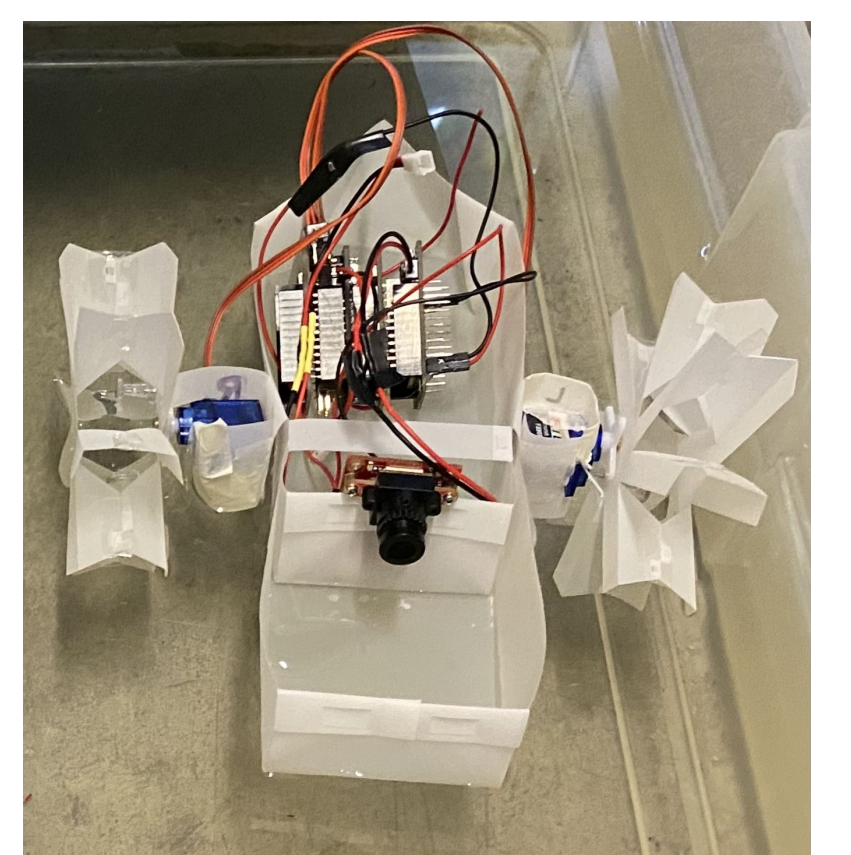
Sketch



Create

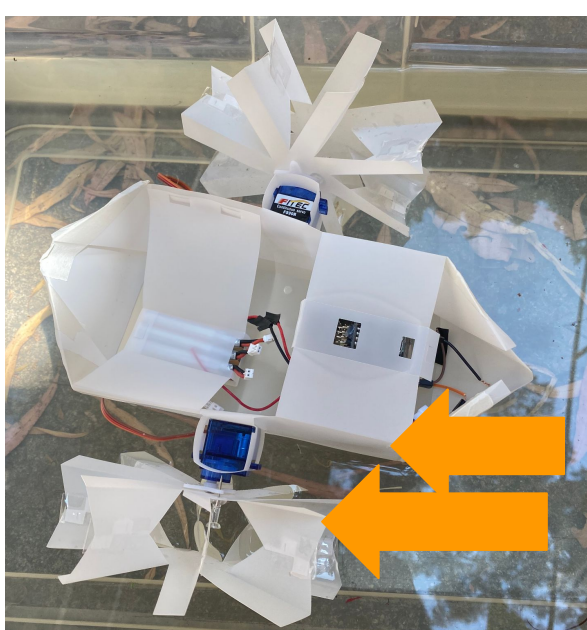


Fold



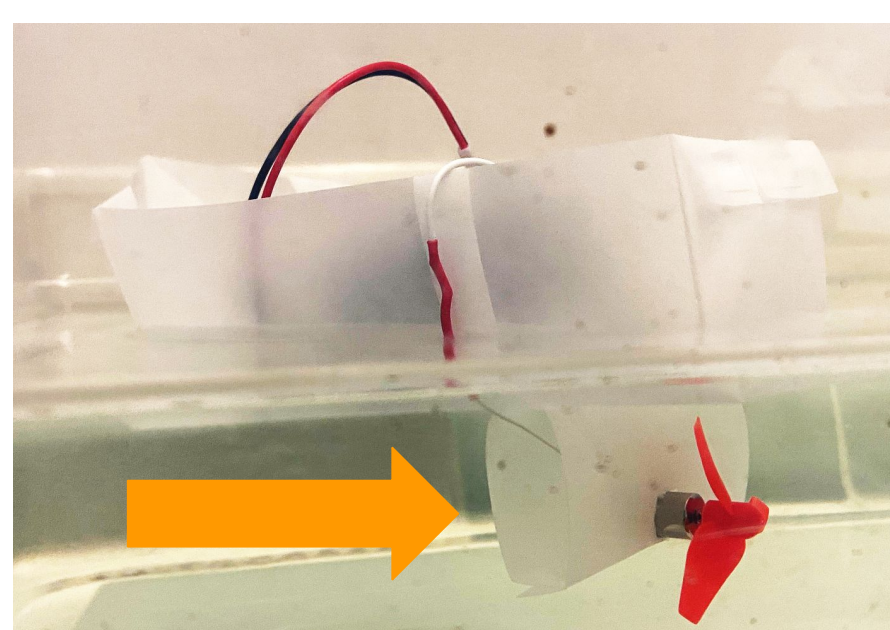
Results

Paddlewheel



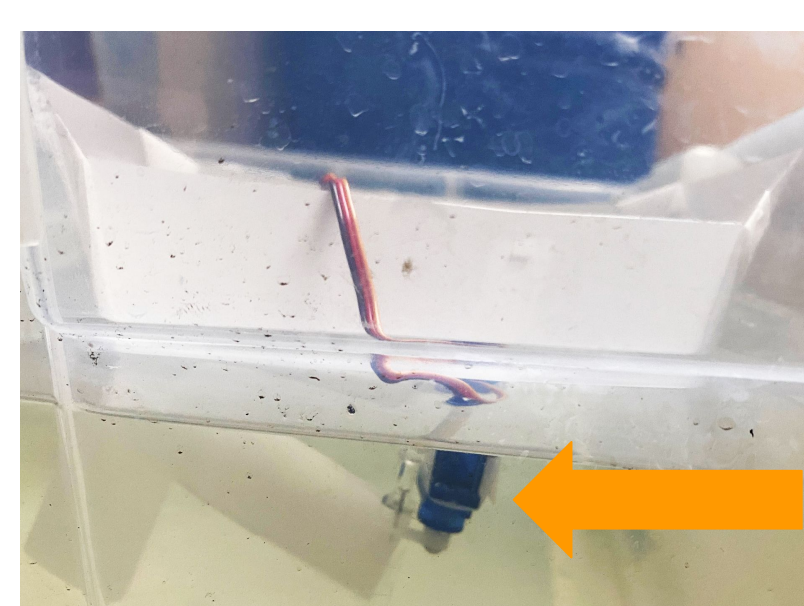
Rotational and linear motion

Propeller



High linear speed

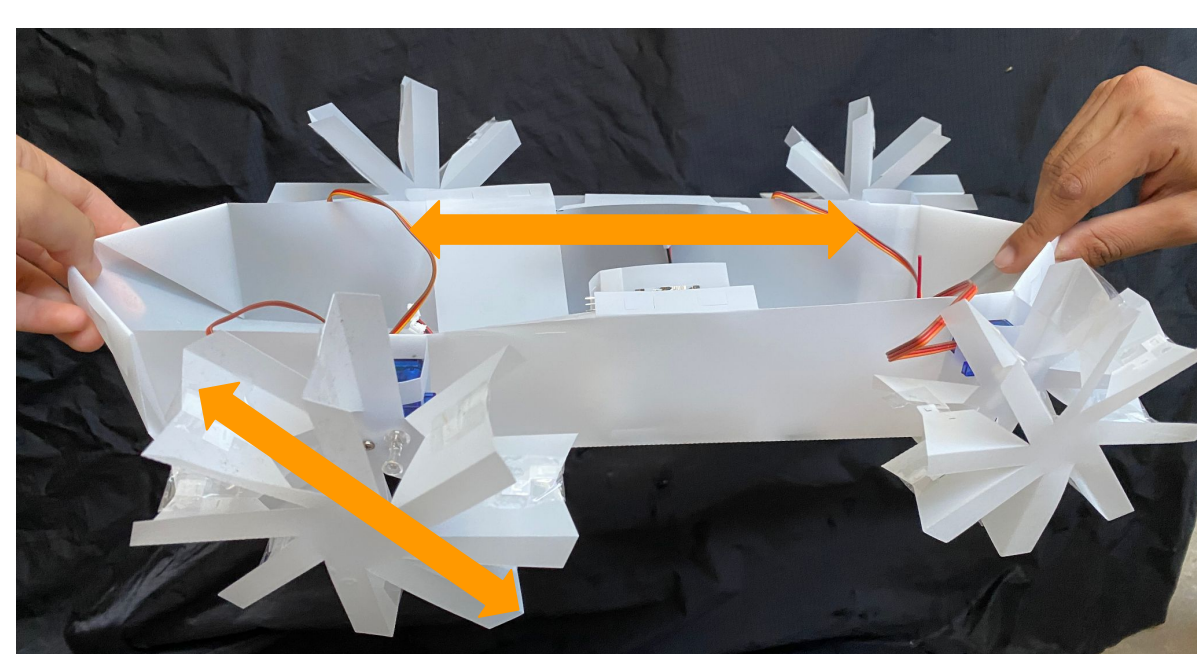
Rudder



More precise rotation

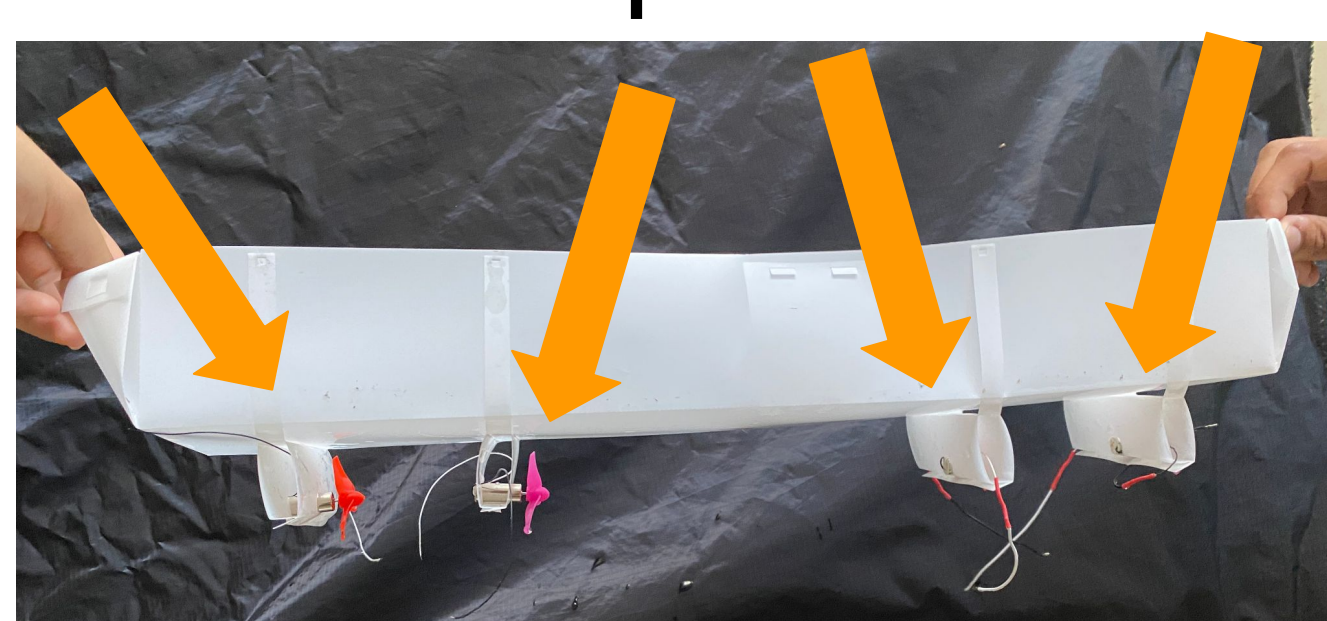
Parameterized

Adjustable dimensions and actuator positioning



Modularized

Designs can be cut and pasted



Additional features

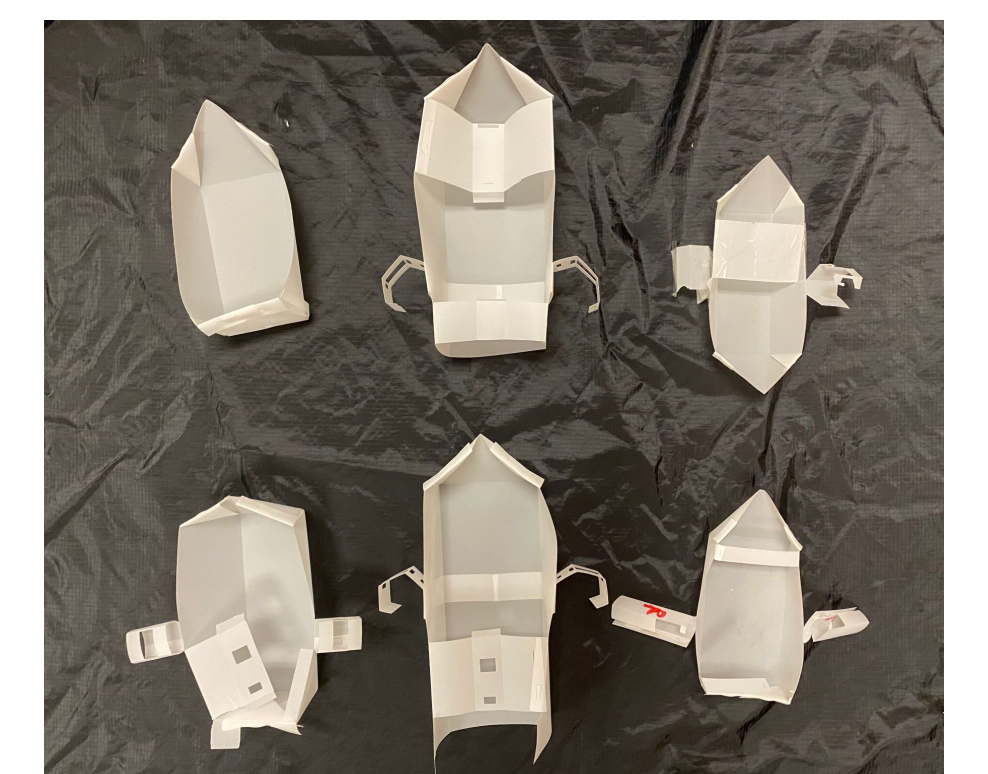
- User-controllable via dashboard
- Feedback control using vision processing



Battery mount
Controller mount

Rapid, simple, low-cost

- Origami-like straight folds
- Tab-and-slot connections
- Single-sheet fabrication



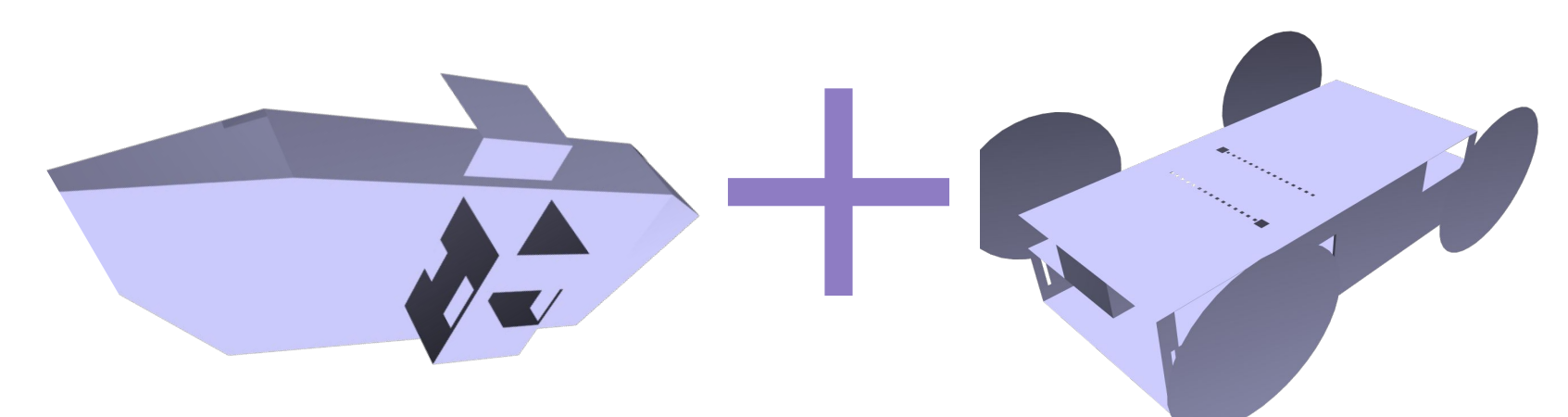
Prototypes

Conclusion

Modularity + Parameterization → New Designs

Future work

- Amphibian vehicles
- Boat sails and masts



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