

OpenROV

Open Source Remotely Operated Underwater Vehicle



IRON RANGE
ENGINEERING



Facilitator:

Client:



Project Overview

- Group Selected OpenROV Project
-
- Scoping
- Started Build
- Design Presentation
- Electronics/Wiring
- Final Presentation
- Final Document

Deliverables

- Functioning ROV
 - How to Guide/Instruction Manual
- Parts Lists/ Cost List
 - Budget



Item	Price	Link	Quantity	Total Price
ESC	\$31.99	https://www.ama	1	\$31.99
Converter	\$10.42	https://hobbyking	1	\$10.42
Enclousure	\$193.00	https://bluerobot	1	\$193.00
Cable Penetrators	\$4.00	https://bluerobot	4	\$16.00
3D Filament	\$21.99	https://www.ama	3	\$65.97
Remote	\$45.99	https://www.ama	1	\$45.99
Motor	\$16.99	https://www.ama	3	\$50.97
Camera	\$25.99	https://www.ama	1	\$25.99
FPV Reciever	\$22.99	https://www.ama	1	\$22.99
Tether	\$39.95	https://www.ama	1	\$39.95
			Total	\$503.27

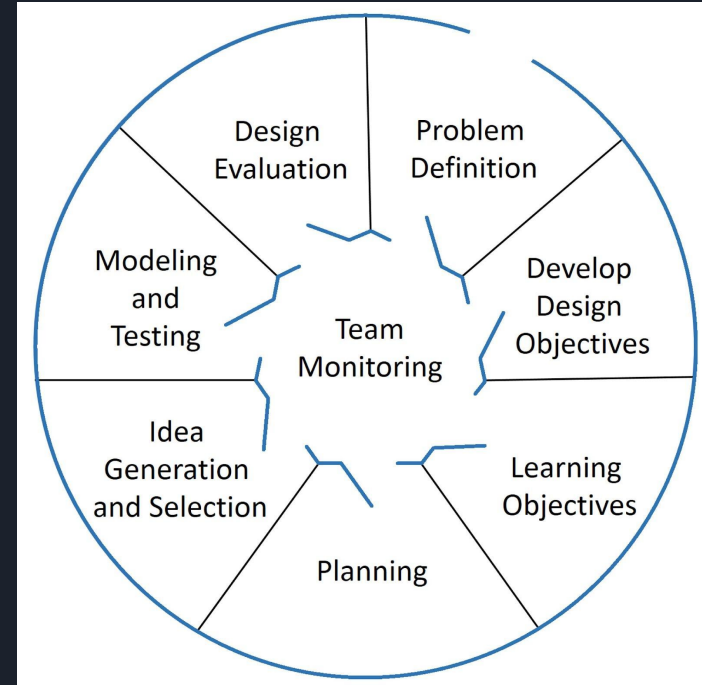


Constraints

- Must be watertight at depth and maintain its hull integrity
 - Rated for 100 m Depth
- Data transmission for the camera and control interface
- Fit the allotted budget for overall project
- Meet the semester deadline with functional and finished product
- Provide a meaningful solution to our initial problem

Design Process Description

- We started by defining the problem
- We made a list of design objectives to implement to the ROV
- The group wanted to learn how to self-direct this project
- Planning took place and we made a schedule
- We chose ideas that best reflect our abilities and resources
- Created and assembled the OpenROV for testing
- Final review and assessment of our progress



Design Decisions

	Cost	Integration	Enclosure	Usability	
Weight	3	2	2	2	Score
Design 1	1	1	2	3	15
Design 2	2	3	5	4	30

Cost

1- \$500+ 2-\$400-499 3-\$300-399 4-\$200-299 5-\$0-199

Integration

1-Everything bought and nothing original 3-Room to change and can be built in IRE Labs 5-All in house Fabrication

Enclosure

1- Similar cost and less-insured 3- Purchased enclosure 5- Affordable and easily acquired



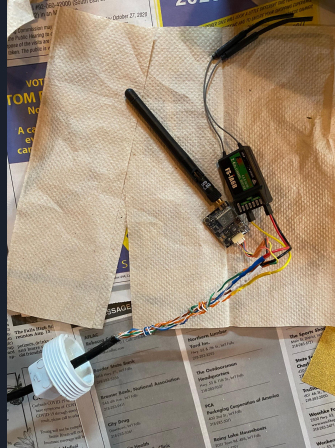
Design 1



Final Design

Project Design

- 3d Printed Frame
- RC Remote and Receiver
- Brushless Motors
- USB Camera Receiver
 - Housed in PVC Piping



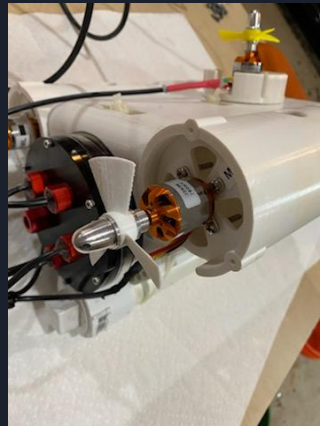
Final Design

Pros

- 3D Printable
- Hobby Grade Electronics
- Commercial Enclosure
- Easily Operated

Cons

- 3D Printed layers
- Not as large of community base
- Printed in pieces



Testing and Validation

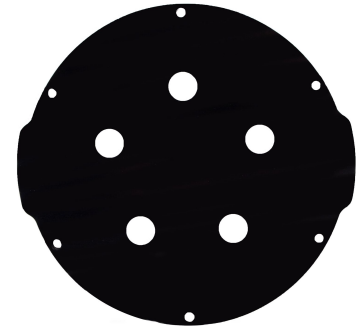
- Waterproofing
 - Cable Penetrators
- Tether
 - Tested with a Short Piece
- Testing
 - Large Tub of Water
- Ballast Weight System



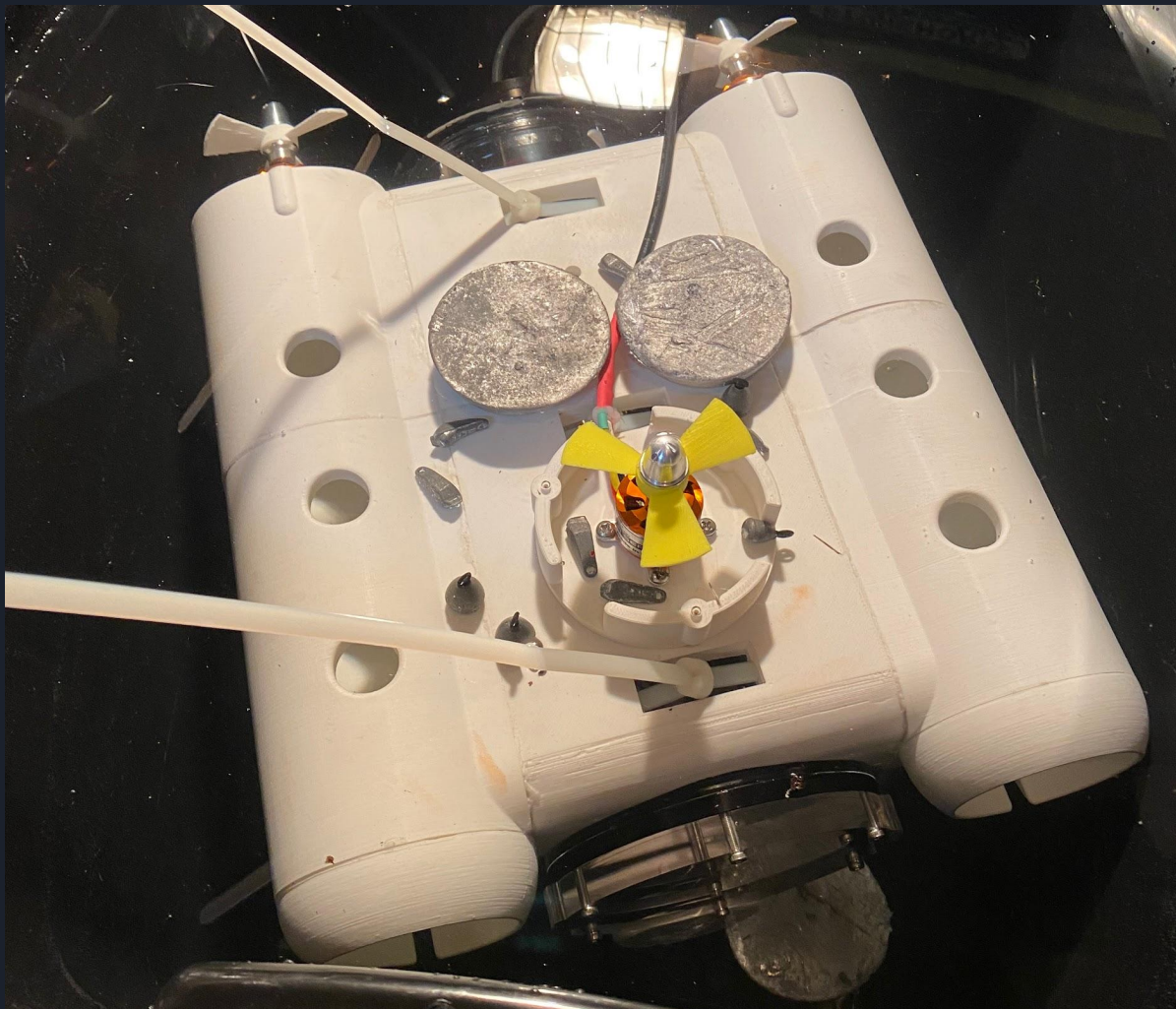
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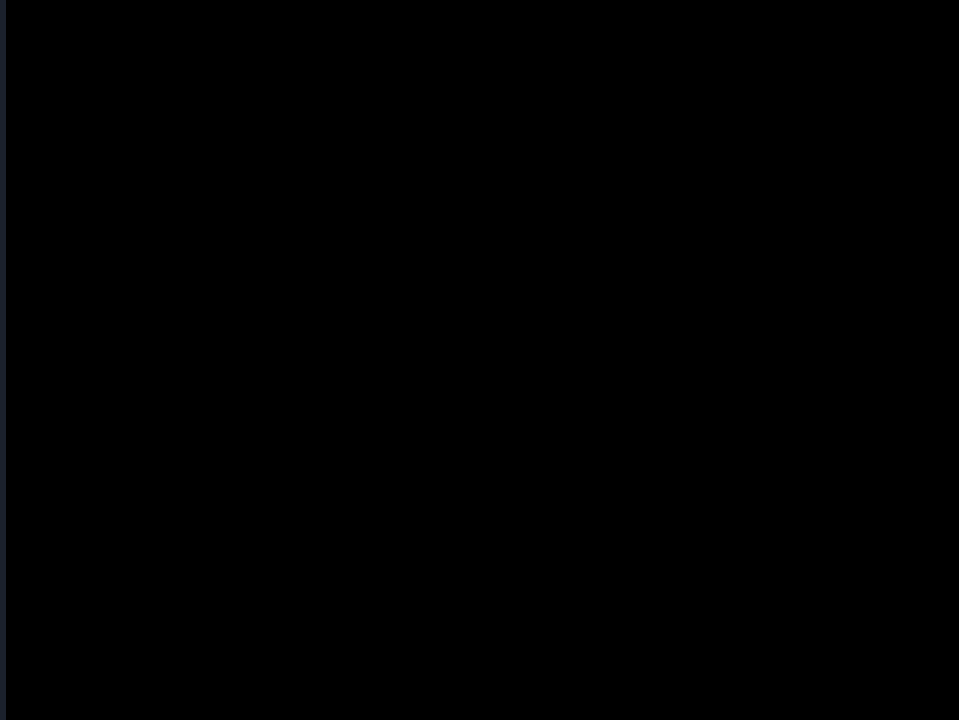
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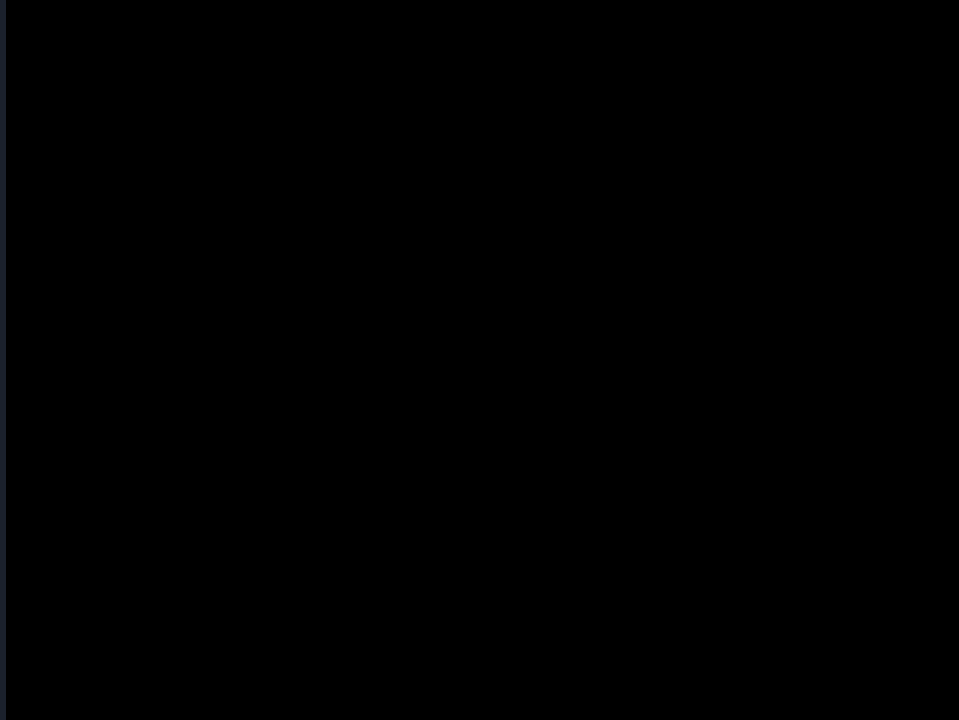


Correct Ballast Weight





Motors Running Forward and Backwards



Future Work

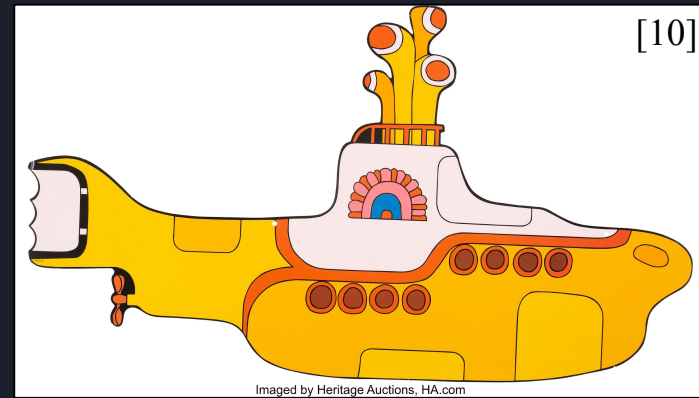
- Retrieval Method
 - Adding Another Tether
- Lights
 - Alter the Camera Cap
- Cable Tray in Enclosure
 - 3D Printed
- Battery



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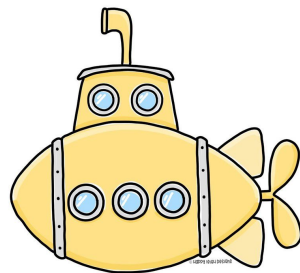
Overall Learning

- REDACTED
 - Underwater vehicles/design, remote data transfer
- REDACTED
 - Project Management
- REDACTED
 - Control system used for underwater vehicles
- REDACTED
 - 3D Printers, Shops, Word Docs
- REDACTED
 - 3D Printing



Questions?

deepest thanks



[11]



Citations

[1] <https://www.dreamstime.com/illustration/manual.html>

[2] https://openrov.dozuki.com/c/OpenROV_v2.8_%28Kit_Assembly%29

[3] <https://www.thingiverse.com/thing:2934890/comments>

[4] <https://www.ebay.com/itm/Skydroid-5-8Ghz-150CH-True-Diversity-UVC-OTG-Smartphone-FPV-Receiver-for-Android-/173971252121>

[5] <https://roboticlegends.org/resources-remote-controls/>

[6] <https://www.amazon.com/Crosman-Copperhead-BBs-EZ-Pour-Pistols/dp/B081ZSPJ9Z>

[7] <https://bluerobotics.com/store/cables-connectors/penetrators/penetrator-5mm-10-25-r1-rp/>

[8] <https://bluerobotics.com/store/watertight-enclosures/4-series/wte4-m-end-cap-5-hole-r1/>

[9] <https://www.amazon.com/Kalevel-Emitting-Headlights-Accessories-Multicolor/dp/B07M9KMOV82>

[10] <https://entertainment.ha.com/itm/music-memorabilia/memorabilia/the-beatles-yellow-submarine-large-size-promotional-cut-out/a/7221-89384.s>

[11] <https://www.happyleighdesigns.com/cards/deepest-thanks>