# Subsea Resident AUV

Memorial University of Newfoundland
Engineering Capstone Request for Funding

# Project Description

Tethered ROVs and divers are the existing goto for subsea asset inspection and intervention. These services require expensive equipment and personnel often contracted by day rates and require an additional vessel. Structure surveying and asset inspection among other hands-off tasks may be efficiently handled without the requirement for real-time communications to the observer/operator. Both ROVs and divers have surface condition limitations for launch and recovery, safety checks, and time to location procedures that are not negligible in duration or could prevent a mission from executing entirely.

An Autonomous Underwater Vehicle (AUV) that is to remain subsea indefinitely, parked in a garage on the seafloor (slightly elevated). The AUV will charge and communicate to the surface station wirelessly while docked, see Figure 1 on the following page. The AUV will fly the prescribed route on a daily schedule for preventative observation missions as required. During the mission, the AUV will gather optical surveying data, return to the garage, and upload the observed data to a surface control computer for review by a technician at a later time. Further iterations of this system could include live or post-processing anomaly detection paired with alerts for hazard prevention

The dock is expected to have an umbilical to a fixed structure/bouy on the surface providing wifi communications and fixed link/solar power supply capabilities.

# Preliminary Budget

The following is a preliminary budget of items necessary to complete the project successfully. A more detailed budget is available upon request.

| Catagory | Cost | Additional Info |
|---|---|---|
| Flight Computer | $400 | RPi 4, Coral Accelerator, ethernet adapters, etc. |
| Thrusters | $1,500 | Six Thrusters |
| Electrical | $1,600 | Sensors, PCBs, ESCs, batteries, etc. |
| Mechanical | $1,000 | Acrylic, aluminum, weights, etc. |
| Misc | $900 | Shipping, tax, duties estimate, etc. |
| **Total** | **$5,400** | |

# Donateable Items

The following commonly found components can be donated to the project to save overall costs. Upon request, donated components can be recovered after the project completion date in April of 2021.

| Component Description | Quantity | Comments |
|---|---|---|
| BR T200/T100 Thrusters | 6 | Other small subsea thrusters under 300W may work as well. |
| BlueRobotics Penetrators | 16 | Common cable penetrators, both 6mm or 8mm variety will work. |
| BlueRobotics Depth Sensor | 1 | Bar02 or Bar30 sensor. Other small pressure sensors may work as well. |
| LED Headlights | 4 | Any waterproof bright LED lights will work. |
| 18650 Batteries | 24 | 18650s, ideally of all the same mAh capacity. |
| 1/2" HDPE Stock | 4 | Require 4 sheets of 2' by 2' stock. Smaller pieces of scrap may also work, depending on their size |
| 1/4" Acrylic Stock | 1 | Require small pieces, under 1' by 1', scrap stock will work. |
| 1/16" Acrylic Stock | 1 | Require small pieces, under 1' by 1', scrap stock will work. |
| 3/8" Aluminum Stock | 1 | Require small pieces, under 1' by 1', scrap stock will work. |
| 1/8" Aluminum Stock | 1 | Require small pieces, under 1' by 1', scrap stock will work. |
| 2.5" UHMW Stock | 1 | Require a ring of stock about 6" by 8", center piece can be kept by donor. |
| 1" UHMW Stock | 1 | Require small pieces, under 6" by 6", scrap stock will work. |
| Buoyancy Weights | 1 | Lead dive weights between 1-2 pounds each are preferred. |
| IMU (BNO055) | 1 | Any small low cost IMU module works, ideally a 9-DOF module with heading. |
| 2 Pin Wetmate Connector | 1 | Small 2 Pin connector for power, Subconn / Bulgin style. |
| 8 Pin Wetmate Connector | 1 | Small 8 Pin connector for Ethernet, Subconn / Bulgin style. |
| **Total Estimated Savings** | **$3,260** | |

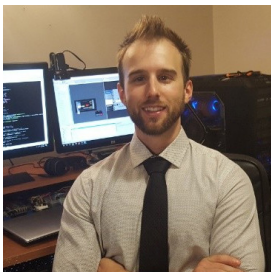
# Timeline


# Thank-you

Thank you for taking the time to review our sponsorship package! We are a passionate group of young engineering students excited to get involved in the next generation of ocean technology. Please email **msbelbin@mun.ca** if you are interested in any form of sponsorship or donation.

**Mark Belbin**
Electrical Engineering
Notable work terms:
Zoox, KLA, Solace Power, Agile Sensor Technologies.

**Mohamed Birama**
Computer Engineering
Notable work terms:
Phreesia, CoLab Software, Fytics.



**Mark Duffett**
Computer Engineering
Notable work terms:
Google, Tesla, Kraken Robotics, AOSL, C-NLOPB.

**Andrew Nash**
Computer Engineering
Notable work terms:
Bank of Canada, IBM, RBC, BlackBerry, Nalcor Energy.

**Mitchell Stride**
Electrical Engineering
Notable work terms:
Nokia, Curtiss-Wright, Kraken Robotics, ExxonMobil.

**Frank Walsh**
Electrical Engineering
Notable work terms:
Tesla, Solace Power, Nokia, Nalcor Energy.