

# Autonomous Underwater Vehicle for Lake -Floor Exploration Mapping (AUV)

Status: Filled

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Sponsor(s):

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## Project Description

Our proposal for our 2022 Spring Capstone project is an uncrewed submersible for use in the exploration and mapping of shallow freshwater reservoirs. The submersible will be designed to use minimal power while traversing long distances, delegating most of its resources for mapping the floor of lakes and other freshwater bodies of water. The submersible will be capable of returning to its launch point after collecting data.

Primary project goals include:

- Submersible modelled after the hydrodynamic shape of a glider for smooth navigation through the water with minimal turbulence.
- Propulsion with either a traditional propeller and neutral buoyancy or variable-buoyancy propulsion
- Maneuverable in 3D space with all available degrees of motion.
- Simultaneous localization and mapping (SLAM).
- Draggable rescue buoy in the event of power loss during operation.

Stretch goals include:

- Simple robotic arm to manipulate its surroundings.
- Electromagnet to anchor on metal surroundings or hold and retrieve small metal objects.
- Wireless control from an antenna mounted on the rescue buoy.
- Simple object recognition.

The AUV will rely on lithium battery power during its operation. Due to the non-renewable and limited nature of this power source, the submersible will be modelled after a sea glider design in order to preserve power by using buoyancy, gravity and hydrodynamics to assist the propulsion of the motor.

The AUV is intended to take up less than a half-meter cubed of space, although the specifics of the design are flexible to best meet project parameters. Additionally, a system to manipulate buoyancy of the craft will be developed to allow for better vertical movement and quick resurfacing should a problem occur. The shape and propulsion system will allow the craft to be able to achieve sufficient velocity for long-range mapping. Though speed is not a priority and can be sacrificed in favour of imaging quality and power efficiency.