

# Progress Report #6

AUV Project

Phase II



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## **Progress Report #6**

This fall 2023 phase II independent study project constitutes the continuation of the design and development of a proof-of concept autonomous underwater vehicle (AUV) from the spring 2023 phase I independent study with the intention of constructing a secondary AUV in the spring 2024 semester. This proof-of-concept AUV will be capable of meeting all technical requirements to participate in the *2024 International Robosub Competition* [1]. Progress reports #4, #5, and #6 will document the technical development of the project. Progress report #6 is part of milestone #3 out of the five milestones that constitute the project.

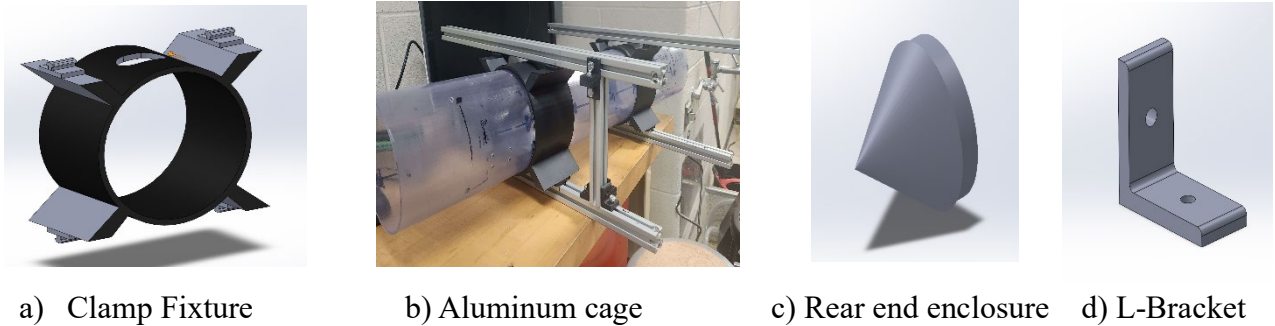
### ***Executive Summary***

The project is currently in between milestone #2 and milestone #3, completion of unified overall prototype concept design, and the physical build of the AUV, respectively. Completed tasks consist of a completed overall hull design, torpedo/marker system, and robotic arm. Current tasks underway consist of drafting an Advanced Robotics sponsorship brochure, 3D printing of mechanical components, finalization of the electronic block diagram, and the physical build of the AUV. The physical build of the AUV will consist of assembling mechanical components, hardwiring of electronic components, and basic programming of the AUV for basic operation. Next month's tasks include finalization of the physical build of the AUV and beginning the tasks of milestone #4.

### ***Completed Tasks***

The overall hull concept prototype design is complete and consists of a cylindrical hull with a surrounding aluminum boxed framed cage. The overall hull utilizes clamp fixtures with a T-slot attachment for hooking onto the aluminum cage and custom designed L-brackets for securing the cage together. The AUV will have an aerodynamic rear end enclosure and the front

end will have a dome enclosure. The clamp fixture, the AUV with the surrounding cage, the L-brackets, and the rear end enclosure are each shown in *Figure 1*.



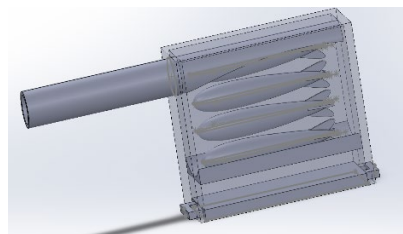
**Figure 1: Components of the AUV Hull**

The robotic arm prototype concept design is nearly complete, pending the T-slot CAD attachment. The final robotic arm will either use a custom design with an attached commercial off-the-shelf gripper, or a selected commercial off-the-shelf arm as shown in *Figure 2*.



**Figure 2: Custom Designed Robotic arm or COTS arm**

The torpedo/marker prototype concept design is nearly complete as shown in *Figure 3* currently updated with the addition of markers and pending the T-slot attachment.

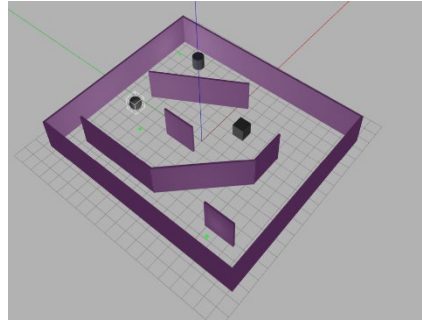


**Figure 3: Updated Torpedo system with the addition of markers**

The electronic bay and rail system concept prototype is complete. The electrical team has successfully been able to test, obtain, and read LIDAR sensor data in an atmospheric environment as well as successfully initialized and ran Gazebo, a computer simulation software for the AUV as shown in **Figure 4**.



a) LIDAR program test



b) Gazebo Simulator

**Figure 4: LIDAR sensor testing and Gazebo simulator initialization**

### *Current Tasks Underway*

Finalizing the parts list from the first draft submission and drafting of the sponsorship brochure for the team is currently in progress pending completion of the updated overall prototype design AUV CAD model. 3D printing of the torpedo system, the electronic bay and rail system, clamp fixture, rear end enclosure, and L-brackets have started. Pending a decision on the robotic arm, the electronic block diagram is undergoing finalization and a custom designed thruster mount with the T-slot frame attachment is currently underway for attaching the thrusters to the aluminum cage. Testing of the AUV's sensors to read and obtain data has begun.

### *Upcoming tasks*

Upcoming tasks this month consist of ordering all parts, securing sponsorship funding, physical assembly, and electronic hardwiring of the AUV. Next month's tasks consist of finalizing the build of the AUV as well as inputting basic programming for the AUV to function properly and basic testing of the AUV to perform basic operations.

## References

- [1] “About,” *RoboSub*. <https://robosub.org/about/> (accessed Sep. 24, 2023).