

Mission Pacific

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Introduction

There is enough trash in the Pacific Ocean to cover more than twice the surface area of the state of Texas, and more garbage is finding its way into the ocean every day. Current efforts to remove debris are slow and require crewed ships to pick up the collected trash. Our goal at Mission Pacific is to prototype a system that will automate the garbage removal process.

Design Goals

Prototype an small scale aquatic device that can follow a predetermined path and collect floating surface debris. Upon completion will know the necessary specifications and of a full-scale production model that can affect the current clean up process.

Analysis

In order for our system to be feasible we had to ensure that the prototype would be both waterproof and buoyant. We decided to make the pontoons from a fiberglass layup because of its waterproof characteristics (training and materials provided by SLCC). It was also determined our max carrying capacity of 215 lbs., which is ~twice the weight of the device, using Archimedes' buoyancy principle.

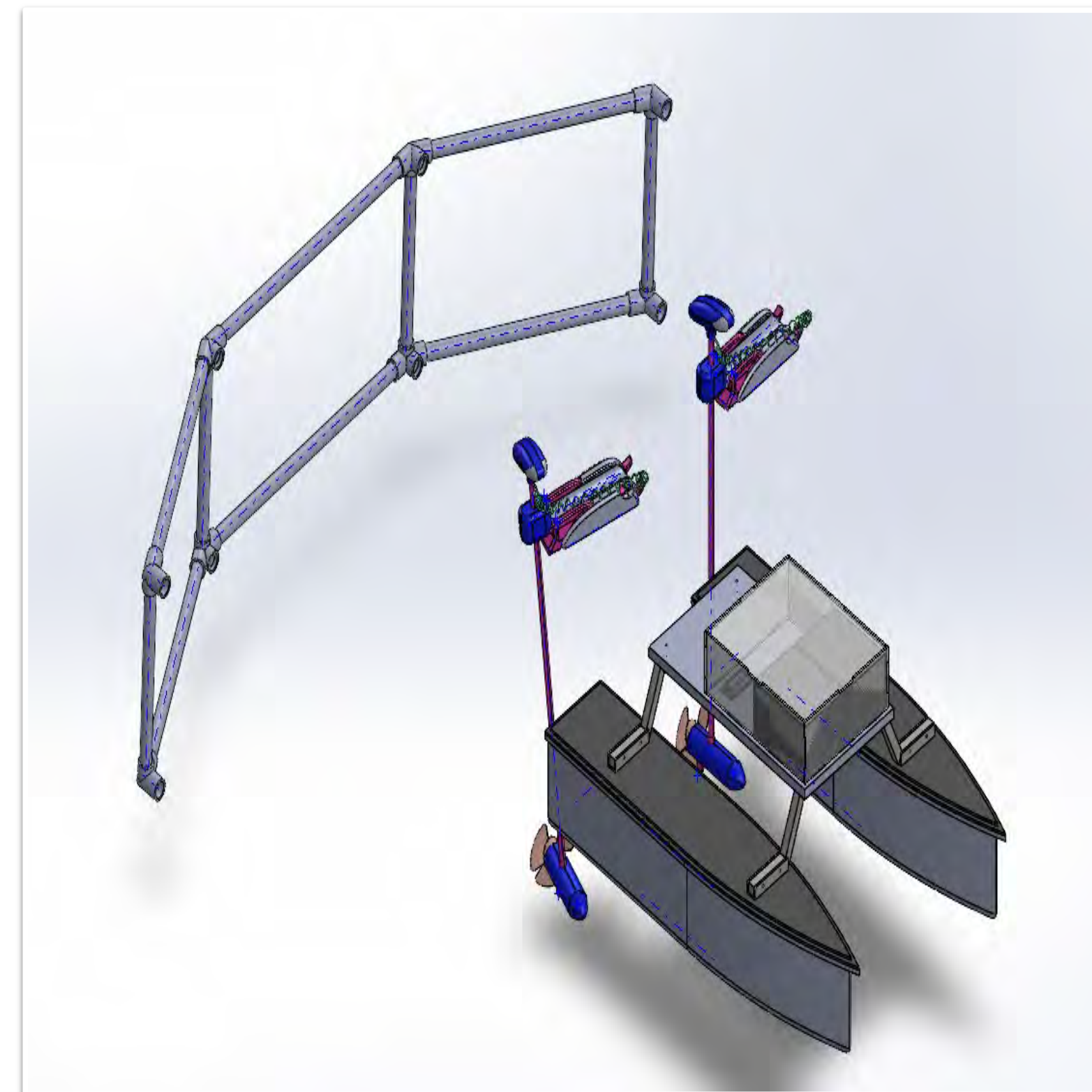


Figure 1. 3D rendering of the prototype design

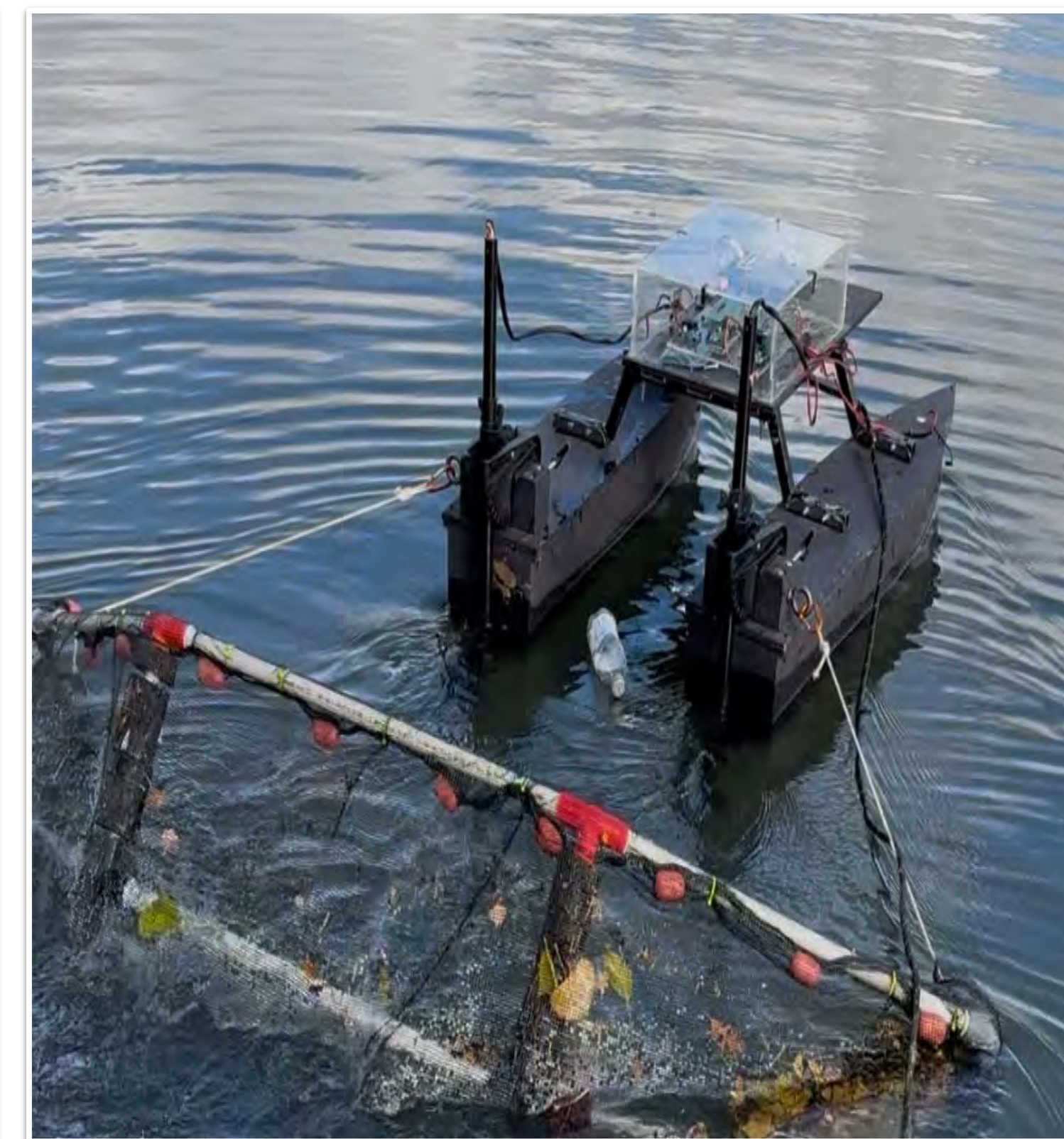


Figure 2. Picture of our prototype performing critical function test

Results

After testing our device in the field Mission Pacific demonstrated that the device is able to follow a predetermined path and collect trash. Our prototype also has the operating characteristics listed in table 1 and are compared to the full scale production needs. Since our design is a small scale prototype table 1 compares our small scale characteristic to what would be required for a full scale operation and what change would require to achieve that requirement. We can then conclude what changes would need to be made for a full scale prototype that would improve the ocean clean up efforts.

Characteristic	Small Scale (Output)	Large Scale (Requirement)
Operating Speed	4.9 ft/s	> 6.0 ft/s
Output Force	22 lbs	2000 lbs.
Operating Time	4 hrs	10 hrs
Max Weight	200 lbs	500 lbs

Table 1. Output characteristic of our device compared to the full scale requirement

Conclusion

In order for a device of this type to have an effect on the garbage in the pacific ocean it would have to collect more trash than other existing devices. From our results we can conclude that a full scale prototype that would achieve this goal would need two 20 HP motors, two 12 V 400 Ah batteries, and the surface area of the pontoons would need to increase by 150%. All told a full scale prototype would cost \$10,000, remove at least 300 kg in 4 hours with an effective range of 40 mi. per vehicle. With a swarm of these vehicles operating continuously we could have an effect on the ocean clean up efforts.