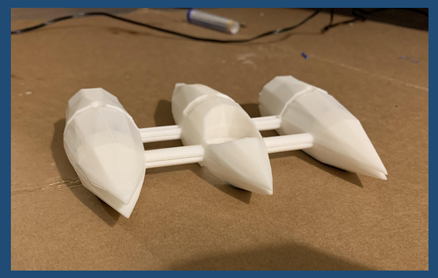
Innovation Challenge



Design #1

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Design #2

Abstract

We selected the Innovation Challenge that requires members to design a prototype to collect microplastics with SeaPerch. We did this because we have the resources to build and test a prototype that fits this function.

Our prediction and objective this year was to create an ROV that is a successful and viable resource for pollutant collection in the ocean.

Background & Motivation

We picked this project because this is a real world application of our Seaperch and engineering skills that impacts a cause we a passionate about. Plastic pollution is a serious issue affecting our marine life and ecosystem. The Ellen MacArthur Foundation says “There will be more plastic in our oceans than fish in 2050.” As well as 100% of the mussels tested by Plastic™ Oceans contained microplastics.

This innovation challenge allowed us, highschool students, make an impact on a global scale.

Methodology

We approached this project with the impression that we would use 3-d printing. This is because we are in open division which allows 3-d printing, as well as having the materials to do so locally. Our approach evolved over time as we had 2 main designs. We utilized 3D filament for our prototype.

Our design #1 experimented with a torpedo-shaped ROV. This design was incredibly hydrodynamic and could travel quickly with minimal drag. With the nose of the torpedo being center and pointy, we tried utilizing it to serve as a sufficient hook.

Our design #2 experimented with a more dedicated hook and a hollow outside inside to allow us to grab the floating garbage. The open body now allows us to be able to reach the floating garbage in the garbage patch. We have a more efficient design with the incorporation of two hydrofoils and motor casings directly attached to the ROV.

Our final design was the fastest that we tested and possessed a versatile hook that can fold back while not in use.

Results & Discussion

Through designing and testing, we found that our second design was better suited for the mission course as well as the obstacle course. This was surprising as we predicted that we would lose speed in the obstacle course by using design #2. Through this process our team has learnt how to improve upon our designs after examining data, while also keeping elements from previous designs that are beneficial.

Test #	Design #1- Time (minutes)	Design #2- Time (minutes)
1	3:31	2:36
2	3:46	2:27
3	3:28	2:15
Average	**3:32**	**2:25**

Conclusion

Ultimately, our objective for this project was to design, build, and test an innovative SeaPerch model. Our results have indicated success in achieving our objective. However, this year has helped us develop a stronger sense of cohesiveness and resiliency as we continue to learn, adapt, and develop a better understanding of the design process.

Next Steps

Moving forward, we look forward to continue testing and redesigning our ROV for improved performance and efficiency. The special circumstances of this year have led us to ponder how we can improve the collaborative design process and the sustainability of our resources. Beyond that, we hope to explore new development techniques.

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