Nets, Not Neglect :

How a 5th Grade Team is Helping Save Our Coral Reefs

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Abstract

Our team, PB & Jellyfish, is passionate about protecting both our community and the ecosystems that depend on healthy waterways. Inspired by this year's SeaPerch theme of coral restoration, we designed a project focused on using our ROV to remove trash and debris from local lakes and bayous - pollution that ultimately threatens marine habitats, including coral reefs.

We selected this project after noticing the amount of litter accumulating in our neighborhood waterways and realizing the long-term impact that pollution can have on aquatic life. Our original hypothesis was simple: if we could use our ROV to clean up debris, we could help protect sea life and improve our environment. However, as we collected materials, we realized we could take our idea a step further by sorting, recycling, and repurposing what we removed - giving trash a second life and reducing the need for new resources.

The outcome exceeded our expectations. Not only did we successfully collect and remove harmful debris using our ROV, but we also developed a sustainable system to recycle the materials into useful items, creating a full-circle environmental solution. Through teamwork, innovation, and a lot of testing, because we turned a local cleanup project into a model for global impact—even small actions can ripple all the way to the reefs.

Background & Motivation

Team PB & Jellyfish was inspired to take action after learning about the harmful impact of pollution on aquatic ecosystems. As students who deeply care about sea life and the health of our environment, we wanted to use our SeaPerch ROV to do more than just compete - we wanted to make a real difference in our own community.

We noticed that trash like plastic bottles, wrappers, and cans often end up in local lakes, bayous, and rivers. These items don't just make our environment look bad - they hurt the plants and animals living there and can eventually affect larger ecosystems, including coral reefs. Since traditional cleanup methods are mostly done from the surface, we saw a need for a tool that could reach underwater debris more effectively.

By attaching a net to our ROV, we created a way to collect not only surface debris, but additionally submerged trash with precision, helping to restore cleaner, safer habitats for aquatic life. Our project grew from the idea that even a small team with the right tools and motivation could improve the health of local waterways - and by extension, help protect coral reefs and ocean environments far beyond our neighborhood.

This innovation is important to us not only because it supports marine life, but because it proves that young people can engineer real solutions to real problems.

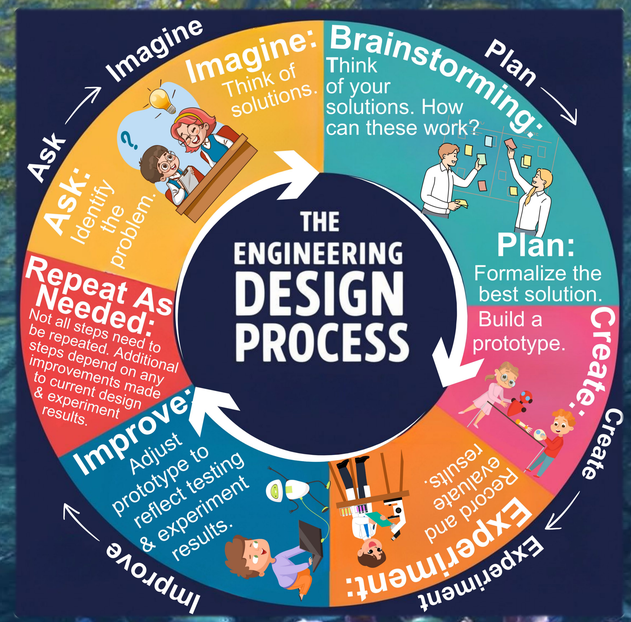
Methodology

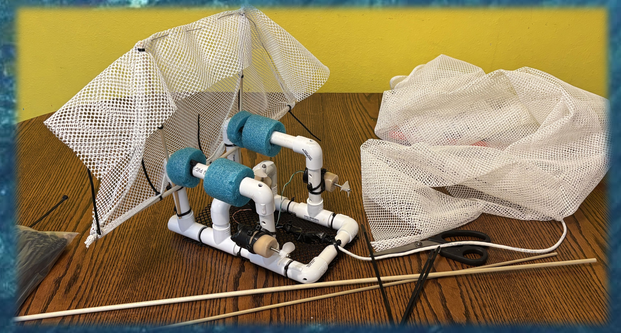
To begin our project, we asked ourselves: "How can we use our ROV to help protect aquatic life in our own neighborhood?" Our team noticed a lot of pollution in nearby lakes and bayous - especially plastic bottles, wrappers, and cans - and decided to use our SeaPerch ROV to help clean it up. Since we are passionate about protecting sea creatures and their habitats, we wanted to find a way to remove trash from underwater where people can't easily reach.

Our first step was to design and test a lightweight, removable net attachment that could be added to our ROV without limiting its movement. After some trial and error, we found a mesh size that could catch both large and small items without slowing down the ROV. We used zip ties, mesh netting, and waterproof clips to create our design.

At first, we focused only on collecting debris. But after a few cleanups, we realized much of the trash we gathered could be recycled. That led us to a new idea: sorting and reusing materials at a local recycling center to give them a second life. This shifted our project from just cleaning up to creating a full cycle of sustainability.

We documented each step by taking pictures and videos during testing, cleanup missions, and recycling trips. These visuals help show how our approach evolved over time and how a simple idea turned into something bigger - with real environmental impact.



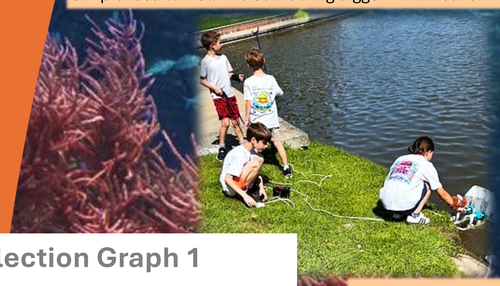


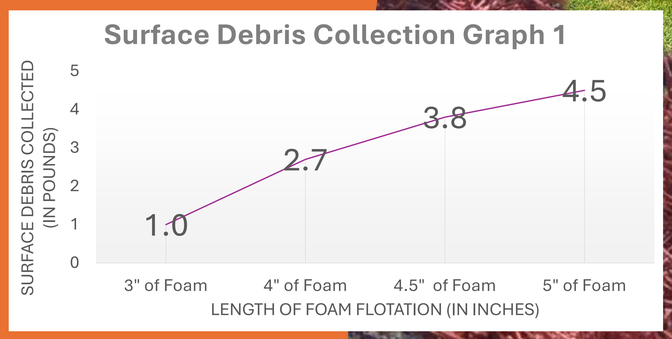
Conclusion

The goal of our project was to design a way to remove underwater trash using our SeaPerch ROV, helping protect aquatic habitats and raise awareness in our local community. We not only met that goal - we also expanded it. By attaching a custom net system to our ROV, we collected over 12 pounds of debris from neighborhood waterways, and then sorted, recycled, and repurposed what we found to give it a second life.

Our invention didn't just clean the environment - it made a real impact on us, too. We learned that with creativity, teamwork, and the right tools, even young students can engineer solutions that matter. Seeing our idea help our local lakes and bayous gave us pride and motivation to keep going.

This experience opened our eyes to the world of environmental engineering and taught us that we're capable of building something with a purpose. We are thankful to SeaPerch for giving us the chance to grow as innovators and make a difference in both our community - and the world.





Results & Discussion

During initial testing, we discovered that attaching the netting system added extra weight to our ROV, which required adjustments to its buoyancy. As shown in Table 1, our buoyancy tests revealed that shifting from neutral to slightly positive buoyancy led to the best performance for collecting debris. Using the Engineering Design Process, we refined our design through multiple trials until we found the right balance of flotation and maneuverability.

Final testing and real-world cleanups confirmed that our ROV net design was not only effective - it was transformative. We successfully gathered a wide range of surface debris, including plastic wrappers, aluminum cans, bottles, and tangled fishing line. One unexpected finding was that our ROV could also transport objects underwater, not just remove them. This surprising capability sparked new ideas about how our design might one day support coral reef restoration, such as delivering coral fragments or restoration materials to hard-to-reach areas.

Over the course of several cleanup events, our team collected and recorded more than 12 pounds of trash from local lakes and bayous (Graph 1). After each mission, we sorted and delivered recyclable materials to a local facility, reinforcing our commitment to sustainability and the concept of giving discarded items a new purpose.

Throughout this project, we gained meaningful insights into environmental stewardship, collaboration, and the power of innovation. We learned that even small engineering efforts - when guided by purpose - can make a significant difference in the health of our planet. Most of all, we learned that young people can be powerful problem-solvers and change-makers.

This experience has motivated us to keep improving our design and pushing the limits of what our ROV can do. With each new mission, PB & Jellyfish moves closer to a cleaner community and a healthier future for coral reefs everywhere.

Table 1

Foam Flotation Length	Buoyancy
(Original) 3"	Negative
4"	Slightly Negative
4.5"	Neutral
5"	Slightly Positive

Next Steps

After successfully using our SeaPerch ROV to remove and recycle debris from local lakes and bayous, PB & Jellyfish is excited to take our innovation further - into the ocean. We believe that protecting marine ecosystems at all levels, especially fragile coral reefs, is critical to the health of our planet. Our next objective is to adapt our design for larger, deeper, and more challenging underwater environments.

To prepare for this transition, we've identified several important questions to explore:

- How deep can our current ROV safely travel with its existing structure and electronics?
- Can we integrate a camera system into our ROV, and if so, what adjustments would be needed to improve visibility and lighting in darker or deeper water?
- Is the current size and weight of our ROV suitable for ocean currents, or should we modify the frame for greater control?
- How can we enhance our buoyancy system to remain stable as we explore different depths?

We are also excited by the idea of expanding our ROV's capabilities to support coral reef restoration - such as transporting coral fragments or placing reef-safe materials in specific locations. These next steps will allow us to continue evolving our design while working toward even greater environmental impact.

With each improvement, our ROV becomes not just a student-built robot, but a real-world tool for change.

Acknowledgments

Team PB & Jellyfish is incredibly grateful to everyone who supported our project and mission to protect local waterways and coral reefs.

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Finally, thank you to the entire Savannah Lakes Elementary community for inspiring us to make a difference. Your support helped us turn big ideas into real-world action.