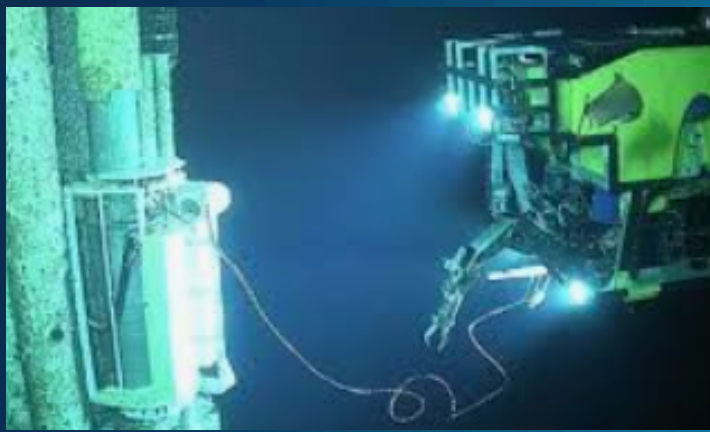


HOW DO ROVS HELP PROTECT AND SECURE OUR SUBMARINES?

Abstract

Students will have to modify their ROVs by adding cameras, sensors, and sonar to inspect submarines. They will check the hull's condition, the propulsion systems, and any structural damage without needing to take the submarine out of the water or send people into dangerous situations.



Methodology

1. Add two to three waterproof navigation sensors to the ROV.
2. Install at least one camera, adding more if needed.
3. Attach waterproof lights for underwater visibility.
4. Add a controllable claw or arm that can be used to help fix or clean parts of the submarine.
5. Pilot the ROV through the water to inspect the submarine.

Background and Motivation

We chose this topic because Lucas's dad works at a shipyard. We think using ROVs to inspect submarines is very important. Where we live, many people work on submarines every day, and they often need safe ways to check equipment in different situations.



Results and Discussion from Research

Using ROVs to inspect submarines helps protect people's lives. Without ROVs, divers would have to go underwater to inspect submarines, and they would need to come up often to change their air, which can be dangerous. ROVs can stay underwater much longer and do the job more safely. They can also be equipped with lights and sensors to find damage, leaks, and other problems.

The Navy also uses ROVs for more advanced tasks. For example, the Yellow Moray uses high-resolution sonar to map the ocean floor and find underwater objects. It can scan in 360 degrees and create 3D models. Submarine forces also rely on advanced systems to connect air, land, sea, space, and cyber operations while keeping submarines hidden and effective.

We believe even an ROV as small and inexpensive as ours could be used to check subs, docking units, and use sensors to detect leaks. We hope to add sensors and test this in our local lake this summer to help with dock maintenance.

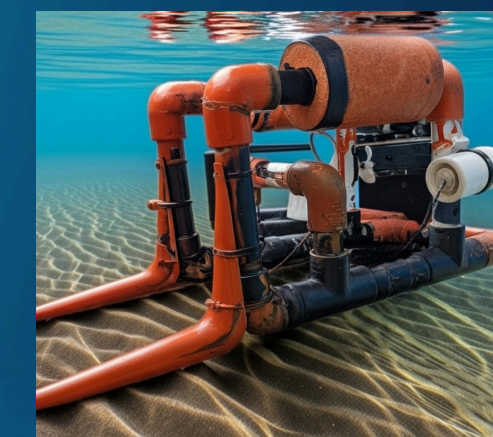
Conclusion

Through this project, students learn how important ROVs are for inspections at the shipyard. They also understand that ROVs will continue to be used in many different situations in the future.



Next Steps

- We can improve our ROV by adding more sensors and additional cameras.
- Our ROV can also be used to inspect other things, such as docks, boat hulls, and the seabed.
- We plan to add these new sensors and cameras after the international competition.
- After making these upgrades, we will test the new components in a protected bay in Lake Winnepesaukee.
- This will allow us to help friends and family check their boats, docks, and other water equipment.



Resources

- Ocean Explorers ROVs
 - <https://oceanexplorer.noaa.gov/technology/subs-rovs/>
- Deep Trekker ROVs
 - <https://tinyurl.com/yzacce9b>
- US Naval Institute UVVs
 - <https://www.usni.org/magazines/proceedings/2025/october/how-new-technologies-are-making-submarine-force-more-lethal>

