ENGINEERING THE DEEP: COMMERCIAL DIVING

Panthrix

BACKGROUND & MOTIVATION

- We chose this project because we're fascinated by how technology continues to transform the way things work in different industries.
- Exploring how ROV's are used in underwater operations allowed us to learn more about robotics, engineering, and ROV's in the real world.
- This project is important because commercial diving is very risky and puts safety, precision, and accessibility in a crucial position.
- ROV's reduce the need for humans in high risk environments

- ROVs or remotely operated vehicles are uncrewed underwater machines controlled by pilots at the surface.
- Commercial diving is a field that specializes in underwater work for different industry like oil, construction, shipping, etc.
- These ROVs are equipped with cameras, lights, robotic arms, sonar, and sensors which allow them to inspect, repair, manipulate, etc. Underwater without human involvement
- As underwater industries grow and the monitoring of our environment progresses the demands for these ROVs will grow.

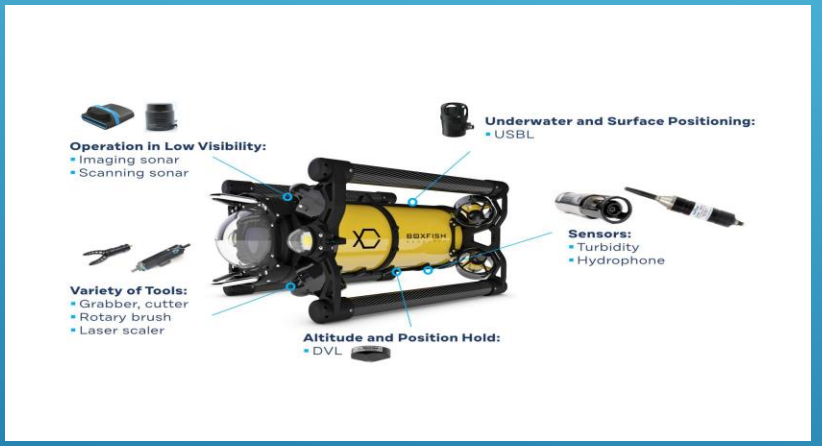
AQUA-ASSIST

- Purpose: To assist commercial divers by providing real-time visual support, object retrieval, and tool handling in environments too risky or deep for human access.
- Key Features:
- 360° camera system for visibility around underwater structures
- Robotic claw arm to grip or manipulate objects/tools
- Modular tool bay (can carry wrenches, welding torch, etc.)
- Sonar sensors to navigate murky water and avoid obstacles
- Buoyancy control system for stability at different depths
- Surface-tethered for real-time control and power

- Waterproof container (large tub or aquarium)
- Small plastic box (ROV body)
- Waterproof camera or phone Foam pieces or pool noodles (for buoyancy)
- Coins or washers (for ballast/weight)
- Toy robotic claw String or wires (to simulate tether control)

USAGE WAYS AND ADVANTAGES

- Rov's can be used to help survey and map the seabed when working on Construction projects.
- They are useful in recovery operations by swiftly locating and retrieving objects that have fallen.
- ROV's can explore potentially dangerous zones in which humans can't. For example, strong currents, contaminated water, extremely deep waters, etc.
- This alternative provides no risk to human life in extreme notes.
- You can operate in deeper waters as humans can only go so far.
- ROV's can stay submerged underwater for hours even days



DISADVANTAGES & CONCLUSION

- Robots can break down or stop working, especially in tough underwater conditions. This causes delays and could cost a lot of money for repair.
- Robots usually do only what they are programmed or told to do. If something happens, they can’t handle it on their own.
- Robots can't see and understand their surroundings, especially when the water is hard to see through.
- ROV's signal can lag, especially deep underwater or in bad conditions.
- ROV's don't have the same reaction skills such as a human divers. Jobs like small repairs or checking complicated places need a person's skill and judgement.
- The development and use of ROVs in commercial diving represents a major step forward in safety, efficiency, and technological innovation. By reducing the need for human divers in dangerous underwater environments, ROVs protect lives while expanding the capabilities of underwater industries. Our conceptual ROV design, AquaAssist, showcases how a compact, modular vehicle can support real-world operations—handling tools, providing visibility, and navigating with precision. Through our experiment, we demonstrated core functions like buoyancy control and remote object retrieval, proving that even a small-scale prototype can reflect the real-world impact of this technology. As advancements continue, ROVs will play an even larger role in reshaping how we explore, repair, and interact with the underwater world.

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