Design of Underwater Vehicle

Introduction:

- The document details the design and development of a Remotely Operated Vehicle (ROV), which is a versatile underwater tool used for various tasks without a human occupant.
- The ROV is controlled from the surface via cables or wireless communication and is equipped with cameras, lights, and sensors.

Objectives:

- To design an unmanned underwater drone capable of exploration and detection of underwater hostile activities.
- Ensure safe storage for electrical control systems with a waterproof compartment for electronics.
- Make the design cost-effective.

Key Features:

- The underwater drone features intuitive control using an FS-i6S controller and receiver.
- It has a 3D printed design for customizable and efficient body construction.
- Enhanced vision is provided by a Raspberry Pi-powered camera, and autonomous capabilities are enabled by the Pixhawk flight controller.
- Four thrusters with dedicated electronic speed controllers (ESCs) ensure efficient propulsion.
- The drone transmits real-time video and sensor data back to the operator and has a modular design for easy maintenance.

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Applications:

- The ROV is useful for underwater exploration, data recording, and inspections in the offshore oil and gas industry.
- It aids in hydroelectric and dam inspections, military and defense operations, search and recovery missions, aquaculture, and infrastructure inspections.

Methodology:

- The ROV model was created in SolidWorks and 3D printed, with an acrylic tube used to house electronics for waterproofing.
- Key components include the Pixhawk flight controller, brushless DC motors (thrusters), ESCs, a power distribution board, a battery, GPS, and more.
- Control is achieved using an FS-i6S controller and QGroundControl software.
- The assembly involved integrating 3D printed parts and ensuring no water leakage.

Design Phases:

- **Phase 1: Conceptual Design:** Focused on translating ideas into a feasible design plan. The vessel shape is cylindrical with a hemispherical dome to combine stability with aerodynamic advantages.
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Outer Cover of the Underwater Drone

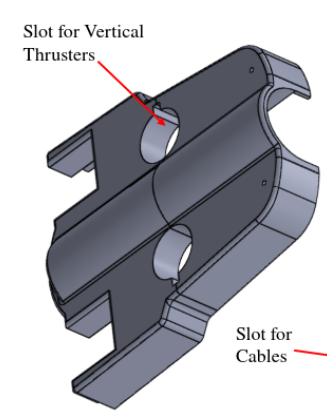


Fig: Upper part of the body

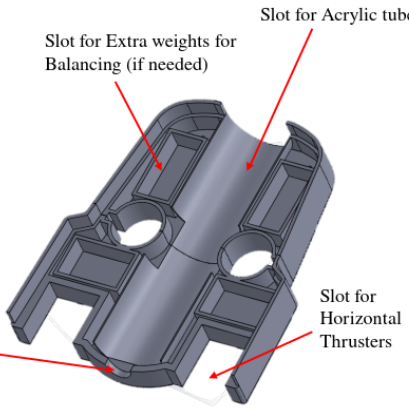
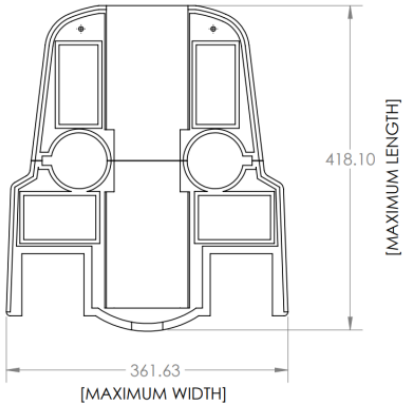


Fig: Lower part of the body



All dimensions are in mm

- **Phase 2: Embodiment Design:** Involves design configuration and analysis, defining shapes, dimensions, and materials, and creating 3D CAD models.

- **Phase 3: Detailed Design:** Specifies complete geometry, materials, and tolerances, with detailed assembly drawings and parts lists for manufacturing.

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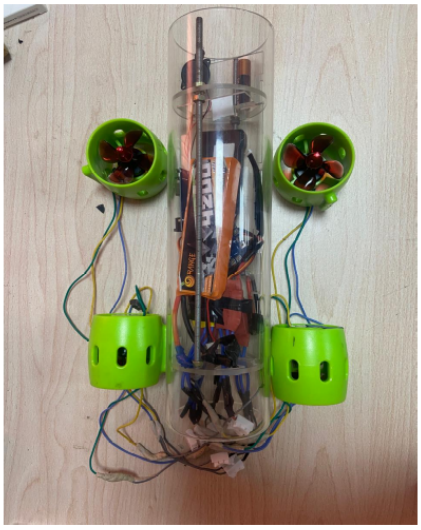
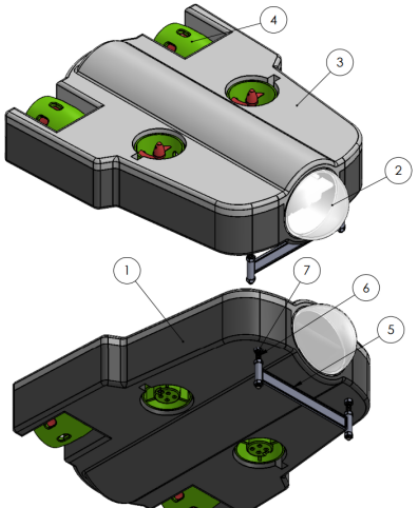
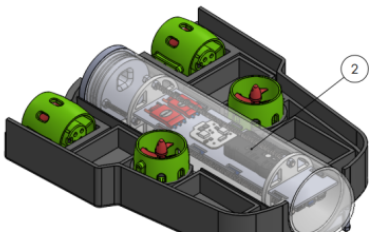
Assembly of Components



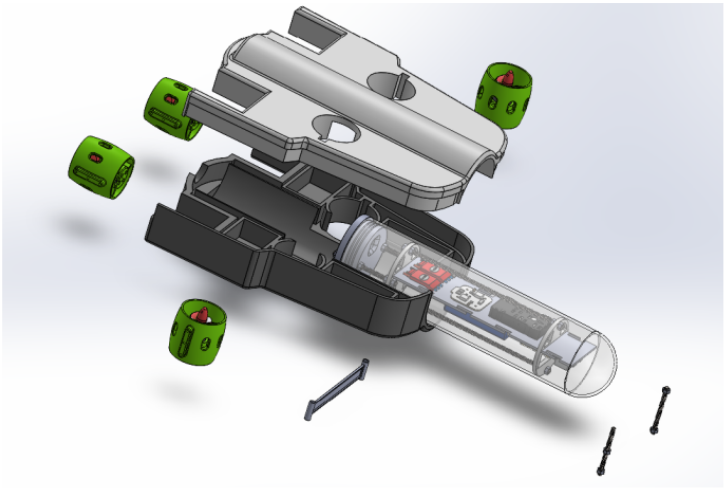
Collapsed View



ITEM NO.	PART NAME	QTY.
1	Lower Cover	1
2	Acrylic_Tube_Inner_Frame	1
3	Upper_Cover	1
4	Underwater Thruster Brushless Motor 4 Blade Propeller	4
5	LED Slot	1
6	Stick LED	2
7	Nut	8



Exploded View



Conclusion:

- The document provides a comprehensive overview of the design and development of an ROV, highlighting its objectives, key features, applications, and detailed design methodology.
- The ROV is presented as a cost-effective and versatile tool for a range of underwater tasks and environments