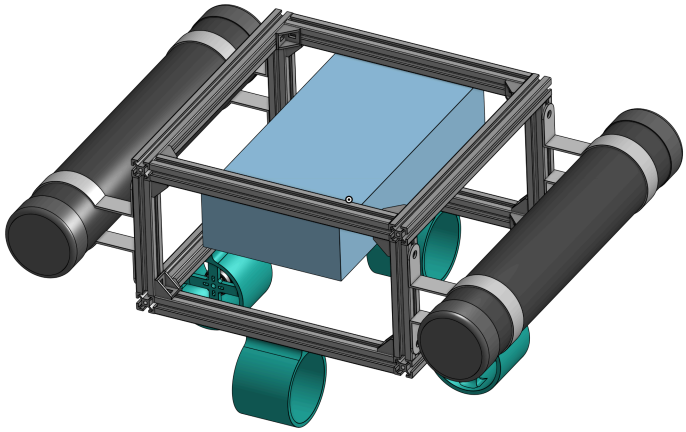
Surface Level Vehicle (SLV)

An autonomous surface water robot

Introduction:

The Surface Level Vehicle (SLV) is an unmanned watercraft designed for surface-level operations. This incorporates a lightweight, durable aluminum extrusion frame for structural support, enhancing stability, modularity, and ease of assembly. Propelled by four BLDC motors, equipped with GPS for autonomous navigation, and buoyed by air-filled PVC pipes, this SLV is designed for efficient and precise operations.



Isometric View

2. Design and Construction

2.1. Structural Design

- The ASV's mainframe is constructed using aluminum extrusions, offering:
  Lightweight durability: Resistant to corrosion and suitable for marine environments.
  Modularity: Easy assembly, disassembly, and customization.
  High strength-to-weight ratio: Ensures robustness while minimizing weight.
- The aluminum extrusion frame provides a rigid platform for mounting motors, electronic components, and sensors.
- Two air-filled PVC pipes are securely attached to the aluminum frame, serving as floatation devices. These pipes are placed parallel to each other to maximize stability in water.

2.2. Propulsion System

- Four high-RPM BLDC motors are mounted symmetrically on the aluminum frame.
- The motor mounts are designed for easy installation and maintenance.
- Waterproof propeller systems ensure efficient propulsion.

2.3. Navigation System

- A GPS module is integrated for precise waypoint tracking and autonomous navigation.
- The navigation system is housed in a waterproof enclosure mounted on the aluminum frame.

2.4. Power System

- The ASV is powered by rechargeable batteries securely mounted on the aluminum structure.
- Wiring is neatly routed through the aluminum channels for protection and aesthetics.

4. Applications

1. Environmental Monitoring: Collecting water quality and biodiversity data.
2. Hydrographic Surveys: Mapping underwater terrain.
3. Scientific Research: Supporting experiments and data collection in aquatic environments.
4. Search and Rescue: Locating missing objects or individuals in water bodies.

5. Future Scope

1. Solar Power Integration:
   - Aluminum extrusions provide a stable platform for mounting solar panels.
2. Advanced Sensors:
   - Easy installation of sonar, LIDAR, or water quality sensors on the frame.
3. Hydrodynamic Design:
   - Exploring streamlined PVC pipe shapes for reduced drag and improved efficiency.
4. Multi-Mission Capability:
   - Modular frame allows for quick reconfiguration for different missions.