REMOTELY OPERATED MICRO SUBMARINE ROBOT

Project Reference No.: *45S_BE_4250*

College ***:*** *Vidyavardhaka College of Engineering, Mysuru*
Branch ***:*** *Mechanical Engineering*
Guide(s) ***:*** *Dr. S A Mohan Krishna*
Student(S) ***:*** *Sukhesh R*
Nithin Pal
Sharath Kumar D
Saamat Riyan

Keywords:

Remotely operated micro submarine robots; Active buoyancy control; Live streaming functionality; Deep sea exploration; Compressed air

Introduction:

Remotely operated micro submarine robots (ROMSR) are robots tethered to the ship wirelessly. Scientists on the ship manipulate an ROMSR through a wireless radio link which connects the robot to the ship. ROMSR can reach great depths and stay there for extended periods. This can be used for search and rescue operation, deep sea exploration and also internet backbone i.e., underwater optical fiber maintenance and surveillance, military -navy operation, etc.

The following points correspond to the problem statement -

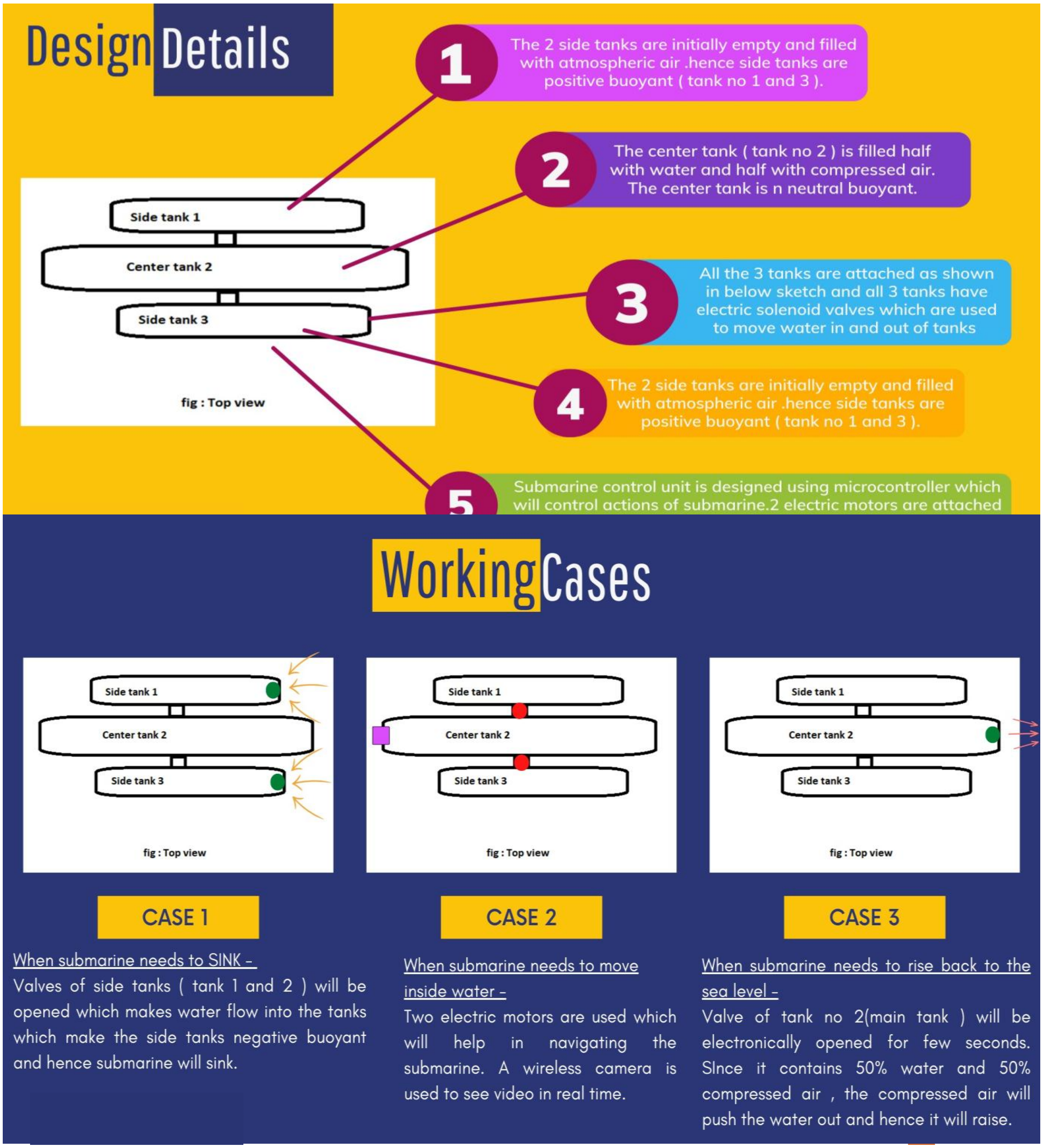
- Optical fiber cable - Corrosion causes the lines to break. Hence, preinstalled micro submarine can detect corrosion in the early stages and prevent major losses.
- Search and rescue operations - Easily maneuverable micro submarines can lead to efficient detection of certain object by local authorities.
- Stealth defense purposes - To detect any incoming torpedo or water borne projectiles.

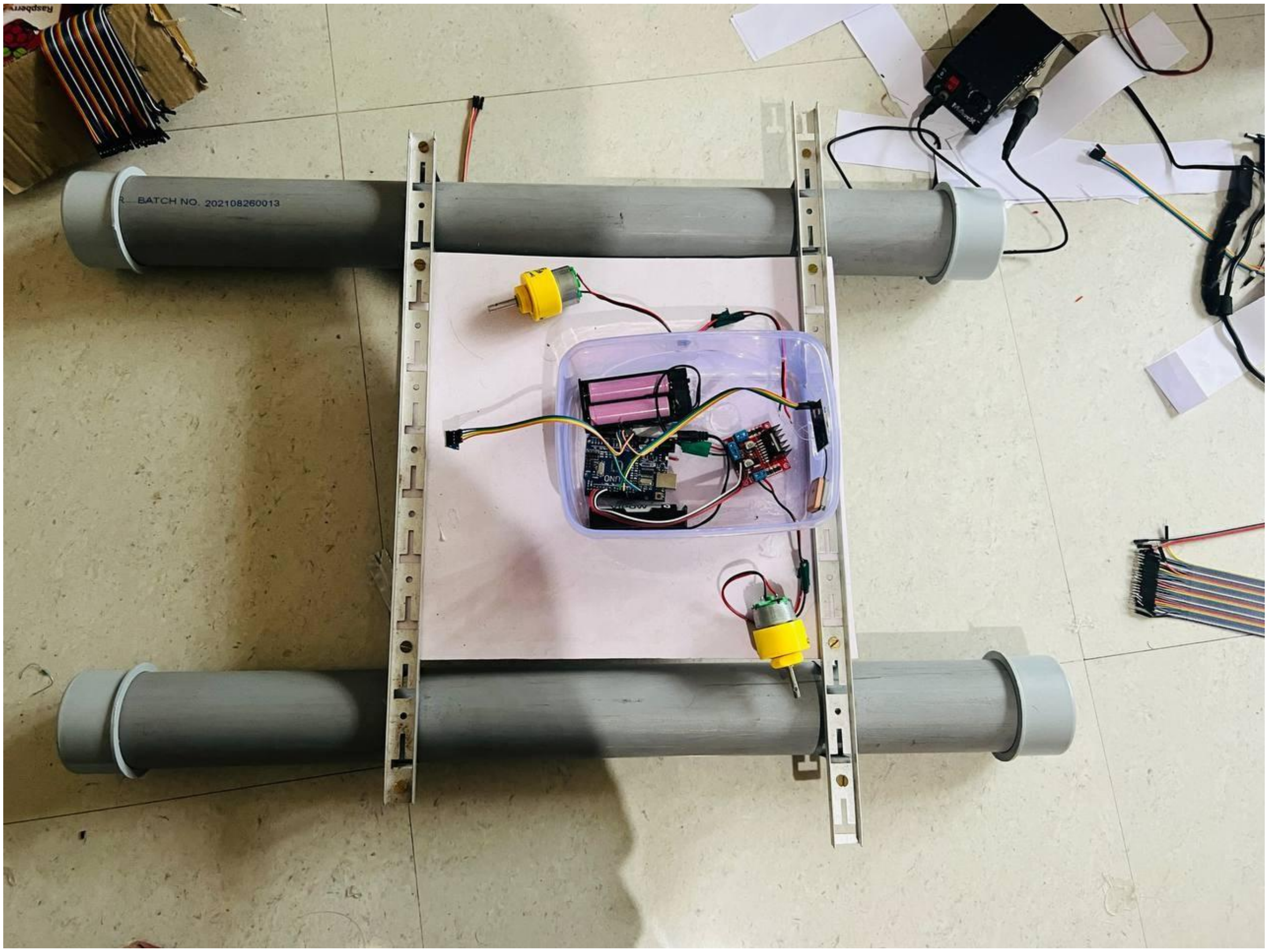
Objectives:

1. Remotely operated - We aim to design and fabricate a micro submarine which can be remotely operated with a radius of 2km in coverage area.
2. Electric motors - The total under water cruising functionality depends on the working of electric motors which would be situated on the underside of the submarine.
3. Active buoyancy control (ABC) - ABC will autonomously descend and ascend the submarine based on the signals/input provided to the receiver by the transmitter.
4. Live streaming functionality - A camera will be attached on the underside of the submarine casing which will provide real time video feed. This will facilitate easy and

smooth transmission of video and the user can comfortably watch this video through the APK on the mobile device.

Methodology:





Conclusion:

Recent research on submarine technology has provided a more complete understanding of the buoyancy processes. Current findings suggest that the dimensions of the vessel along with the right proportion of pressure across the walls plays a critical role in sinking and floating of the vessel. Because it is impossible to provide an exact and accurate calculation at the foundation level, we have resorted to trial and error approach with the help of which the outcome can be predicted to some extent. Consequently, it is difficult for comparisons to be drawn between published case studies and our approach. More complete and accurate documentation of micro submarine technology—including time of submersion; time of sink and float; and the processes involved—will facilitate easier comparison of individual cases and lead to a more complete knowledge of the operations eventually contributing to its long-term sustenance. Once we have a clear understanding of the different equations and formulae involved, we can take steps to improve its functioning and thereby, improving its overall efficiency

Scope for future work:

Deep sea exploration:

At least 95% of the deep ocean is unexplored. It is an extremely difficult place to observe, let alone to visit ourselves. Until recently, marine science was conducted entirely from the surface. The most immediate barrier to deep ocean exploration is its darkness. Water scatters and absorbs light. No light at all penetrates to the 'midnight zone', at depths below 1000m. In practical terms, only in the 'sunlight zone' at depths above 200m, can scientists see what they are studying without the need for artificial light.But the greatest technological barrier to ocean exploration is the weight of water itself. The ocean is an extremely hostile environment, where pressure increases by one atmosphere roughly every 10m you go down. At the deepest point, approximately 11 kilometers down, the pressure is 1100 atmospheres. This is the same pressure as an elephant standing on your little toe or the pressure in the chamber of a gun when a bullet is fired. Hence, micro submarines comes in handy for such levels of exploration.

Detection and Monitoring:

Given the integral deterrence role submarines play in the relationships between nuclear-armed countries, understanding the tools and technologies available for submarine monitoring is strategically important. Advancements in submarine detection have the potential to affect the survivability of submarines as nuclear delivery platforms. Submarine detection and monitoring was traditionally the exclusive domain of highly classified military units specializing in naval anti-submarine warfare (ASW). Military ASW employs technologies such as magnetic anomaly detectors (MAD), which detect tiny disturbances to Earth's magnetic field caused by metallic submarine hulls, passive and active sonar sensors that use sound propagation to detect objects underwater, as well as radar and high-resolution satellite imagery to detect surfaced submarines. Recent advances in commercial tools and technologies now give open-source researchers some ability to monitor submarine fleets.