



Micro-Unmanned Underwater Vehicle STEM Design and Customization

Project Description:

Saab aims to develop a design for a cost-effective STEM kit variant of military micro-unmanned undersea vehicle (UUV) at reasonable cost for academic usage. This effort is envisioned to leverage previously developed architectures, electronics, software, and hardware from one of Saab-Inc.'s micro-UUVs that have been demonstrated as very easy to operate, launch, and recover.

This project aims to design and construct a highly modular STEM UUV with proper documentation. The UUV is intended to have several key improvements in adaptability, maneuverability and power systems. The design and form factor aim to replicate the military EMATT model, allowing for maximum potential for spin-off technologies for Saab.



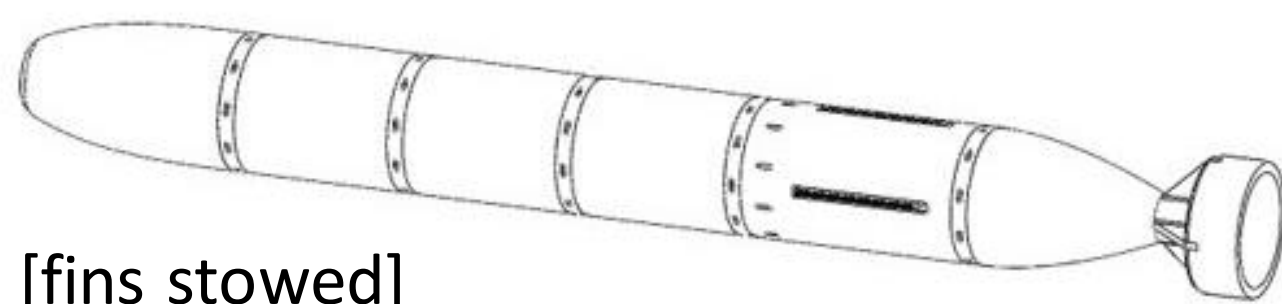
MK39 EMATT MOD 3

Possible solutions:

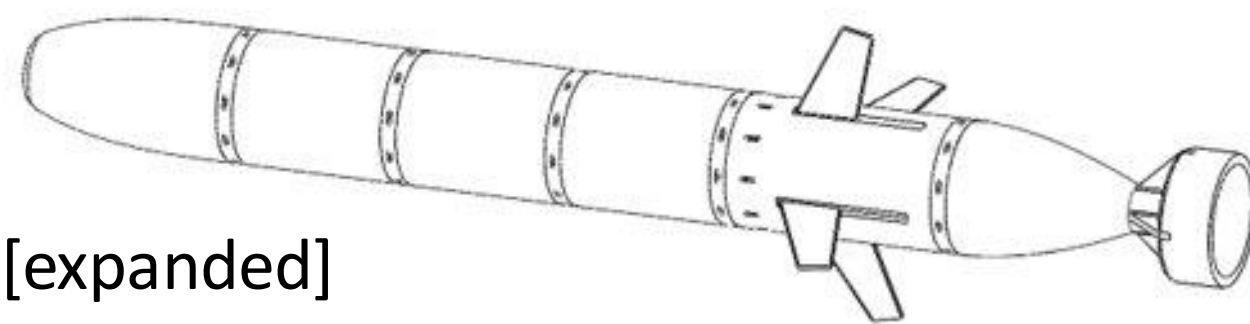
The adaptability of the UUV will be improved with a modular system. This will allow the system to accommodate interchangeable components for various applications.

Polyvinyl Chloride (PVC) will be used as the outer shell's material to support cost effectiveness as well as stability. A maneuverability module with retractable fins will be developed to enhance underwater mobility.

Early CAD Design Concept:



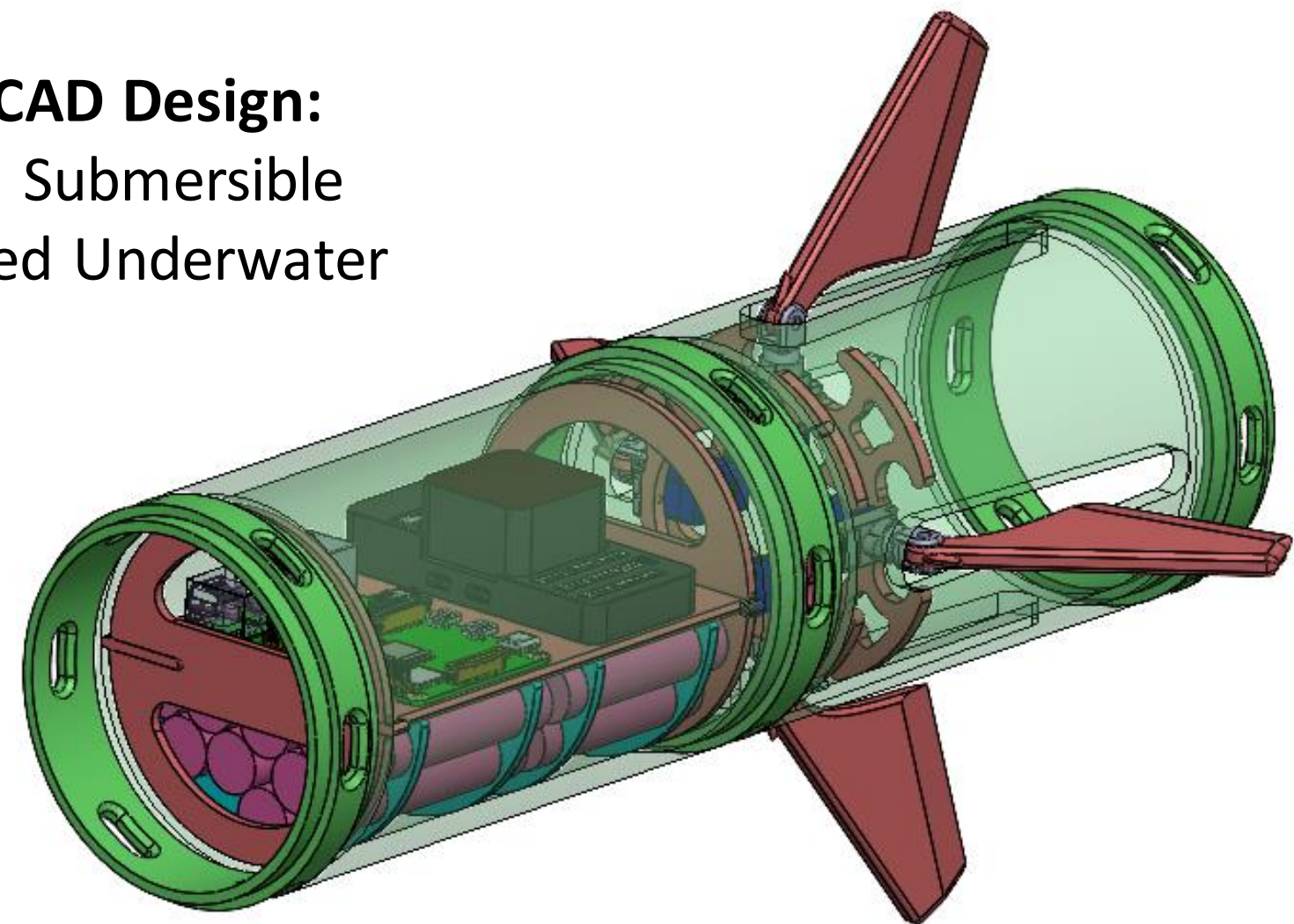
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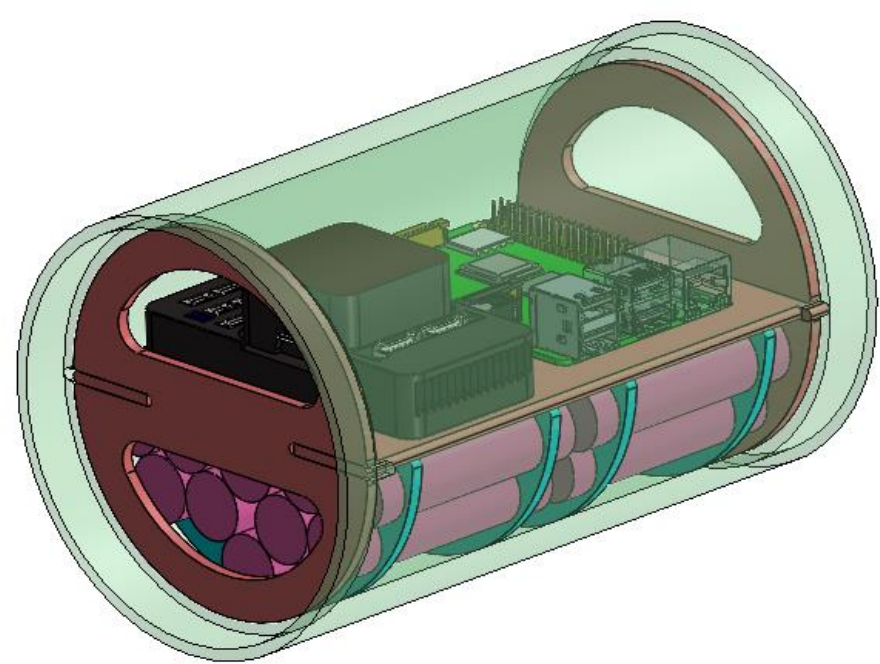
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Current In-progress CAD Design:

Modular Intergration Submersible Testbed for Unmanned Underwater Vehicles [MIST UUV]

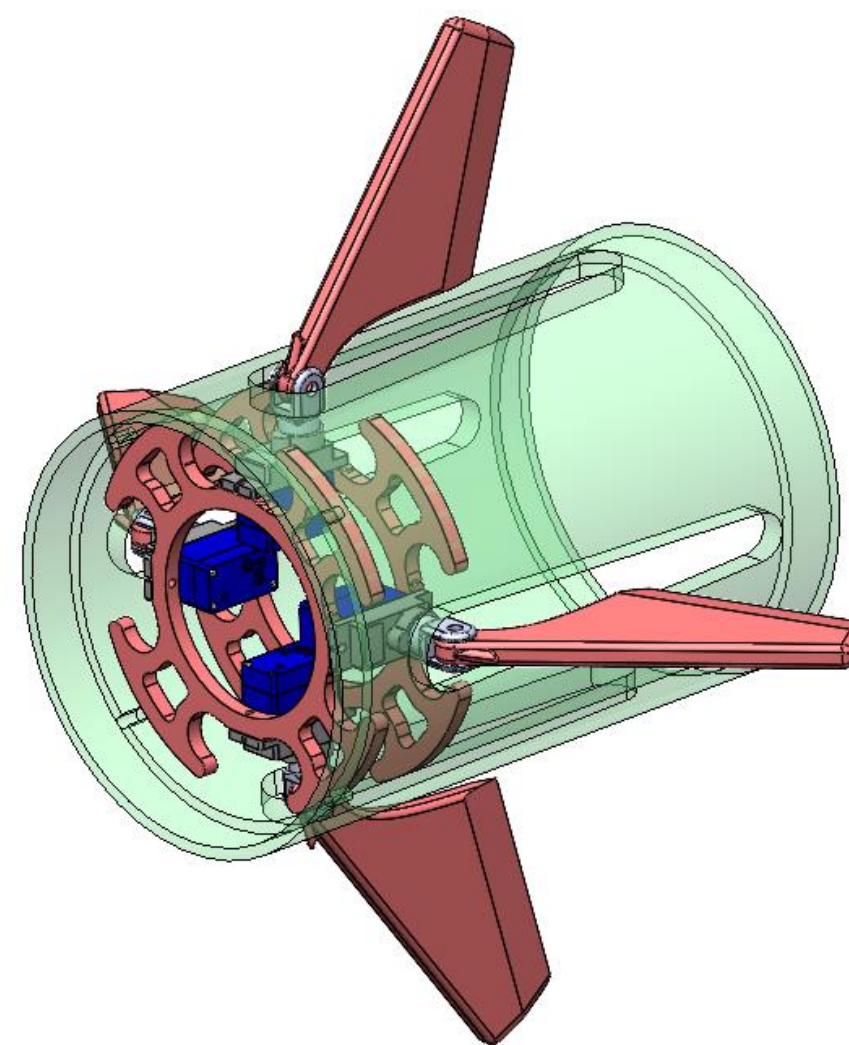


Core Module:

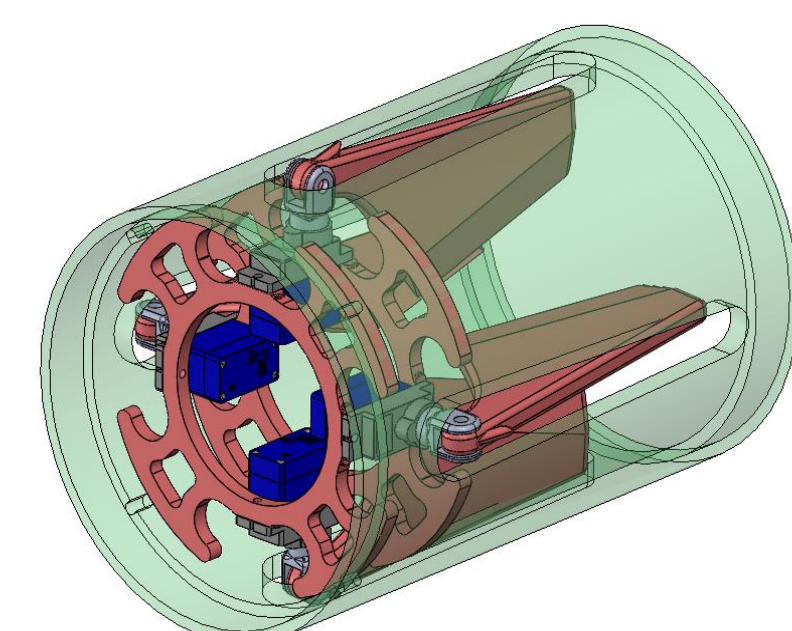


- Integrated 5S4P lithium-ion battery pack, estimated 120Wh capacity
- Pixhawk Cube Black running ArduSub 4.1.0 open-source firmware
- Raspberry Pi co-processor for sensor data and management

Maneuvering Module:



- 4 independently controlled fins for enhanced underwater maneuverability
- Fins stowable to maintain form factor for sonar tube compatibility



Semester Deliverables:

1. Determine design choices and fully develop CAD model for all UUV modules
2. Perform simulation tests to verify design choices using ANSYS
3. Utilize simulation results to determine appropriate materials
4. Determine methods of manufacturing for components (machined, additively manufactured, purchased, etc.)



Faculty Mentor: Prof. Amit Sanyal



Mr. Alexander Callo



Ms. Savannah Kreppein



Mr. Nicholas Tryon



Ms. Buena Zajmi