DALHOUSIE UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING

TEAM 11
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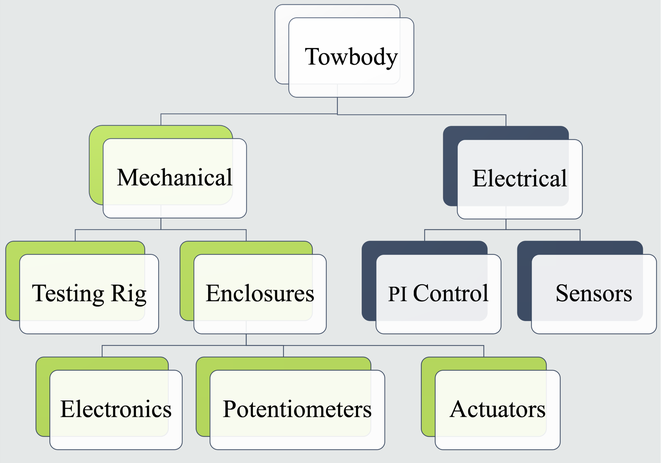
ISE International Submarine Engineering Ltd.

Towbody for Autonomous Underwater Vehicle Docking

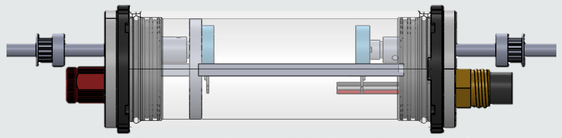
BACKGROUND

- AUV's must be recovered from the ocean for recharging and data collection, an expensive and dangerous process.
- ISE is working on avoiding the recovery process by recharging the submerged AUV using an underwater and mobile towbody docking station.
- Challenges:
  - Stability of the towbody (Capstone)
  - Locating and homing in on towbody
  - Mating the AUV to the docking station
- This project continues on work completed by previous Capstone teams.
- The results of this project will provide the collaborative client, ISE, with a test platform which will be used to determine the feasibility of the concept.

DESIGN PROCESS

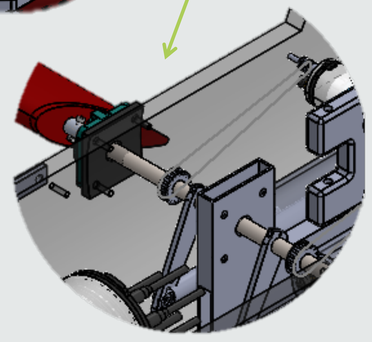


DESIGN

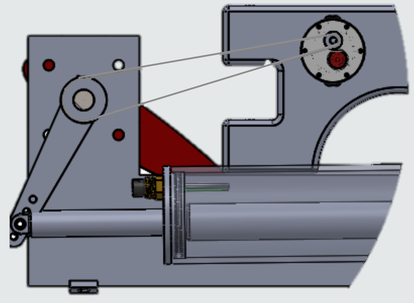


Wing Angle Detection (Using Potentiometer)

Angle of Body Detection (IMU)



Wing Mechanism (Controlled by Actuator)

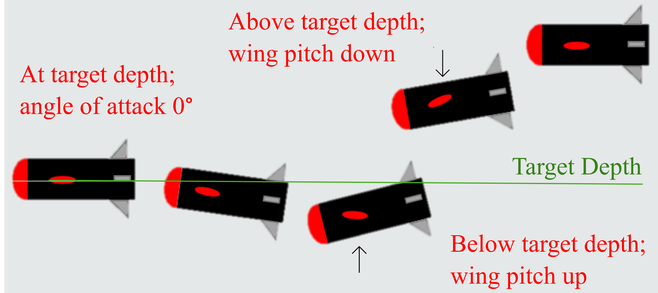


Linear Actuator

OBJECTIVES

1. The towbody prototype must autonomously react to external disturbances, simulated by a depth change, and correct itself back to a stable position using its wings.
2. The prototype will be controlled at the surface via underwater connectors.
3. The prototype must be capable of operating and maintaining depths up to 4.5 m at speeds as low as 1 knot.
4. All enclosures within the prototype must be watertight.
5. The towbody itself must be flooded.
6. The prototype will be pulled via a tow cable, simulating a moving vessel.

CONTROL



Pull towbody using tow cable attached to bridle → Instruct towbody to change depth via surface control → Sense pitch (via IMU) and angle of wing (via potentiometers), the difference is angle of attack → Adjust wings until desired depth is reached, and the angle of attack approaches 0° using PI control

TESTING

Testing will be conducted the week of March 29 at the Dalhousie Aquatron.

Data will be collected monitoring how well the towbody adjusts its role, pitch and yaw as it is instructed to change its depth within the tank.

ACKNOWLEDGEMENTS

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