The Use of ROVs to Aid in Calibration

May 11rd, 2017

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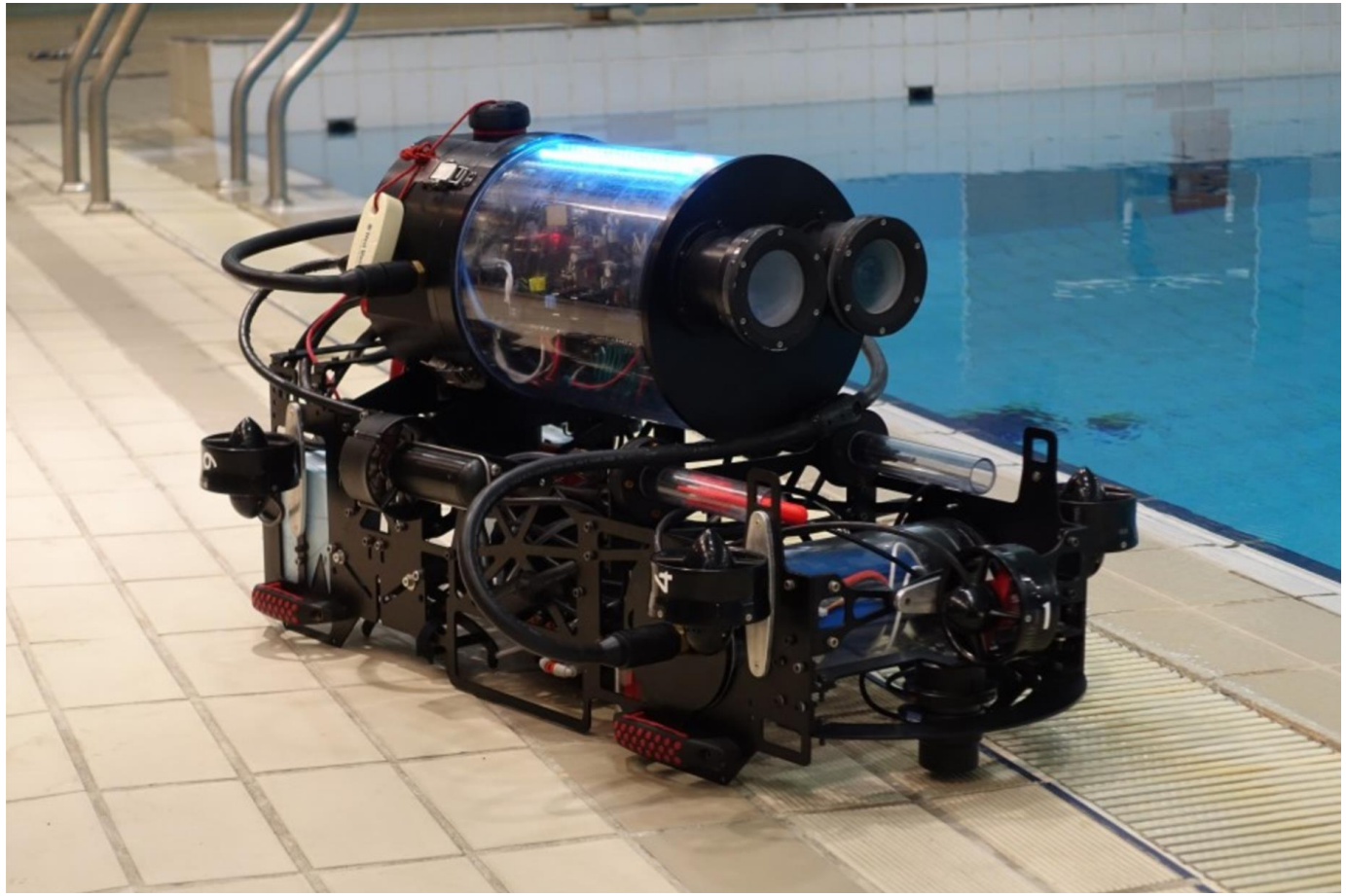
McGill Robotics AUV

- RoboSub Competition
- Design Overview
  - Thrusters
  - Sensors
  - Power
- My Contribution

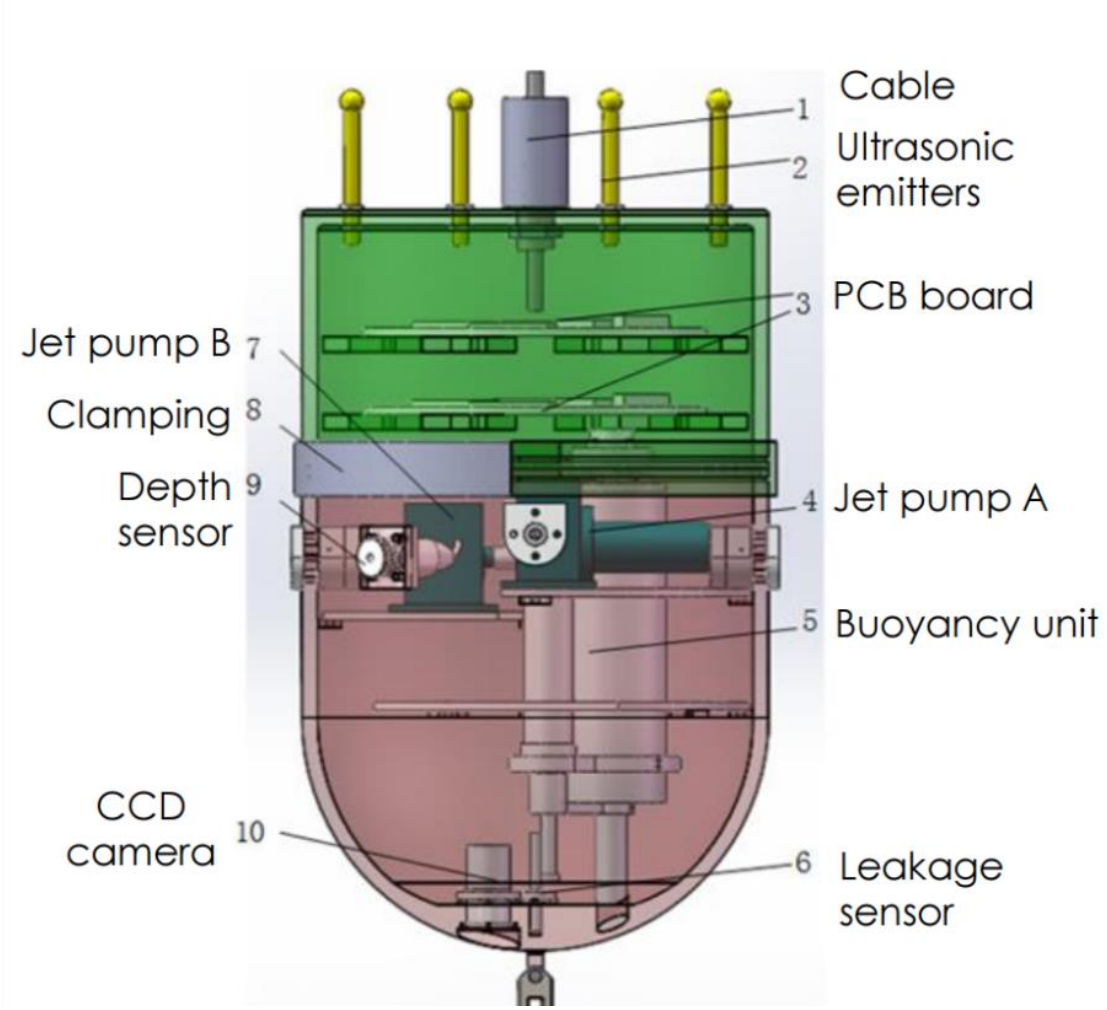


Calibration

- Water transparency tests, particle vertex calibration, energy calibration
- Placement systems with z-direction variability
- Pulley system allows positioning on a plane
- ROV would allow positioning anywhere in the tank
- General Design Consideration:
  - Small size to minimize calibration interference
  - High positional accuracy
  - Stability

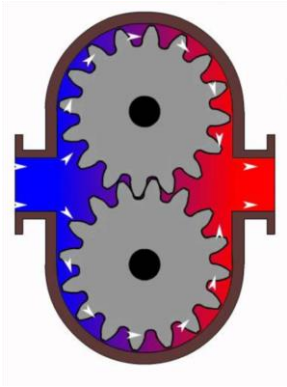
JUNO Central Detector ROV Design

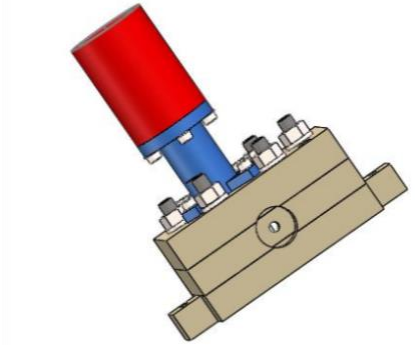
- Used as a secondary mechanism to position both optical and radioactive sources
- Around 30 by 50 cm
- Propulsion
- Positioning
  - Ultrasonic
  - CCD camera

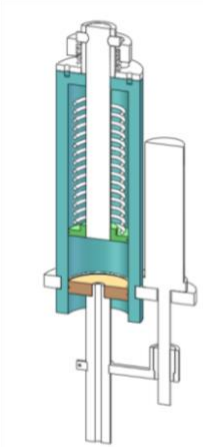


Propulsion

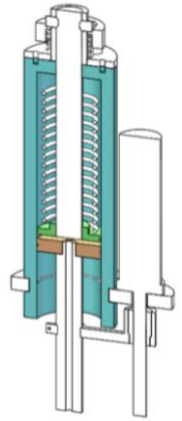
- Component Layout
- Thrusters
- Pumps
- Variable Buoyancy Control



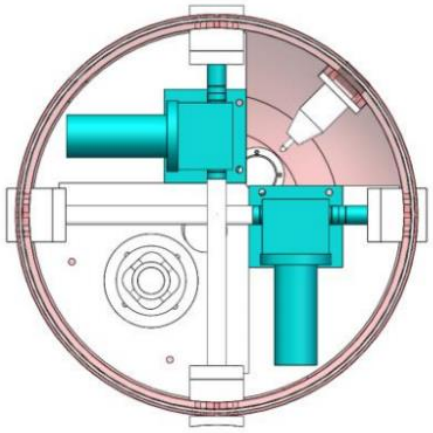




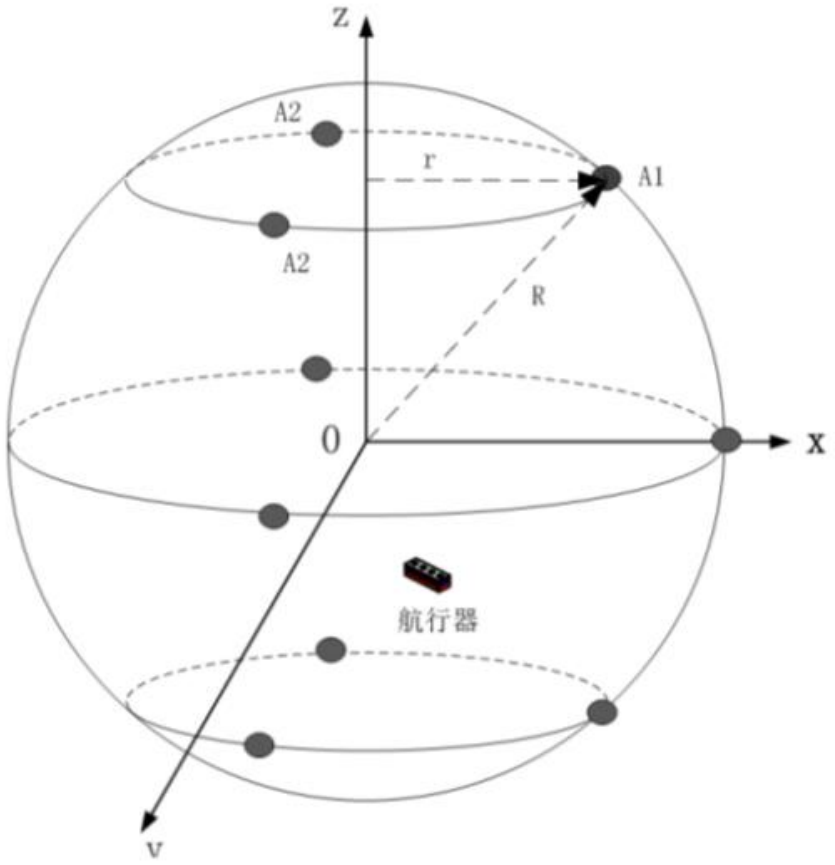
Move Up



Move Down



Positioning



- Passive Sensors
  - Gyroscopes
  - Accelerometers
  - Depth Sensor
- Active Sensors
  - DVL
  - Camera
  - Sonar
  - Acoustic System

Power System

- Lithium-polymer batteries
- Supplying through tether
  - High power loss
  - Short low resistance tether
  - Transforming to high voltage
- JUNO system