Design and construction of an underwater robot

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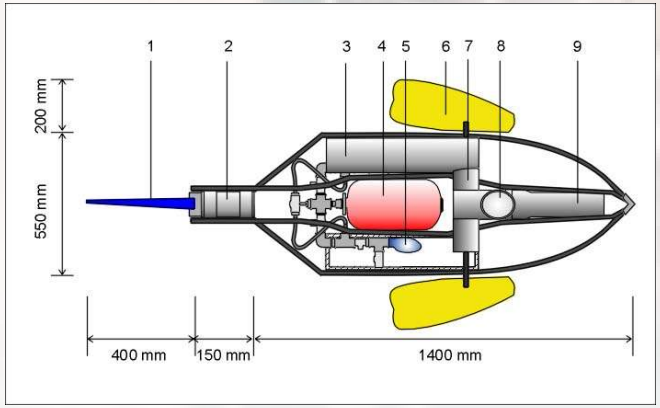
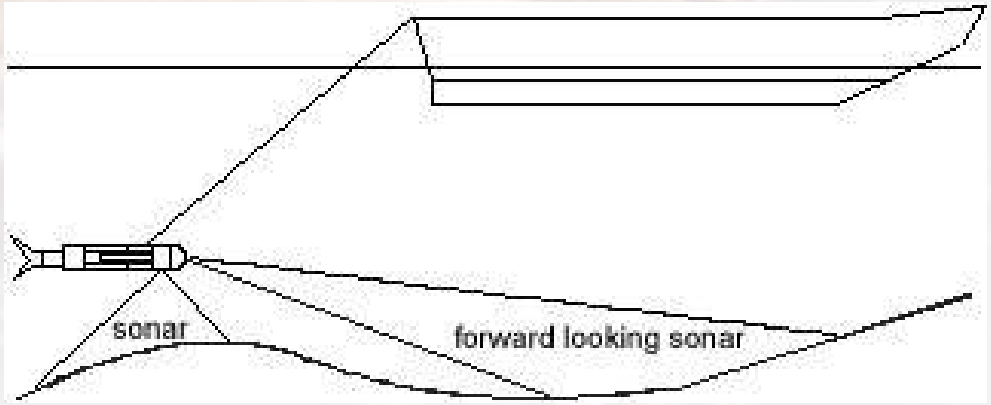
The Task

To build electronics, motion control and sensor system for an environmental monitoring underwater vehicle.

The vehicle:

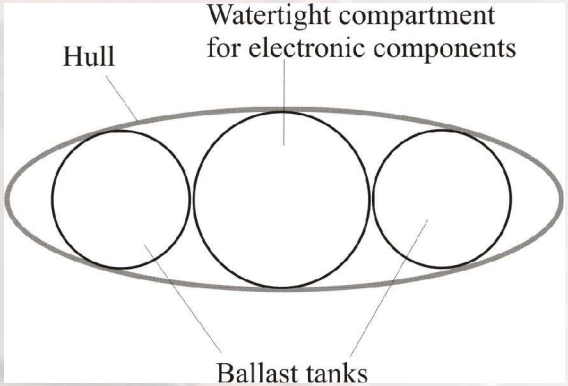
- is towed behind a boat
- must know distance from the bottom
- must control buoyancy
- must control orientation
- must be able to process measurement data

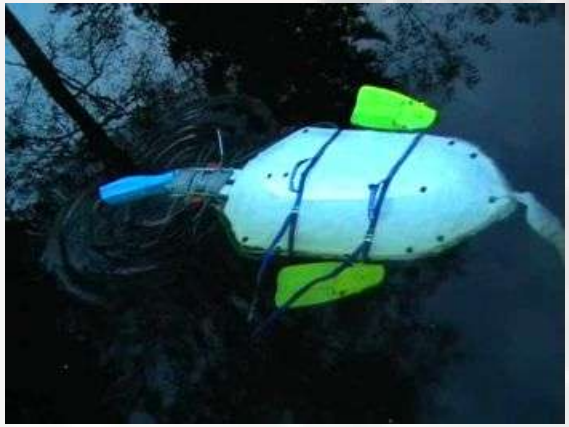


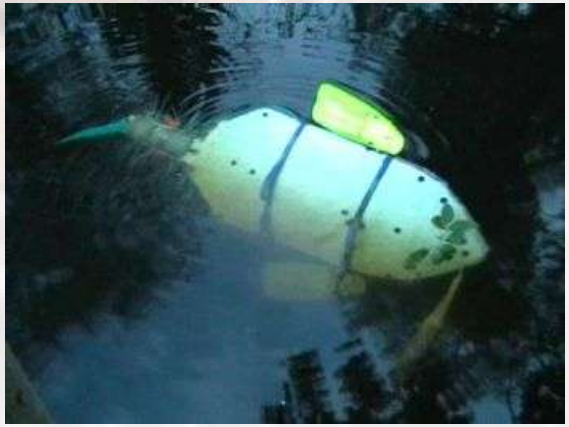


Buoyancy Control

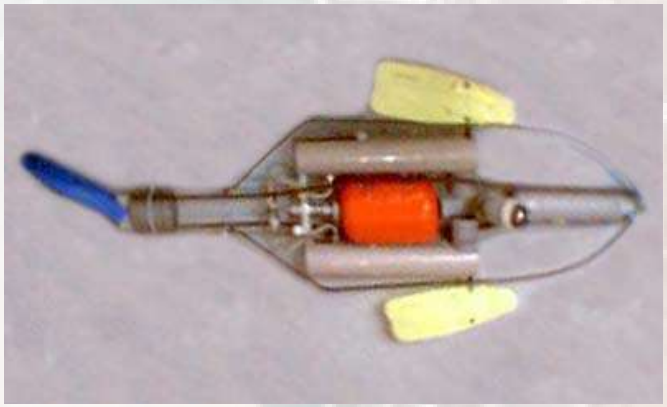
- The buoyancy and orientation can be changed by controlling ballast tanks at both sides of the vehicle.

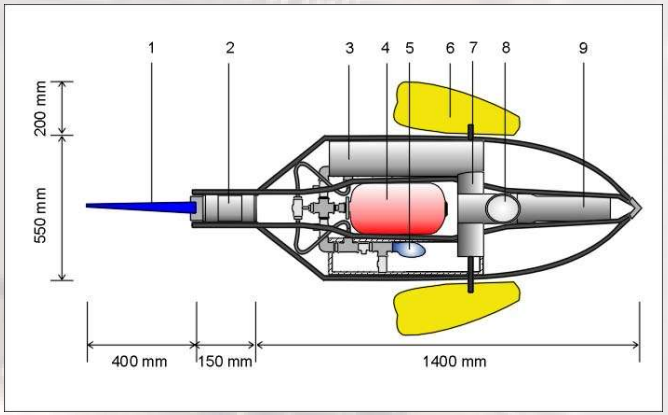




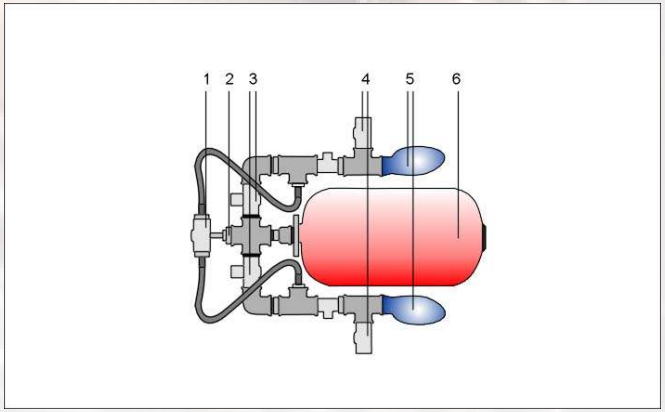


Mechanical structure and Pneumatics





1-pressure equalizing valve
2-air inlet
3-input valves
4-output valves
5-rubber tanks
6-compressed air tank

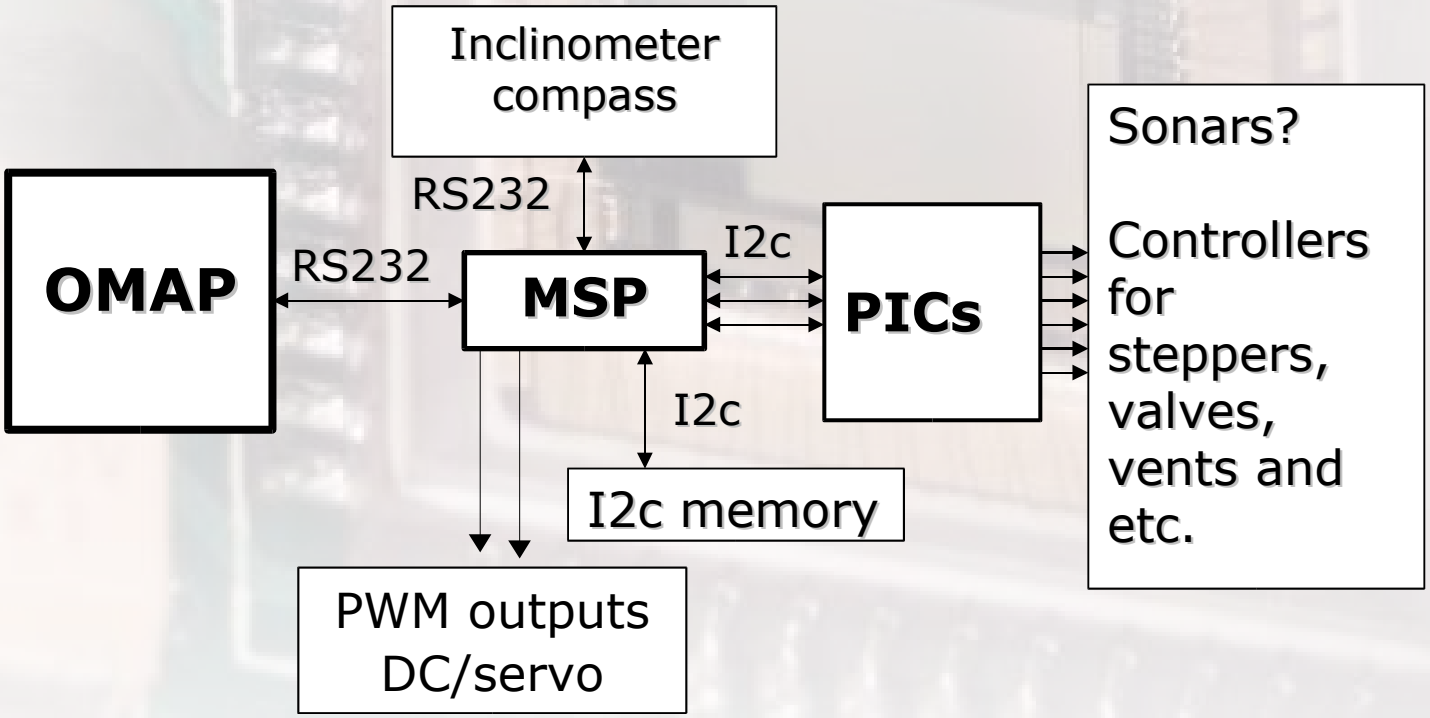


The solution

4-layer system of components:

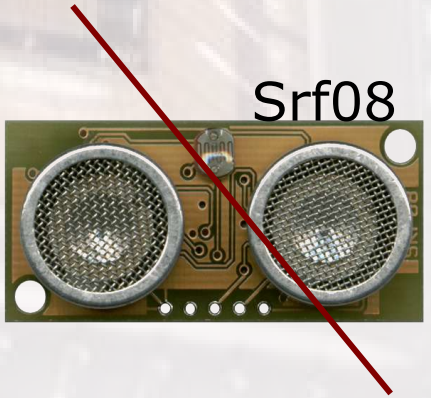
- *OMAP*5912 (ARM + DSP)
- MSP microprocessor
- PIC microprocessors
- Controllers

Communication



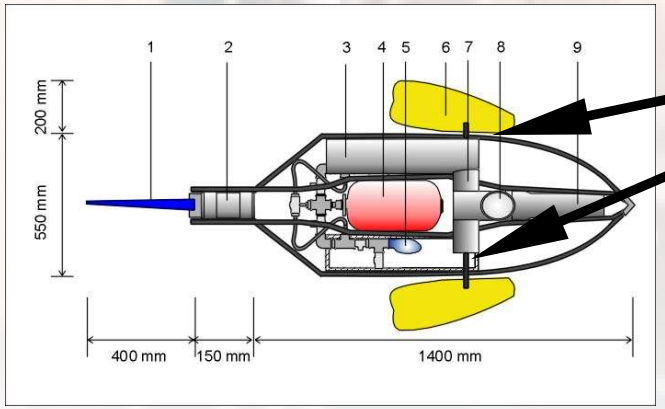
Sonars

- At least 2 sonars needed
- Are used for measuring distances from the bottom of the sea
- Tried to modify SRF08 sonars - unsuccessful



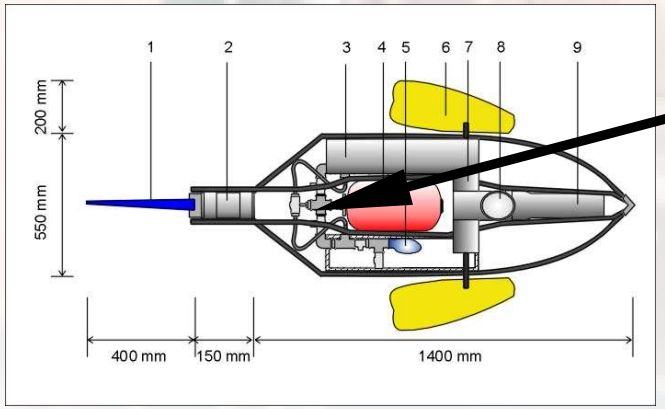
Servos

- Driven by PWM signals from MSP processor
- For moving fins



Valves

- Controlled by PIC processor
- For buoyancy regulation



Future work

- Finding appropriate sonars
- Field tests and vehicle control algorithms.
- Software for ARM+DSP processor

Thank you

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