UNMANNED SUBMARINE DRONE

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Objective

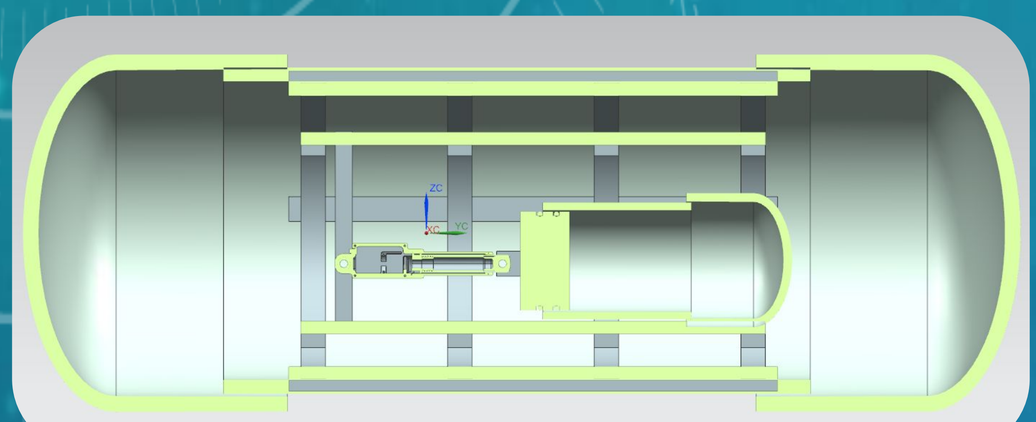
To create a submarine drone that optimizes performance while minimizing cost.

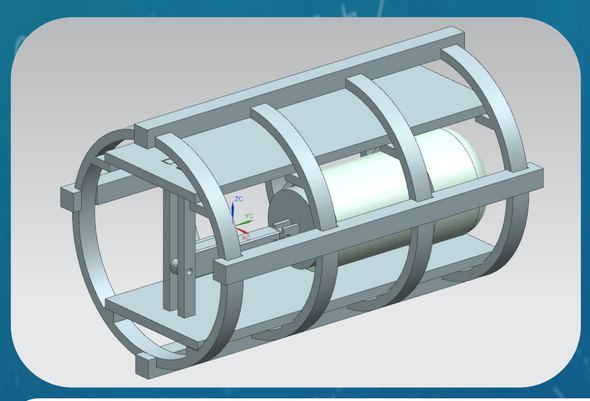
Maximum Depth	3m
Maximum Range	3m
Speed	10 m/s
Payload	1 kg
Size	100 mm x 250 mm
Cost	$500

Design

The program NX 11 was used to design the assembly of the submarine.

The hull houses the piston and actuator used to expel the water and the communication system.

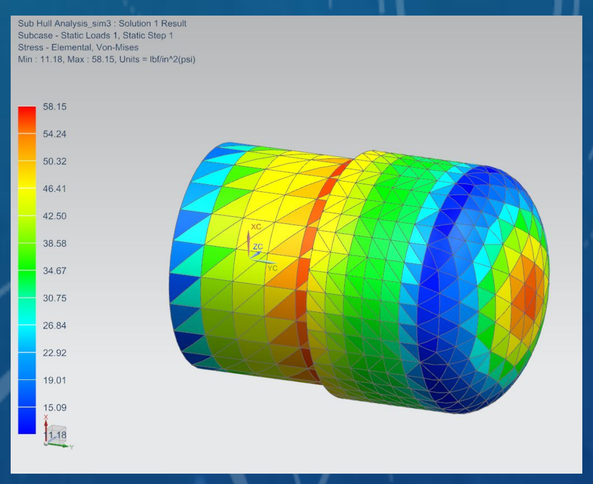


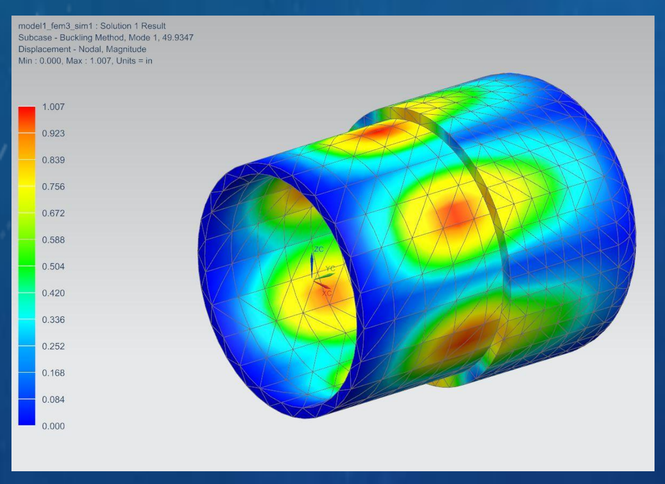


The cage protects the piston, actuator, and communication system and can be easily removed for repair or adjustments.

Failure Analysis

A Finite Element Analysis was performed to examine the stresses within the hull and the risk associated with hull buckling.

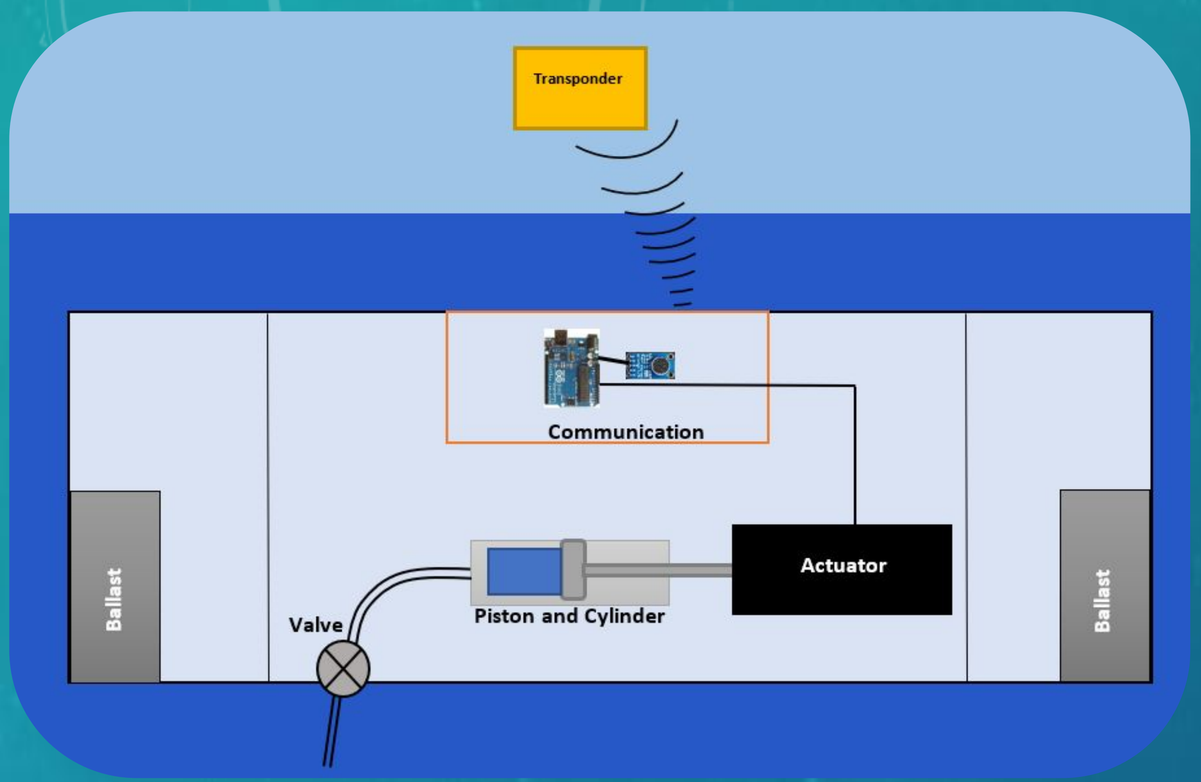




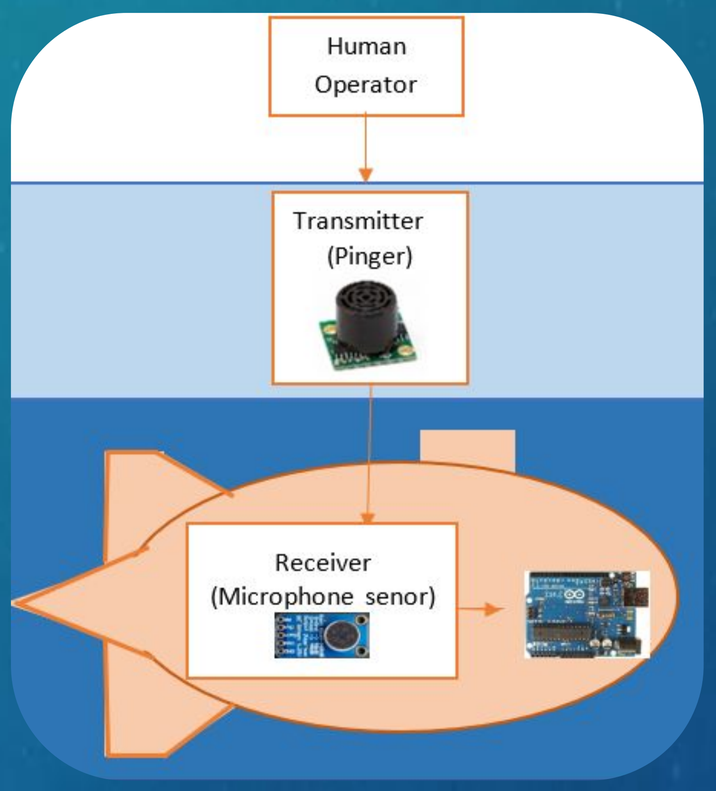
The hull experiences the greatest stress on the center of the cap and where the cap is joined with the pipe. Because of the high factor of safety, the hull will not fail due to buckling.

Communication System

A custom SONAR communication system was created.



The submarine communication system is located inside the hull, with the operator communication system is located just under the water.



The human operator sends a command to the transmitter, or “pinger,” using a modified Morse code which then sends a signal to the receiver inside the submarine. The receiver transmits the signal to the circuit which controls the actuator.

The electrical components consist of a linear actuator, an actuator controller (LAC), and an Arduino microcontroller. The linear actuator provides a positive feedback signal that can be input into the Arduino. The Arduino has a microphone that detects sound from the transponder at the water’s surface, which tells the actuator to extend or retract. The actuator then works with the piston to take in or expel water.