Water Sample Collection Boat

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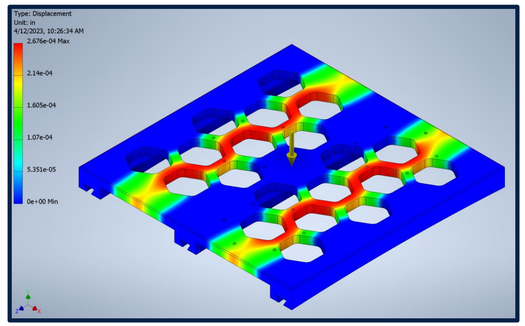
ME 4371-302 Instructor: Professor Hanson

Introduction:

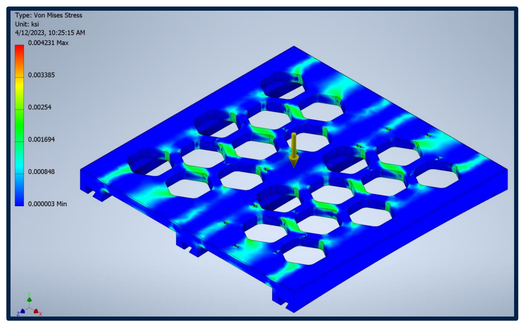
Playa lakes are primarily filled with runoff; therefore, they are prone to contamination. We created a remote-controlled boat designed to collect water samples, eliminating the need to wade into potentially contaminated waters. Our design will simplify the process by decreasing collection time and increasing sampling efficiency.

Stress Analysis:

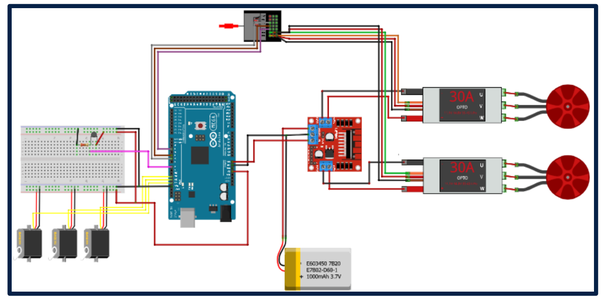
Max Stress – 2.7psi



Max Deflection – 0.00026in



Controls:



3 - Servo Motors
2 – Propellors
1 – ESC
1 – Arduino Uno
1 – 10 Channel Controller

Problem Statement:

Requirements:

- Number of samples: 1-3 125mL/240mL
- Depth of the samples
- >0.5 meters ; depth at .3 meters/ 1 foot
- <0.5 meters ; depth of sample must be 1/3 total depth
- Must use single-use bottles
- Max weight ~ 30 lbs.
- Watertight
- Stands for easy transport

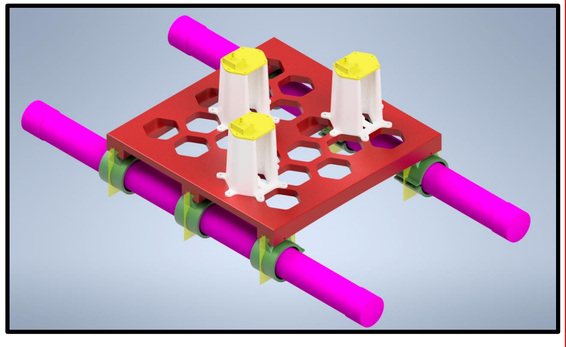
Total cost:

$260.00

Bill of materials:

Kevlar Line ($1.10), 4" PVC (10 ft$ 20.00), 4" PVC Caps (4 $16.00), Motors (3 $40.00), Arduino Kit (1 $25.00) Bottles (6 $16.00), Telescoping tubing (3 $80.00), Transmitter (1 $60.00), Battery (1 $20.00), PVC Sealant (1 $15.00), Waterproof box (1 $20.00), Spools (6 $4.00), PLA Filament (3 $90.00), Threaded Inserts (1 $30.00),

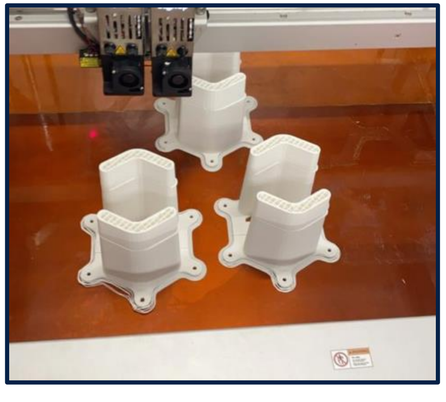
Design:



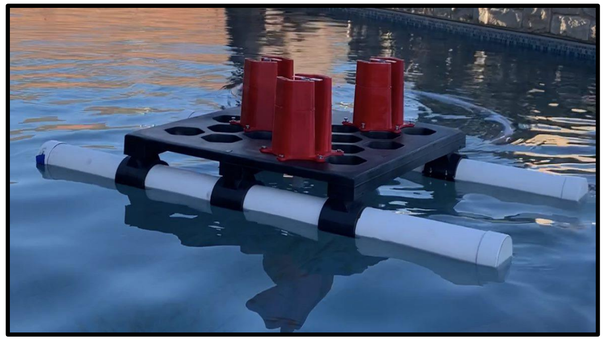
Red – Hull
White – Collection Tower
Green – PVC Clamps
Yellow – Servo Mounts
Pink - PVC

Manufacturing:

All 3D printed materials are PLA, Aluminum
Telescoping Rods were used for the collection method.
Minimal machining required for assembly



Final Assembly:



Successfully drives and collects water.