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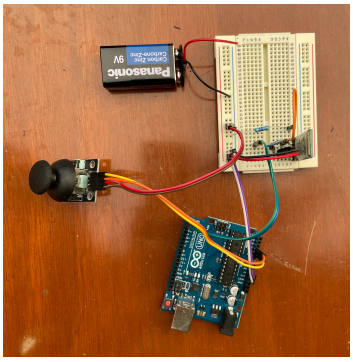
Bluetooth-Controlled Boat

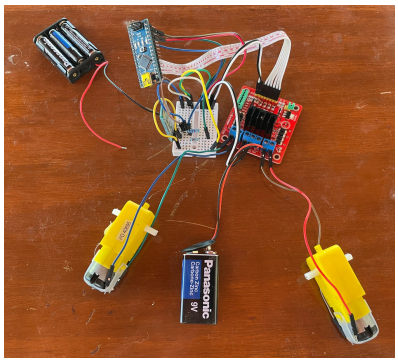
Personal Goal: To grow my understanding of electromechanical systems to make the most of my quarantine

Project Goal: To build a boat that can be driven wirelessly on water using recycled parts

Plan: Separate the electromechanical components into the controller unit and the receiver unit. Connect both units via Bluetooth so that once the receiver unit sits inside the boat made of recycled parts it can be controlled at a distance.

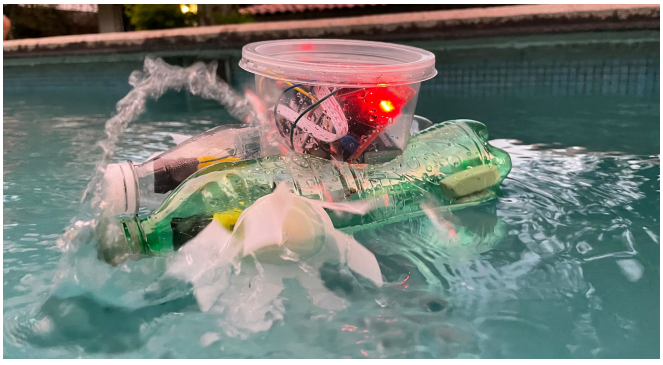


Controller Unit: Its purpose is to send the required information to the boat to act accordingly. The Bluetooth module sends the position of the joystick to the onboard Bluetooth module.



Receiver Unit: Its purpose is to do what the controller unit tells it to do. The Arduino Nano interprets the instructions received through the Bluetooth module by controlling the motors accordingly.

End Product: The electronics are safely secured inside a container with wires connected to the motors. At the back, there is a rock and an eraser hot-glued to the boat to act as counterweight.



End Product in Action: The controller unit instructs the propeller to rotate causing the boat to turn backward. The water level is below the motor axis due to the counterweight, preventing the water from entering.

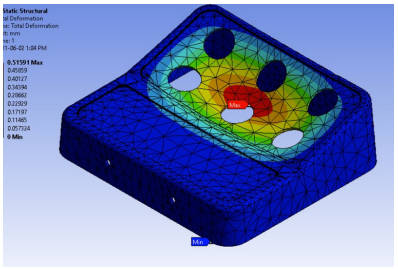
Code: Both unit's code can be found on my GitHub: https://github.com/Luis-Andres-Vazquez/Bluetooth-Boat.git

Centivizer - Structural FEA Simulations

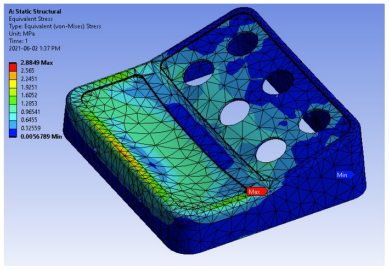
Goal: To determine the maximum deformation and stresses due to a force or pressure applied to different sections of the enclosing of the consumer product.

The finite element analysis was done through *Ansys* Workbench after importing the *SolidWorks* CAD model.

Multiple simulations were done on the model including point-force total deformation as in (A) and pressure principal maximum stress shown in (B).



(A)



(B)

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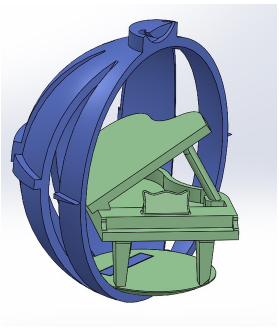
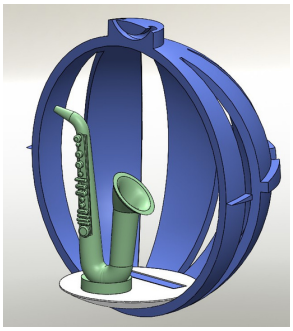
Customizable Ornament Gift

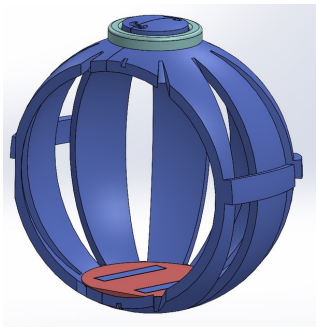
Personal Goal: To design a visually appealing ornament for my grandparents who love music

Project Goal: To make an interactive and customizable design in *SolidWorks* that will be 3d-printed

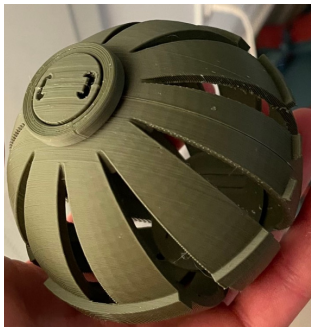




Design: Using *SolidWorks* I created two instruments which assemble with half an ornament. The curved hole at the top is to insert an ornament hanging clip. Note that the colors in the CAD model indicate the separate components that were printed.



Customizability: The section view above shows how both half-ornaments can come together as one.

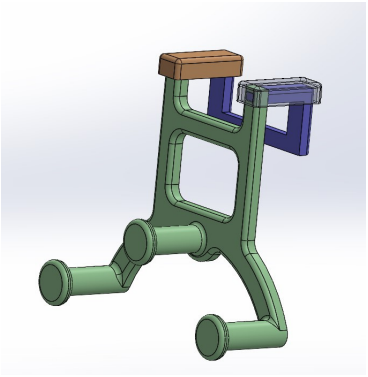


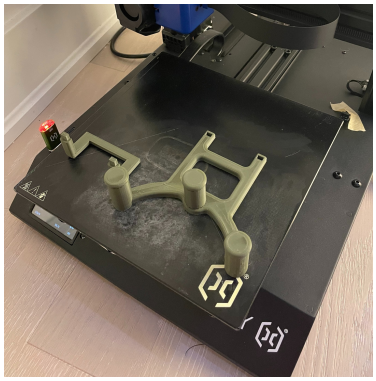
Manufacturing and Final Product: The outer ring in the whole sphere is a snuggle fit to secure both half-shells together. The base of the instruments aligns with the ornament to keep it in place. This allowed the printing process to be faster and more efficient than to print these designs all in one.

Headphone Stand DFM

Personal Goal: To organize my work area

Project Goal: To create a headphone stand design in *SolidWorks* with ease of manufacturing





The headphone stand's design is broken down into four individual components that assemble together. The stand was manufactured with a 3d-printer which due to the DFM focus, the printing time was cut down significantly, and the support needed was minimized.

Rock Climbing Hangboard

Personal Goal: To improve my grip strength from home

Project Goal: To design and make a sturdy hangboard that will support my weight and isn't drilled to the wall

Disclaimer: This project has been interrupted by COVID and will resume when I have access to the materials and parts.