# LUIS VAZQUEZ

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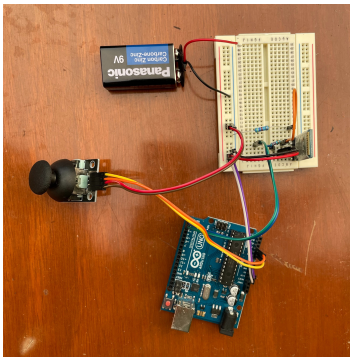
## Bluetooth-Controlled Boat

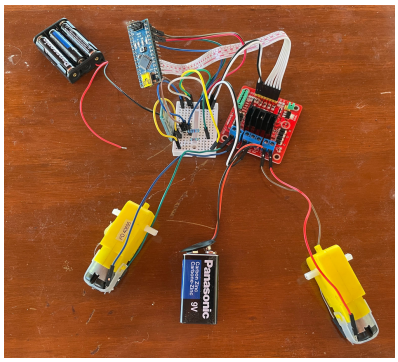
**Personal Goal:** To grow my understanding of electromechanical systems to make the most of my quarantine

**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.

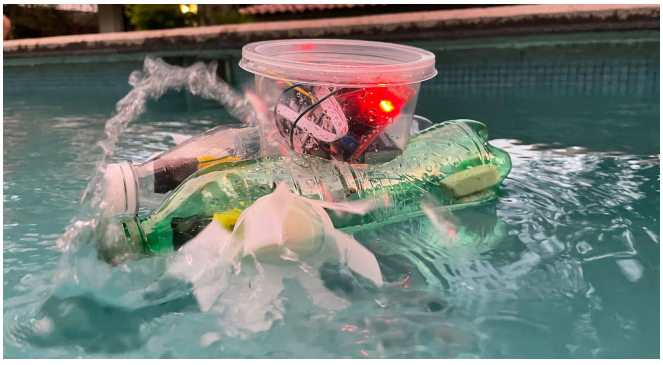


**Controller Unit:** Its purpose is to send the required information to the boat to act accordingly. The Bluetooth module sends the position of the joystick to the onboard Bluetooth module.



**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.

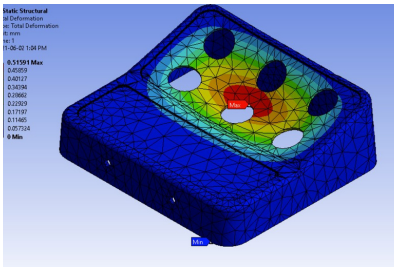
**Code:** The code can be found on my GitHub: https://github.com/Luis-Andres-Vazquez/Bluetooth-Boat.git

## Centivizer - Structural FEA Simulations

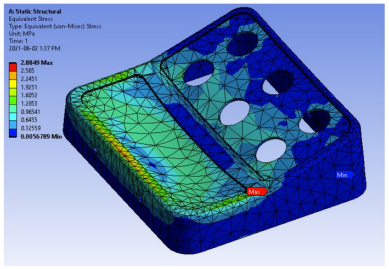
**Goal:** To determine the maximum deformation and stresses due to a force or pressure applied to different sections of the enclosing of the consumer product.

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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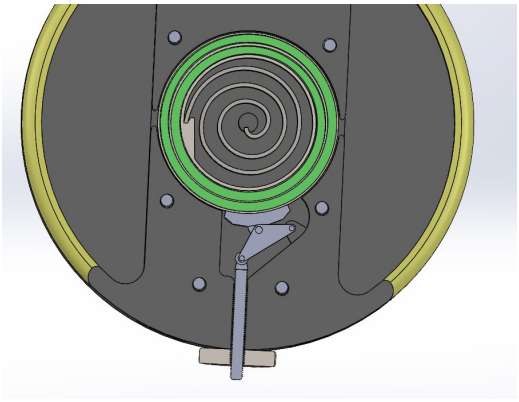
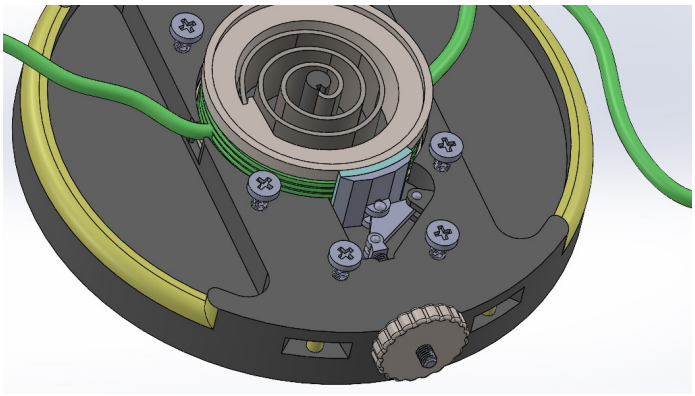
## Portable Gym Design - Designathon

**Personal Goal:** As the team's CAD lead, my goal was to properly translate the team's idea into *SolidWorks*
**Project Goal:** Designing a strong contestant product for the designathon focused on portable gym equipment

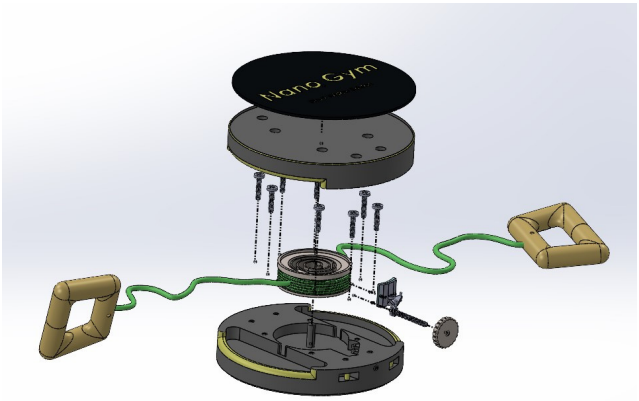

**1) Concept:** The design above is to be worn as a backpack (straps not shown) or to be stepped on while pulling on the handles which provide resistance to the user.



**3) Mechanism design:** The user can increase resistance by turning the knob on the bottom. The threads will make the long rod go up and create a torque on the triangle part consequently applying a force on the rotating disk (not the cords). This mechanism increases the friction between the felt pad and the disk.



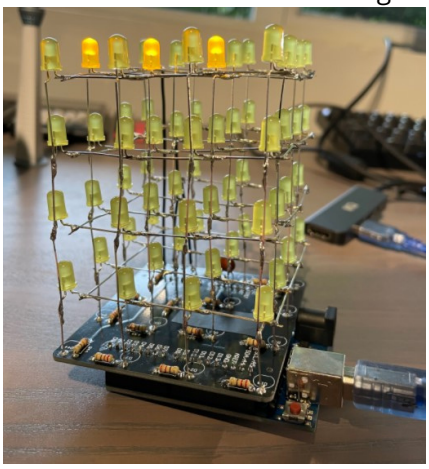
**2) Interior:** The interior consists of a metal coil that's attached to a rotating disk causing the coil to act as a spring (initial resistance). This allows the cords to be reeled back in automatically.

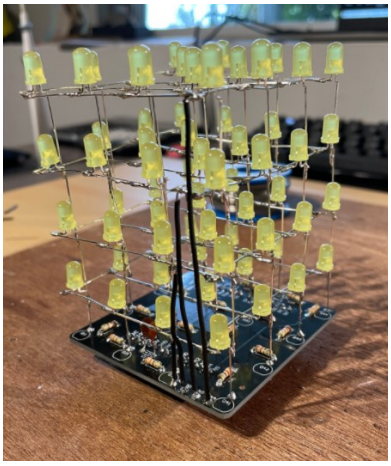



## 4x4 LED cube

**Personal Goal:** Understand how to select individual LEDs to turn on in a 3d arrangement as well as how to code it and improve my soldering abilities

**About:** Cathodes are connected in each level (layers) and the anodes are connected between levels (columns). Hence, to make an LED turn on all there is to do is send a logic HIGH signal to its column and ground the level in which it sits. In doing so, I complete the circuit and the current goes through the specified LED(s). The board is mounted on an Arduino Uno which sends the signals according to the code describing the display patterns.





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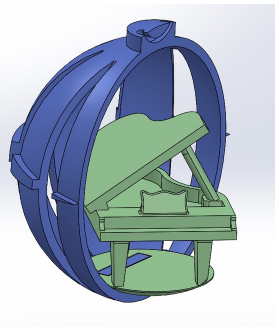
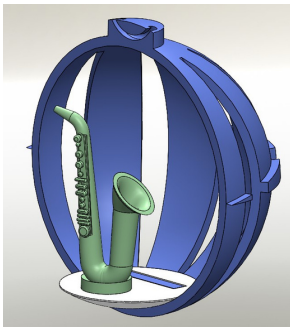
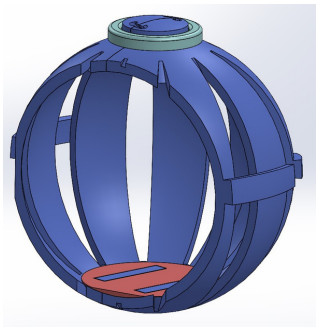
## Customizable Ornament Gift

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

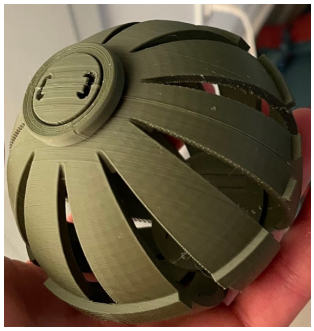
**Project Goal:** To make an interactive and customizable design in *SolidWorks* that will be 3d-printed

**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.

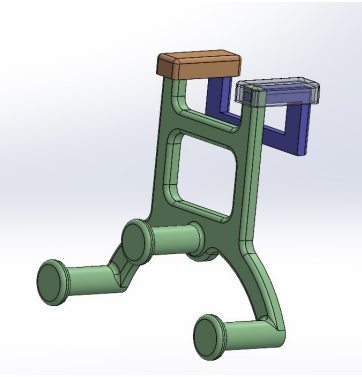
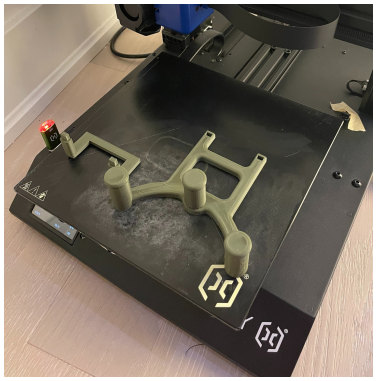



**Manufacturing and Final Product:** The outer ring in the whole sphere is a snuggle fit to secure both half-shells together. The base of the instruments aligns with the ornament to keep it in place. This allowed the printing process to be faster and more efficient than to print these designs all in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

## Headphone Stand DFM

**Personal Goal:** To organize my work area

**Project Goal:** To create a headphone stand design in *SolidWorks* with minimal support material required

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