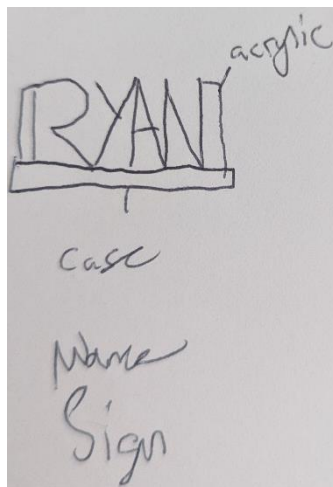# Assignment 6 - Project Report

Ryb22pnl

Section A – Individual Projects
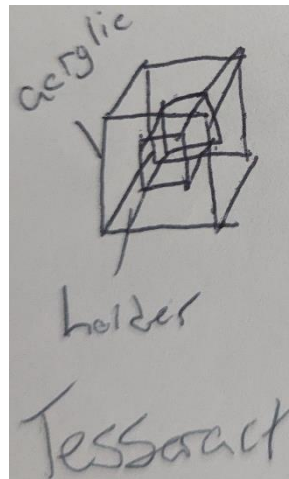
Design

For this module I have been tasked in the design and development of a personal project, using three of the machines around the lab throughout the semester. For the initial design phase of this project, I was tasked in creating designs for eight designs and picking one of them.

Design 1 was just a basic name plate sign with just my name on the 3d printed stand, I didn't choose this as I though it would be too basic to design to have fun with and make unique.
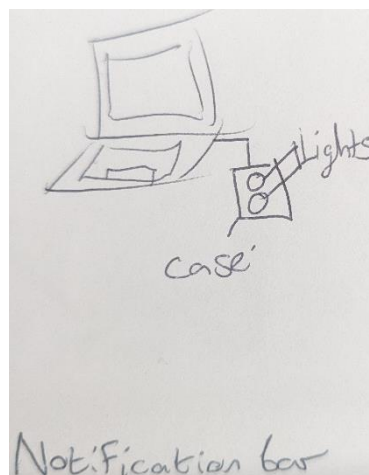

Desing 2 is a notification bar that lights up once one pops up, the design consists of a USB cable connecting to a laptop, the case holding the lights and the acrylic showing off the lights when a notification shows. I did not end up with this design as I found it very difficult to properly get an idea of how I would implement this idea into reality.

Design 3 being a tesseract this is just a basic cube holder with the acrylic around it all this design would be fun to make if the acrylic was more than just the one plane of acrylic and I could make an actual box one. From this issue I decided not to go with this design.


Design 4 is a lightsabre with the acrylic acting as the blade this would be the runner up out of the ideas that I had as it would be fun to make and allow me to make my own lightsabre as well, the design allows for a switch to turn on the lights on the hilt I would possibly have chosen to do RGB to change the light to whatever I want.
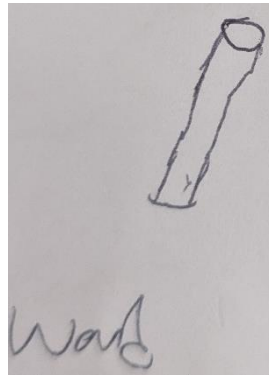
Wand

Design 5 is very similar to design 4 the wand would have an acrylic tip and the same with the last design also have a switch on the bottom, I decided not to follow through with this design as I found I had better ideas that allows for better functionality and a more fun experience in the creation of the project.

acrylic   alexa

Stand

Face plate for alexa
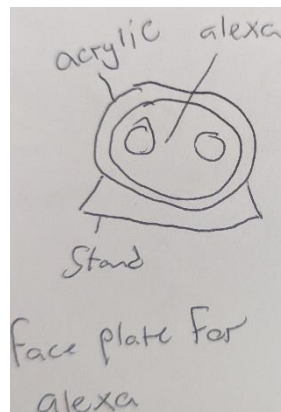
Design 6 is a faceplate and stand for an Alexa smart home device, I designed this to just be basic stand allowing for a faceplate to be attached on the front to give the Alexa a more unique look compared to others around the stand would case the PCB and wire the lights up to the sides of the face plate to light up, I decided to not do this design as I found it difficult to properly layout the lights to the faceplate difficult.
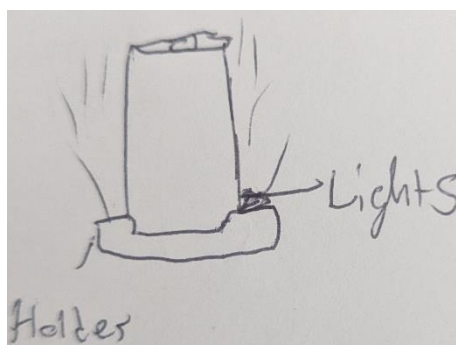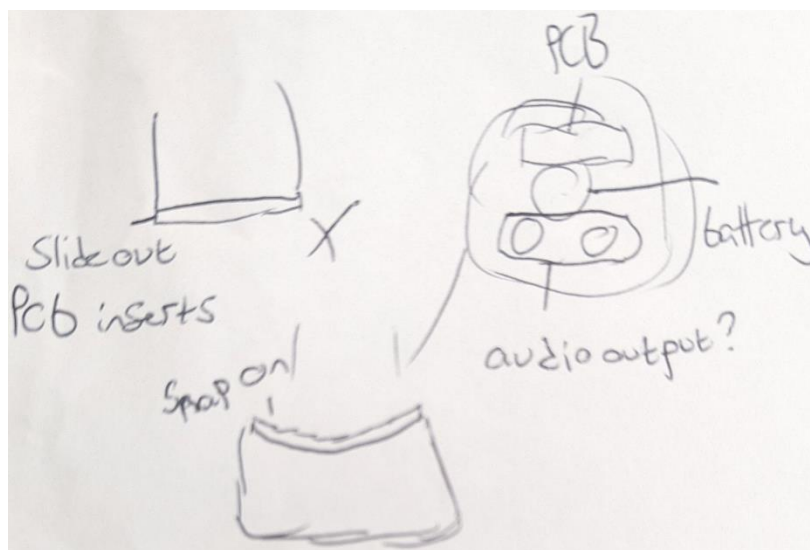

Lights

Holder

Desing 7 is a cupholder that lights up once a cup has been placed on the pressure would switch the lights on making the cup light up surrounding it. This design is based on the fact I prefer drinking with coasters and a unique coaster would be a good idea, the reason why I did not follow this is due to the fact that the design does not utilise acrylic in it whatsoever.
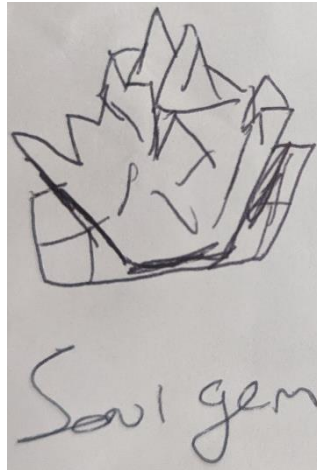
Design 8 is a soul gem/ holder based of my favourite game I've been playing since 2011 this design allows for the acrylic to be taken out and back in to switch the light on and off with the holder being made of two halves the top casing the acrylic holder and the bottom snapping into case the PCB and the pressure switch.

Implementation

Post Design Phase

After picking the soul gem holder as my project I had to then brainstorm how the project would work, I thought I would create a two-half holder with the PCB on the bottom and Acrylic on top.
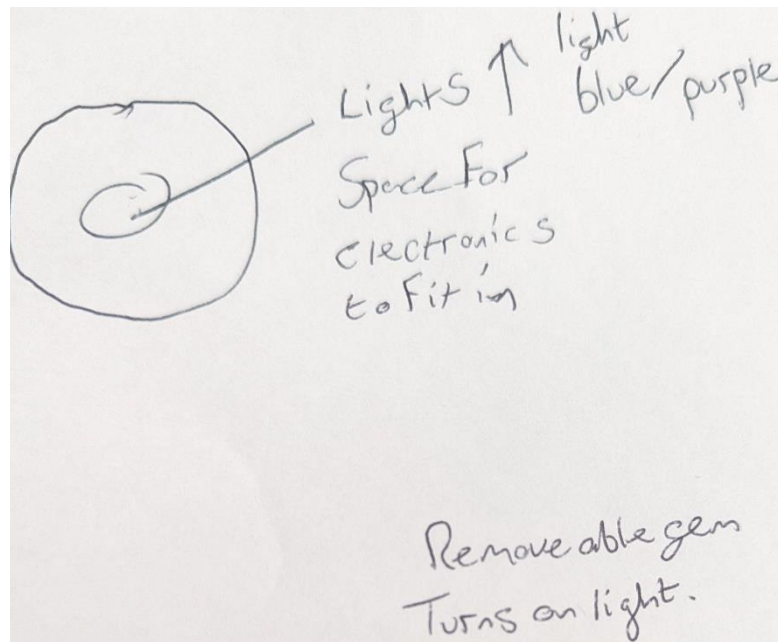
This is where I decided whether to have blue or purple lights and the idea to make the acrylic be the case for when the lights turn off or on as a removable piece.

This is where I decided that the two halves would snap together with the acrylic on top and the initial stages of how the acrylic ands 3D print would look compared to the finished product.
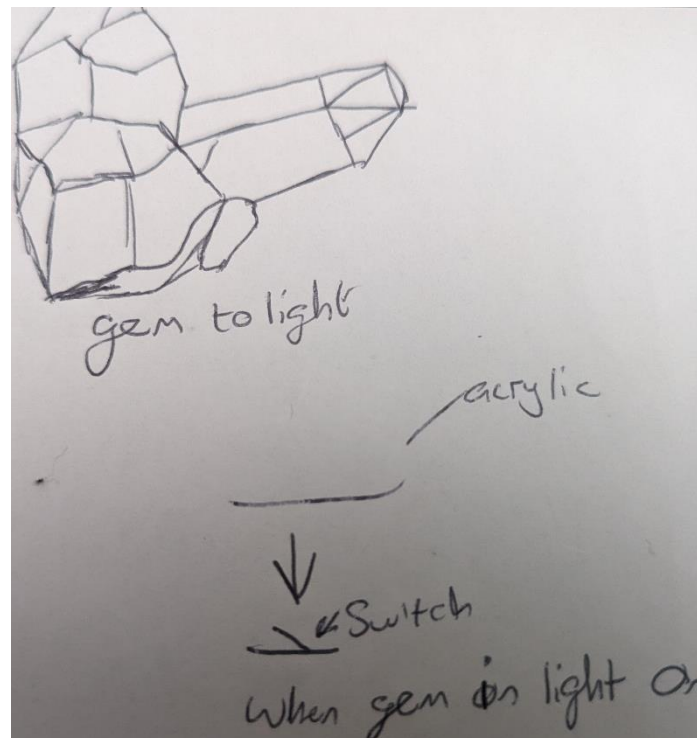
This is a prototype design for the acrylic and the start of how the lights on the project would work.

PCB

For the PCB there were three processes needing done to produce the work that I made and that is KiCad, Inkscape and a Milling Machine, each played a massive role in creating my PCB and each of them was the first time I used any of these processes. I've had a lot of work put into these with varying levels of success with the errors being mostly having no user error and just bad luck.

KiCad

KiCad allowed me to create the schematic and layout of my PCB I created two distinct variations of my PCB the first had the wrong footprint, which I had simply included the wrong one with this error being noticed late. From KiCad alone there has only been that one issue of the wrong footprint. I will show the original footprint and the finished print.

First Schematic	First PCB Footprint Design
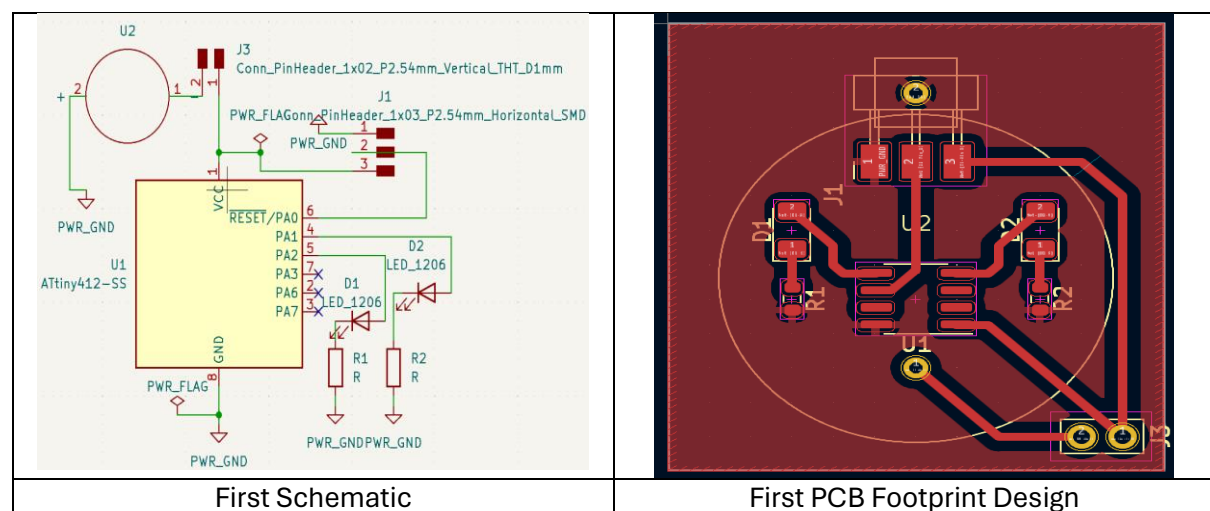
Finished Schematic	Finished PCB Footprint Design

There isn't much variation from the two simply down to a different footprint and some reorganisation to make the finished result.

Inkscape

Through Inkscape I had zero errors preparing my designs ready for printing the only issue I really had was that my laptop made the files I created different to the files that I wanted to have, but through sending the documents to the lecturer to then start them it allowed me to finish the work I done. As with the KiCad I also had to redo the Inkscape documents to allow for my printing to be started.

|	
First Trace Piece	First User Drawing Piece
Finished Trace Peice	Finished User Drawing Piece

Milling Machine

The milling machine aspect of my PCB work came with the most issues with problems like the board not holding correctly leading to the machine cutting too much, parts of the boards chipping off because the tracks were too close, and the holes being cut from the milling machine being square so I could not use them. Even though I had I issues with the print I still learned from each of my attempts eventually producing what was told to me the "most beautiful" PCB that the lab group I am in produced.

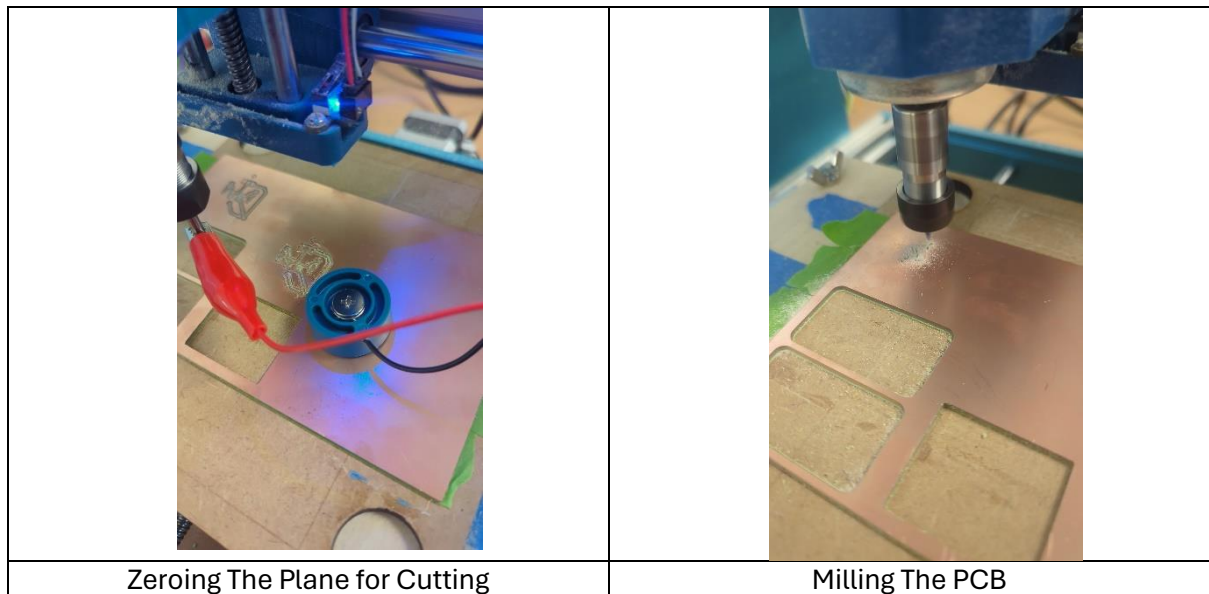First Print Produced That Had Square Holes
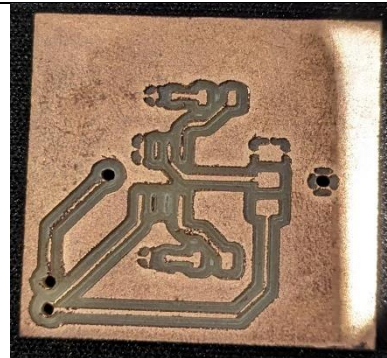
Second Print That Had Chipped Copper
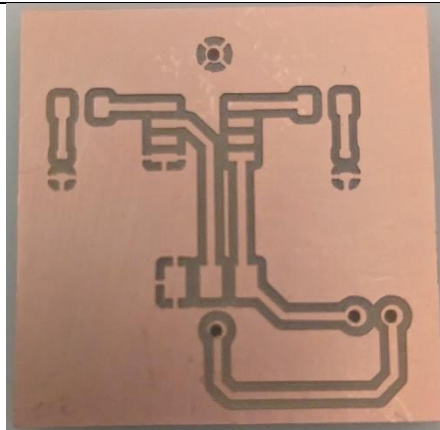

Finished Final Print.

While using the milling machine I had to position the drill bit into the correct spot a zero the plane to let the drill know where it was cutting.

Zeroing The Plane for Cutting	Milling The PCB

Acrylic

Inkscape

Using Inkscape to create my acrylic we used 'hairline' thick lines with the colours RED and **BLACK** with the red being used to cut through the acrylic and the black engraves the acrylic for the details of my piece to show especially the 3D accepts of it.
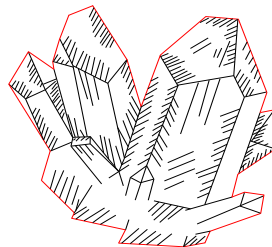
Laser Cutter

The laser cutter was fun to use and allowed me to watch as the acrylic I designed was created in front of my eyes. After completing the concept on Inkscape I then sent it to the application which allowed me to send it to the laser cutter, the cutter engraved the material first showing all the details of the acrylic before cutting it through.

| Acrylic After Being Cut	Acrylic Lit Up from With a Similar Product.
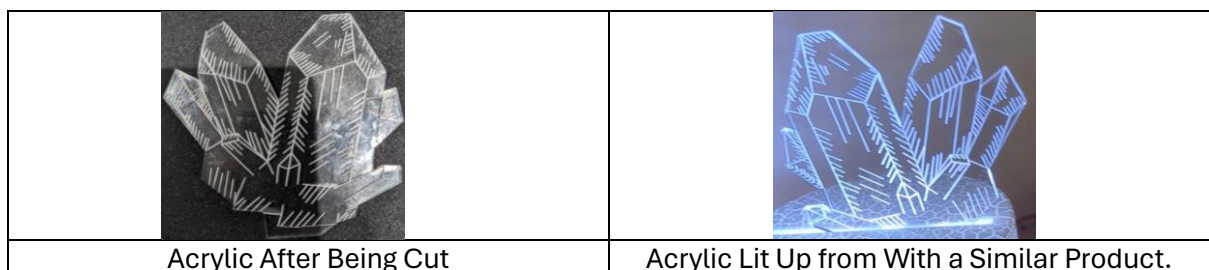
3D Print

3D printing to me was the hardest to do out of the three items produced as it was far from anything I have previously done my holder was designed off of a gem holder from the game my acrylic was based off of as well with my end result being what I believe to be a good similarity but nearing the end of the project timeline I found out that logistically my model just wouldn't fit with the electronics that I had made, so after remodelling everything from scratch again I decided that the design I had was too complicated for a first attempt at a 3d model project and to go with something more simple to make.

Fusion 360

Fusion 360 was hard but fun to use I learned how to form and create my own holder with this I had no real error other than my own not measuring thing up properly and after some time redesigning I eventually had a model that would allow me to fit everything I needed to make my project complete.
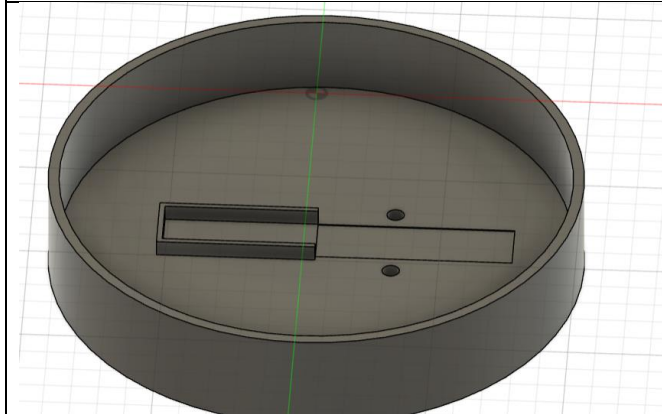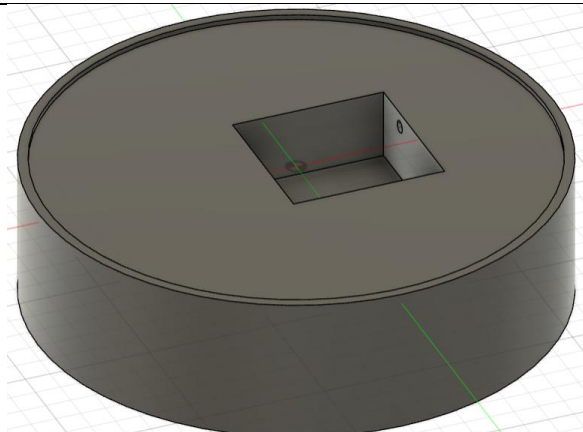

1st Designed Top Half For 3D Print

1st Designed Bottom Half For 3D Print
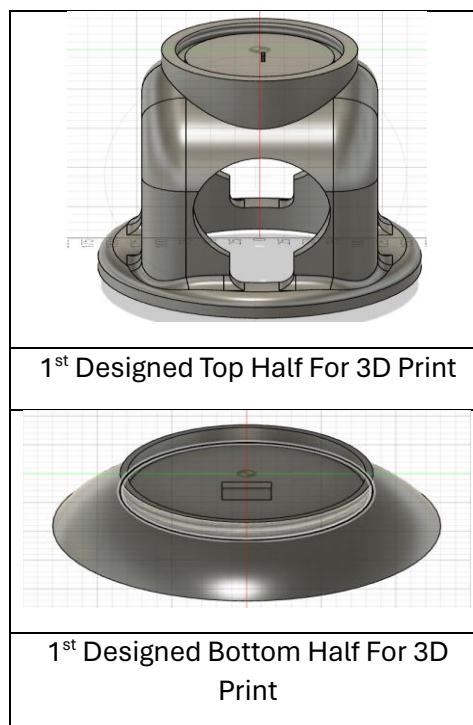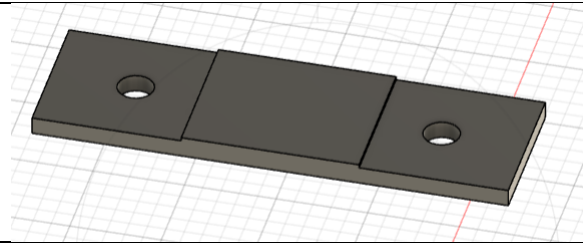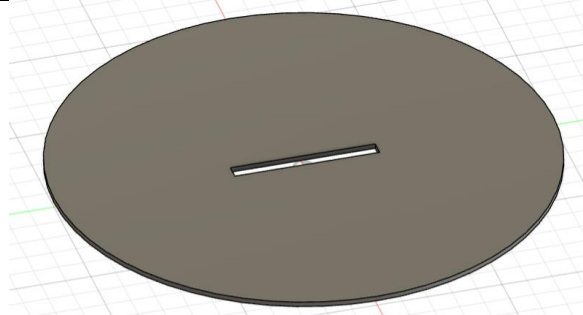
2nd Model latch

2nd Model Lid

2nd Model Switch Holder


2nd Model PCB Holder

3D Printer

The first print I made with that being only the top half was going great the only error was that I ran out of filament in the printer. The second print was printed good with the only changed I made was cut my own hole for a bigger slot for the acrylic to be inserted as well as slopes on the slide to allow it to go in. After the discovery that my original plans weren't going to work having the redesigned print actually fit in was a massive relief and I was glad to see all the work I had done was complete.

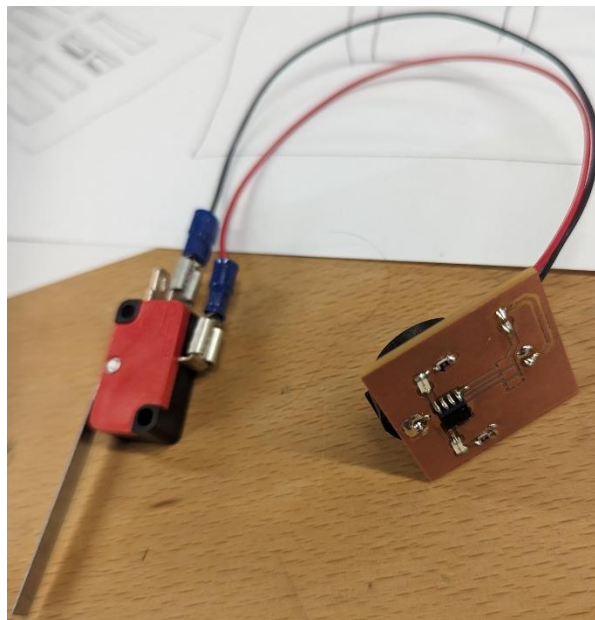1st First Print with Non-Completed Top
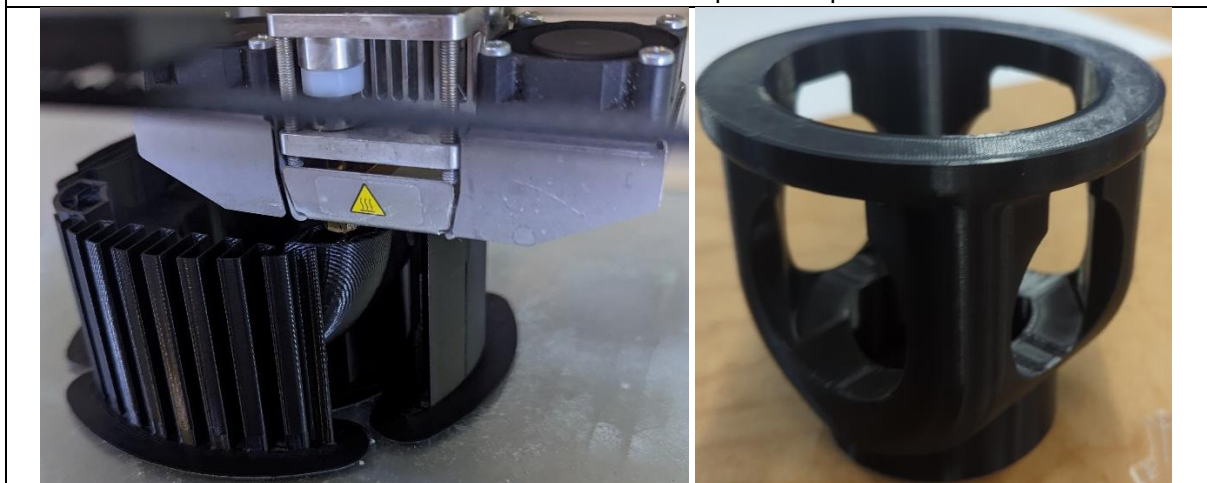
1st Finished Print Full Size
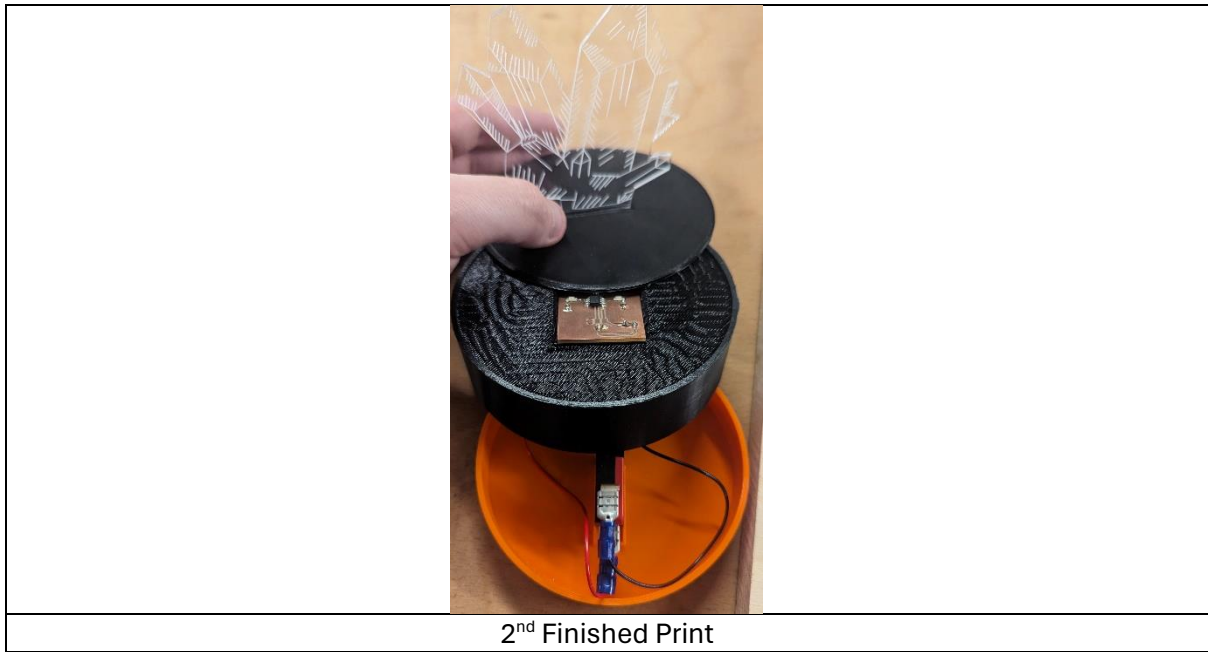
2nd Finished Print

Results

The Result of my personal project has resulted in these finished products concluding in one complete project.
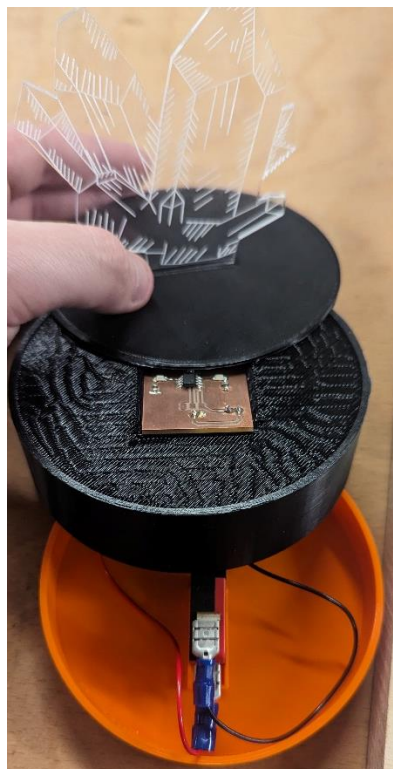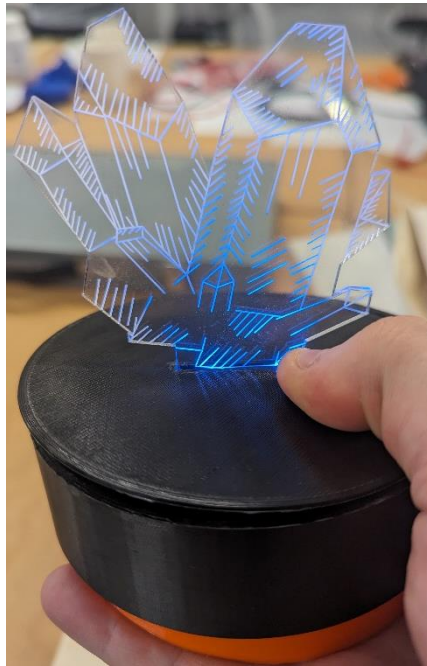
PCB

Edge Cut Acrylic

3D Print

Complete Product

Thoughts

Overall I have loved making this project but with the end putting the product all together there were some slight measurement errors which did not allow for my container to fully close and just sit at an angle, it does allow for the edge cut acrylic to light up but not sit as intended.

Section B – Group Project

Detail The Design

For the project the group consisted of Ben Kendall, Reuben Tarjanyi, me and, Ryan McBride. We were tasked as a group to create a container that is to hold 1 or more dice we decided on a triangular prism as our design with three sections for the dice to go in, the box is 100x100mm with the foam insert being 98x98mm with the dice being having an equal distance away from each other. We split the work into four I would work on the foam inserts for the container, Reuben would work on the stickers and both Ben and Ryan deciding on the style of the container and creating the prototypes for the work.

Results
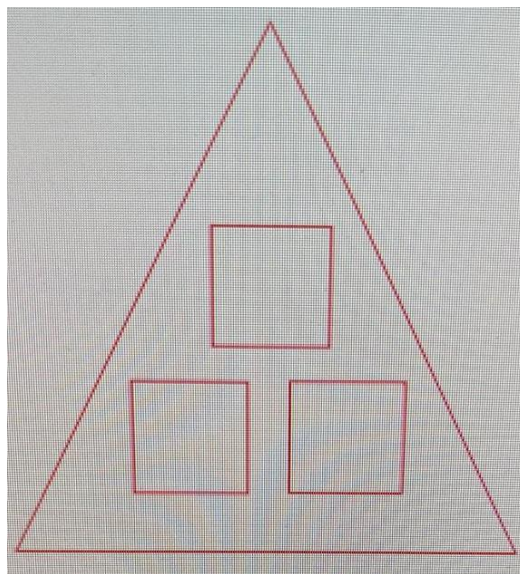
Laser Cutting Vectors for Laser Cutting

Laser Cutting for The Foam Insert

Result Of Foam Inserts with Dice Being Held

Fully Finished Group Project with Lid on The Dice Case