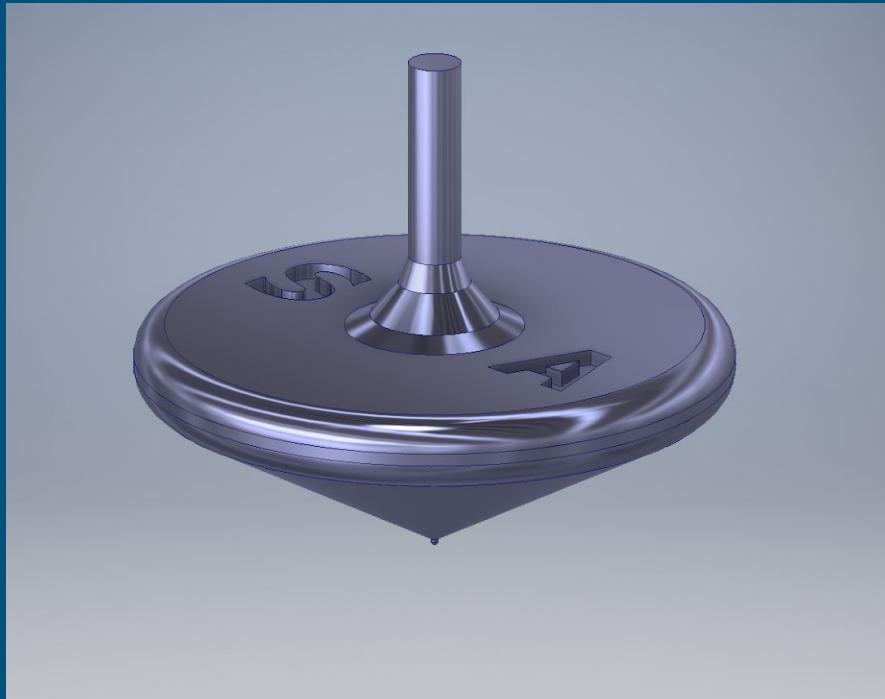


Engineering CAD Work: Portfolio

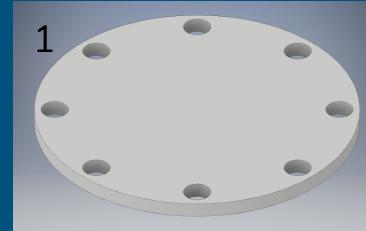
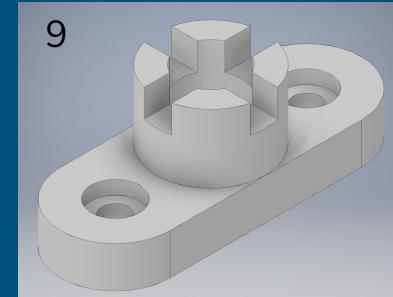
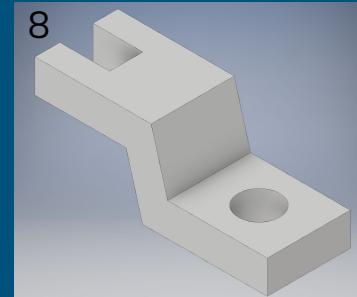
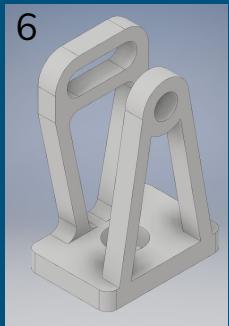
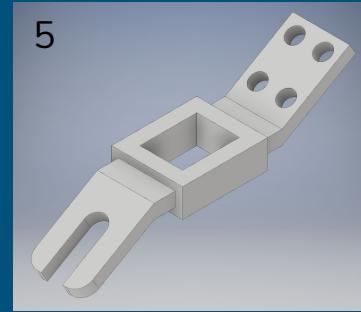
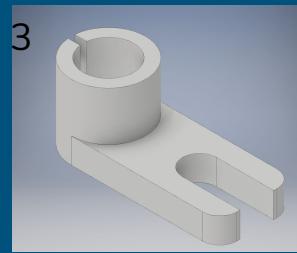
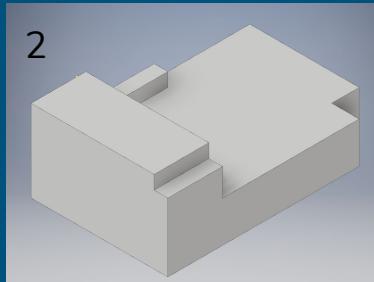
By: Shawn Aviles

Introduction to 3D Printing

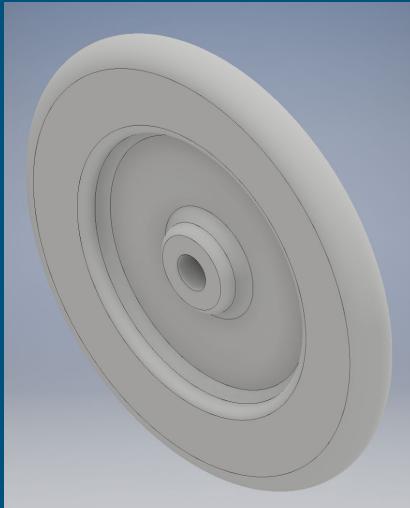
My Top



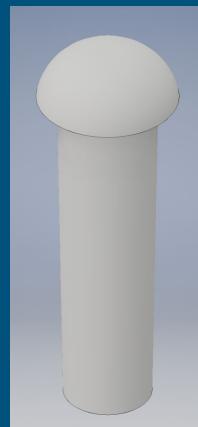
Inventor Exercises 1-9



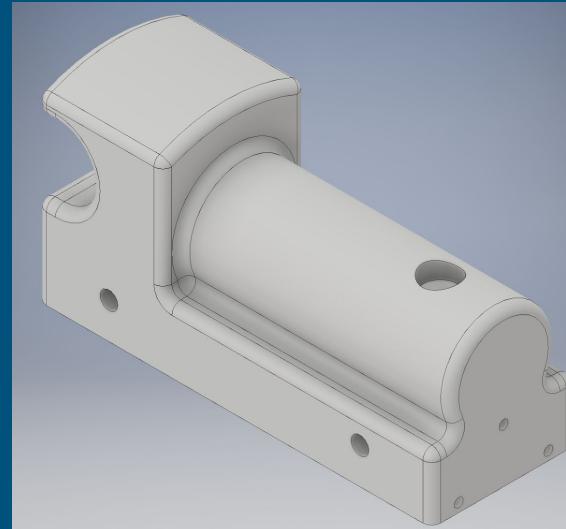
Train Parts



Wheel x4



Axle Peg x4

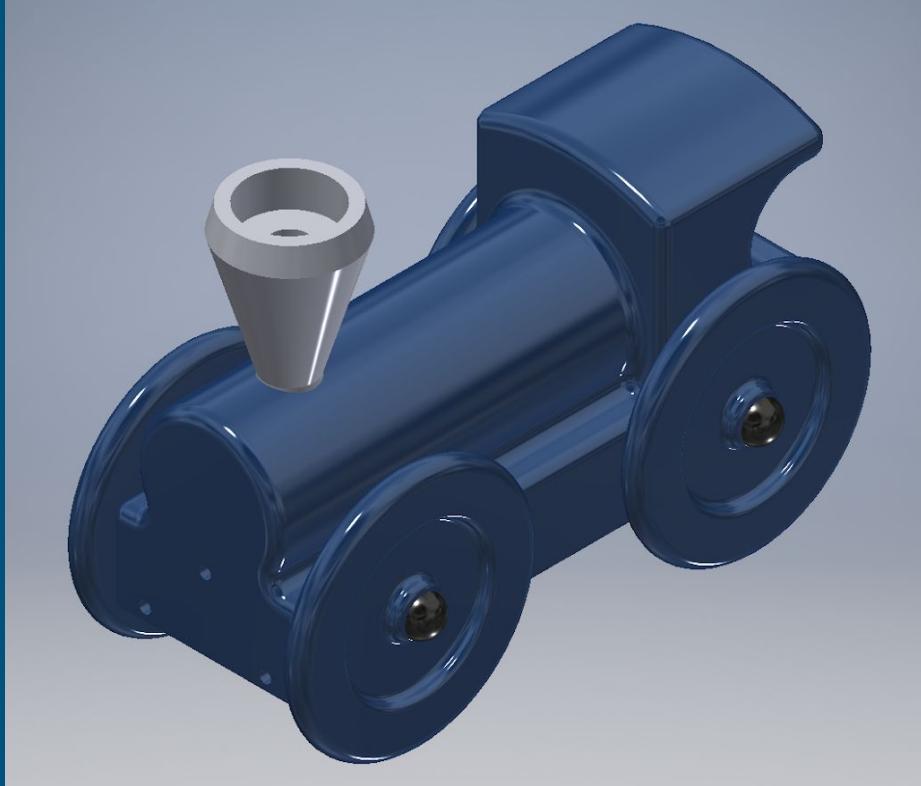


Body x1



Smoke Stack
x1

Train Model

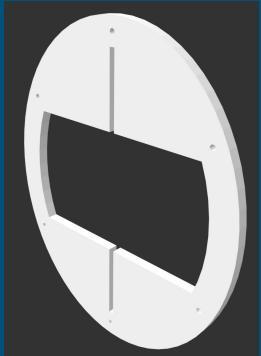


Freshman-Sophomore: Mechatronic Research

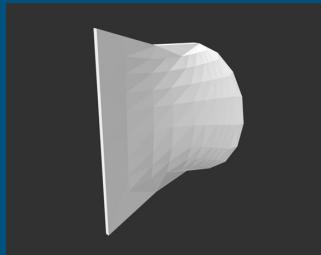
Coral Reef Monitoring Marine Drone



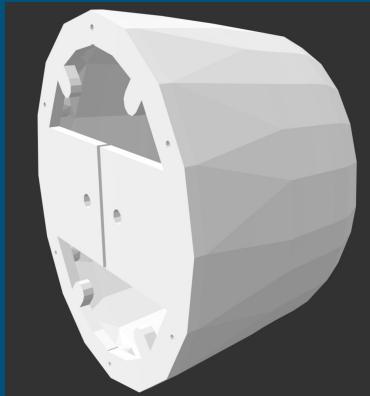
CRMMD Exoskeleton: *CAD Pieces*



Rib



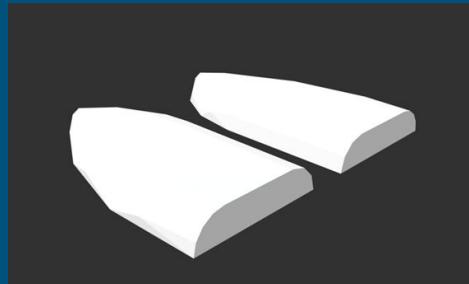
Caudal Fin Base



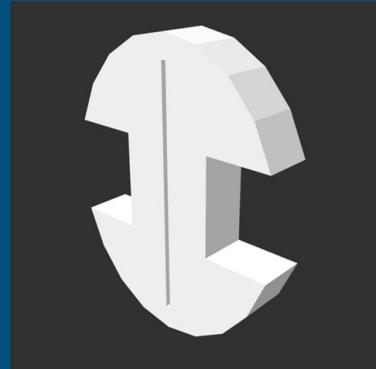
Head Dome



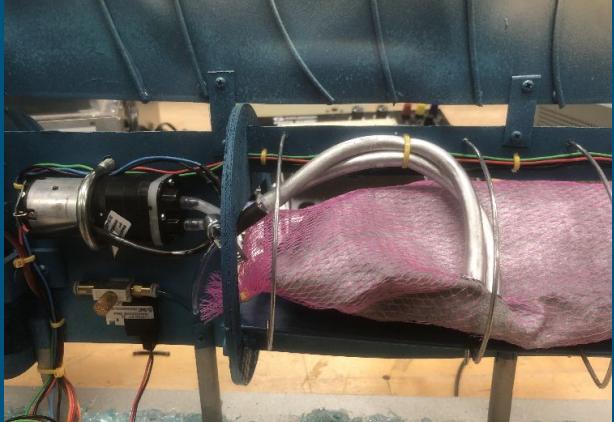
Caudal Fin extension



Pectoral Fin



Servo Rib



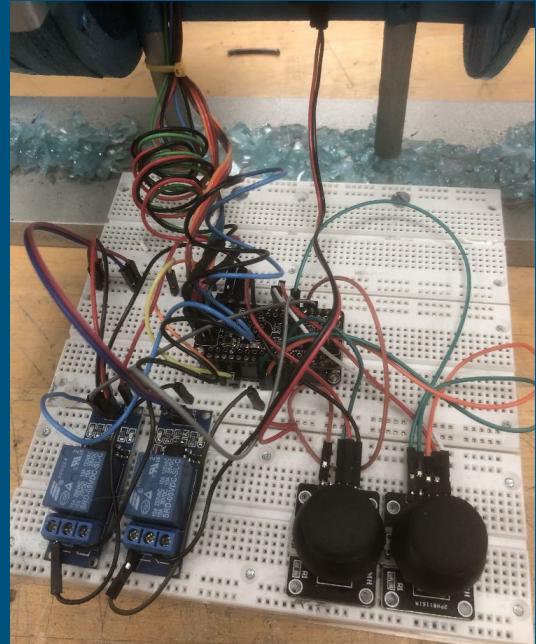
Pump and Bladder



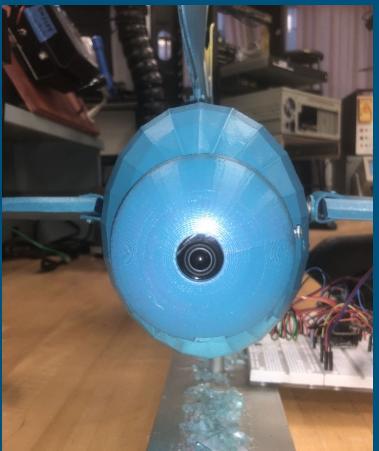
Tail Fin Servo



Pectoral Fin Servo



Remote Control Circuit

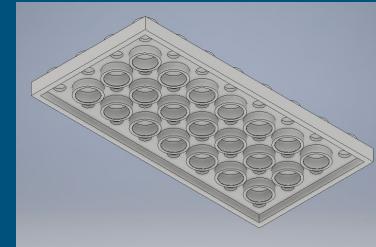
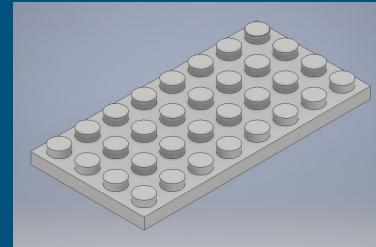
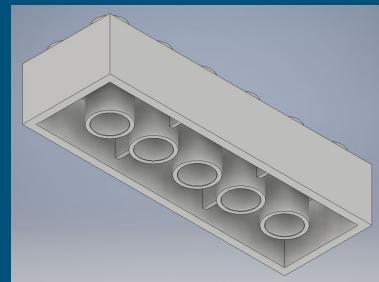
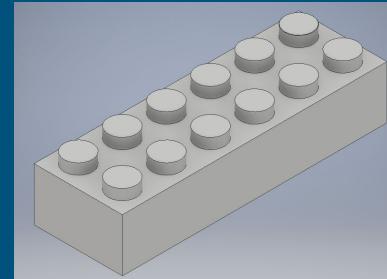
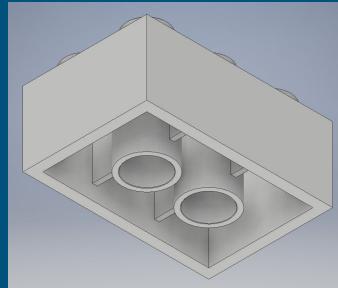
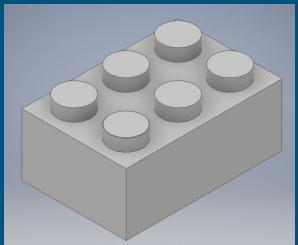
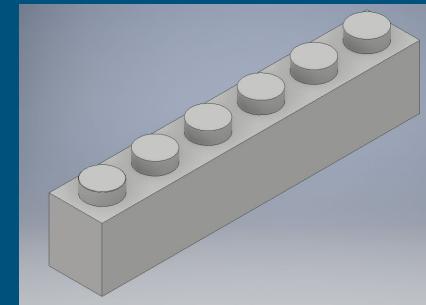
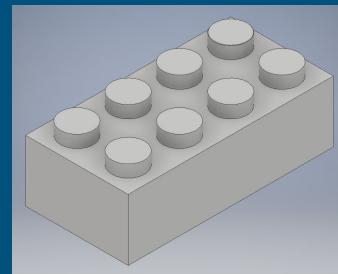
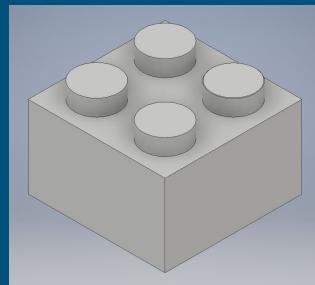
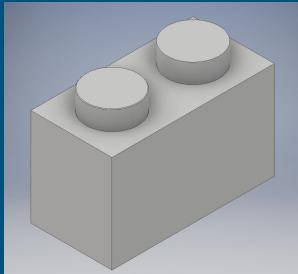


Camera

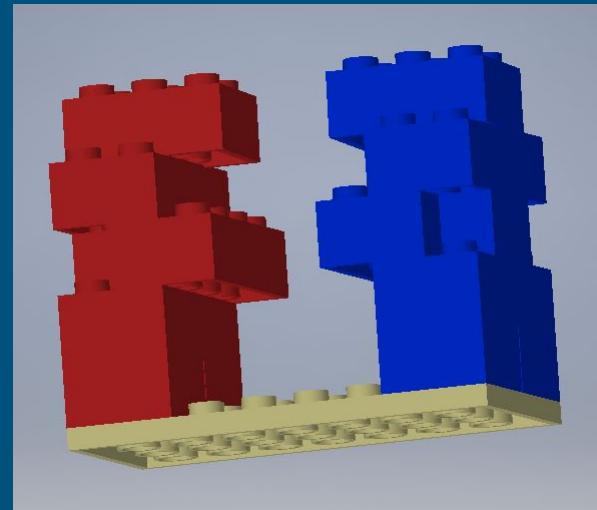
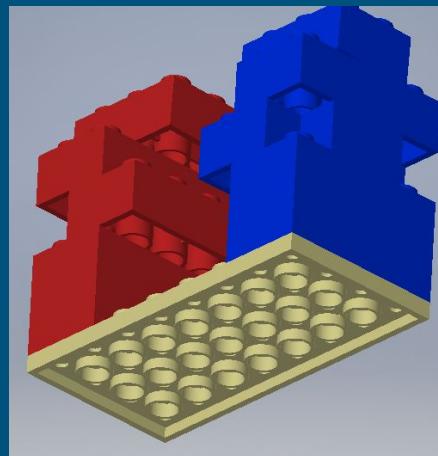
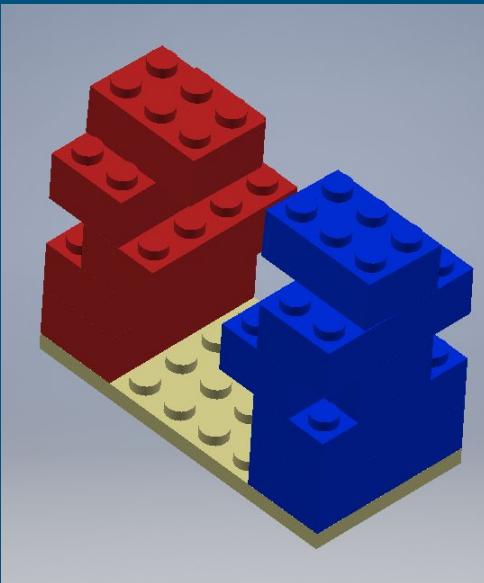
Freshman: Intro to Engineering Design

3D Exercises:

Legos



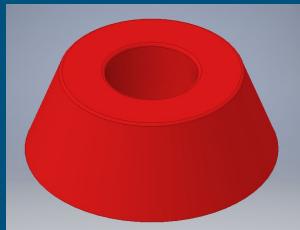
3D Exercise: *Lego Assembly*



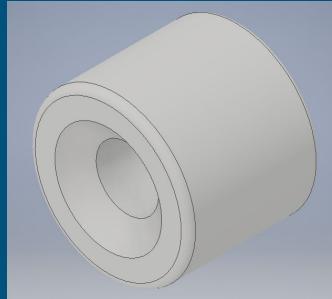
Skateboard: *Pieces*



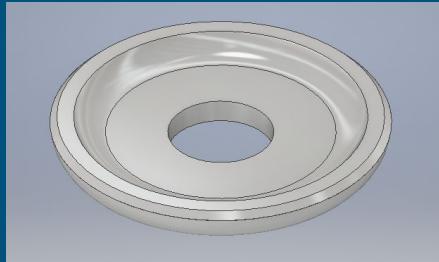
Deck



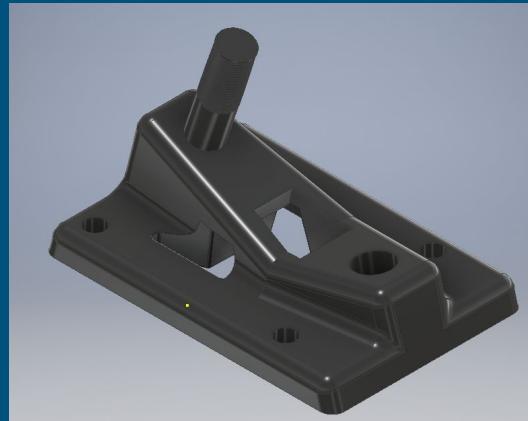
Bushing



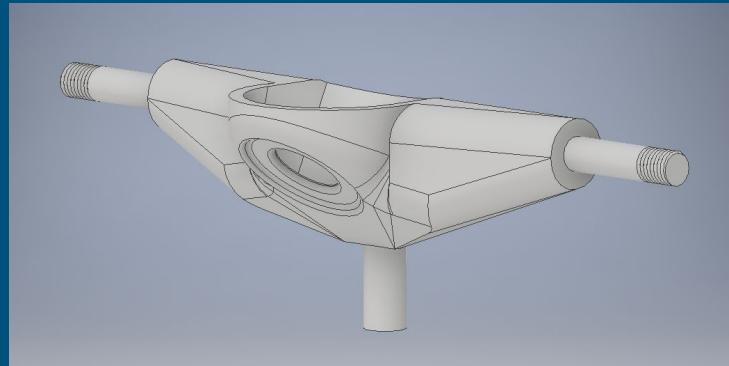
Wheel



Curved Washer

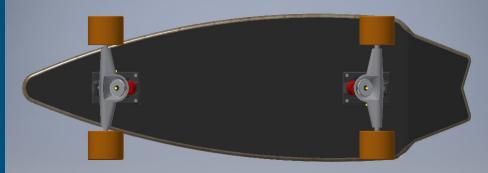
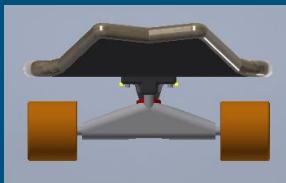
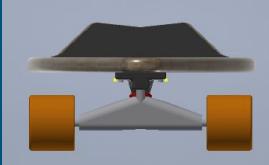
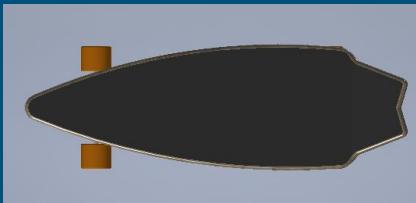


Truck - Part 1

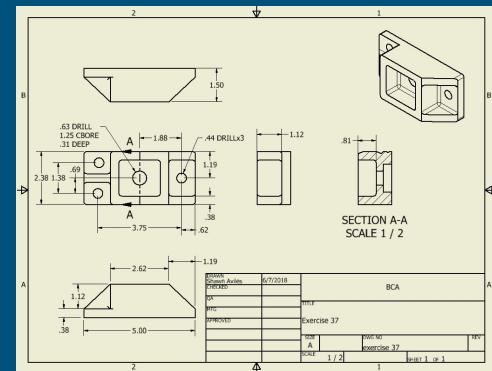
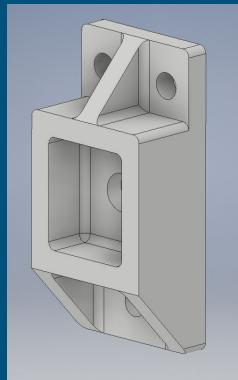
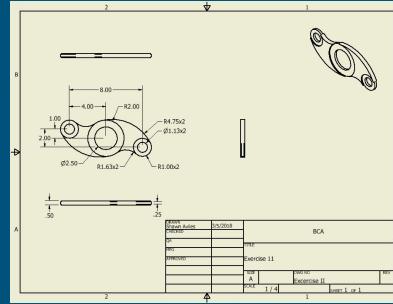
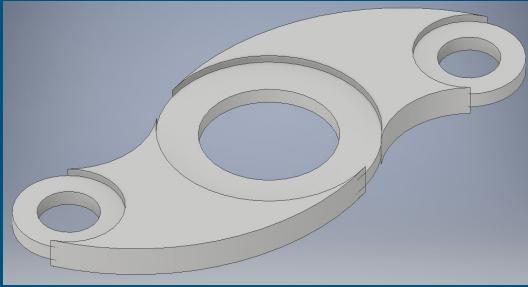
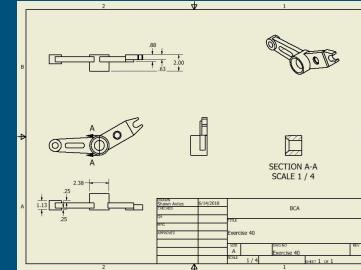
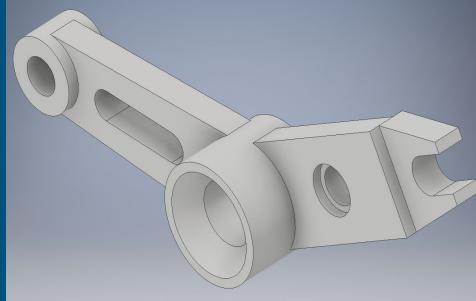
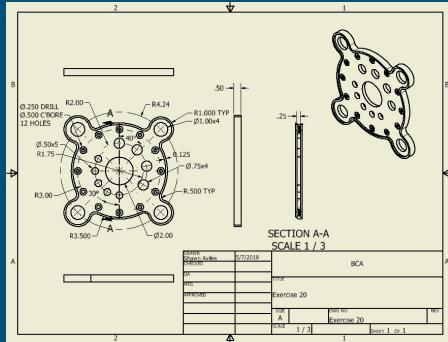
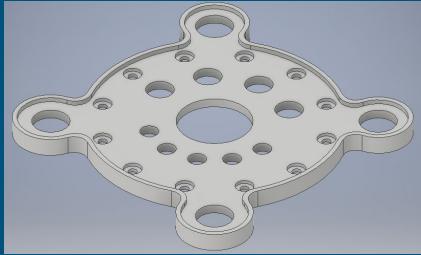


Truck - Part 2

Skateboard: Assembly

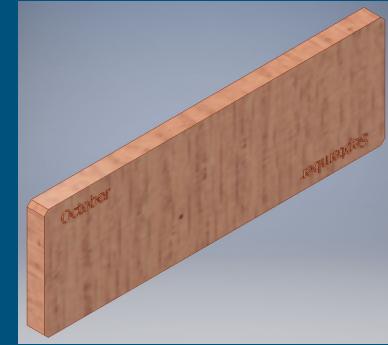
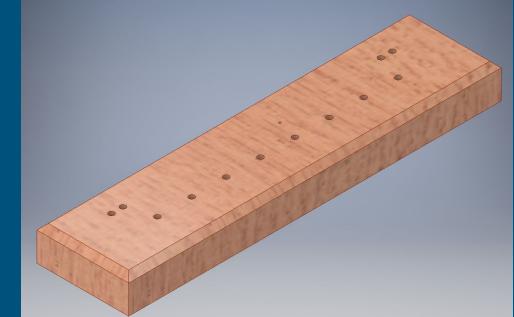
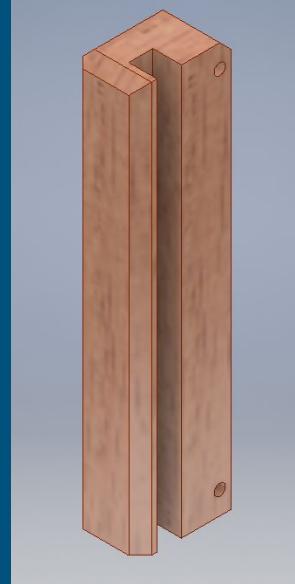
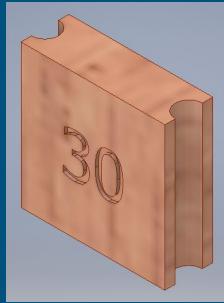


3D Exercise: Highlights

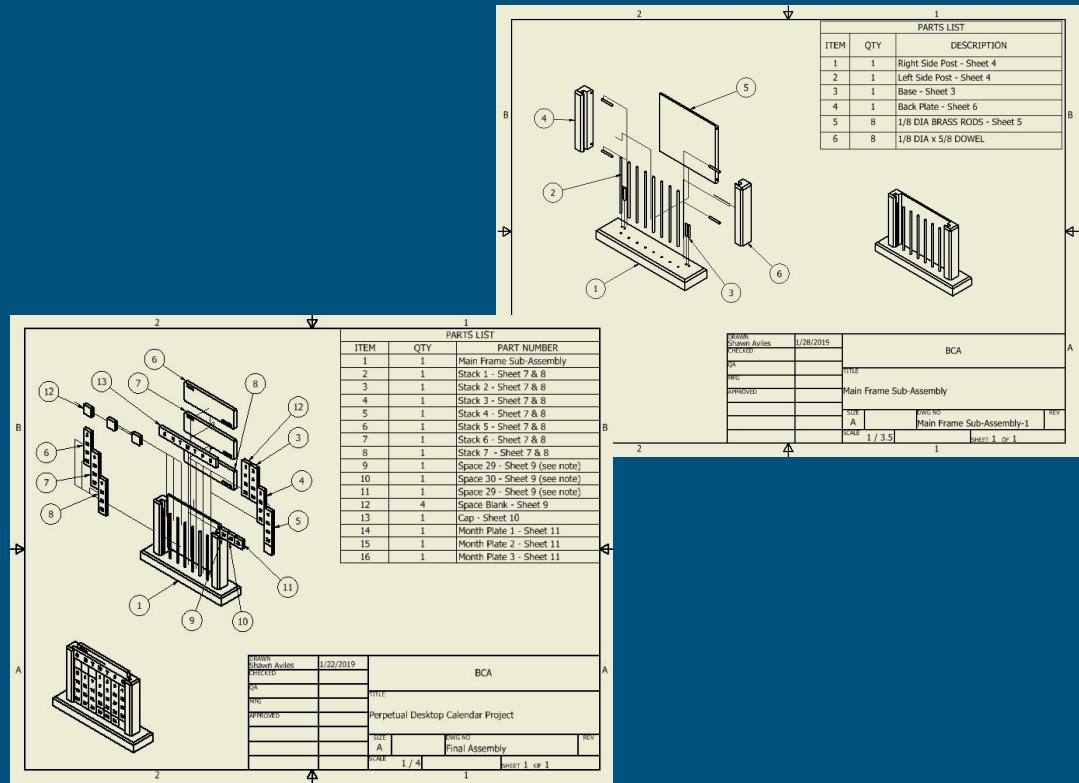
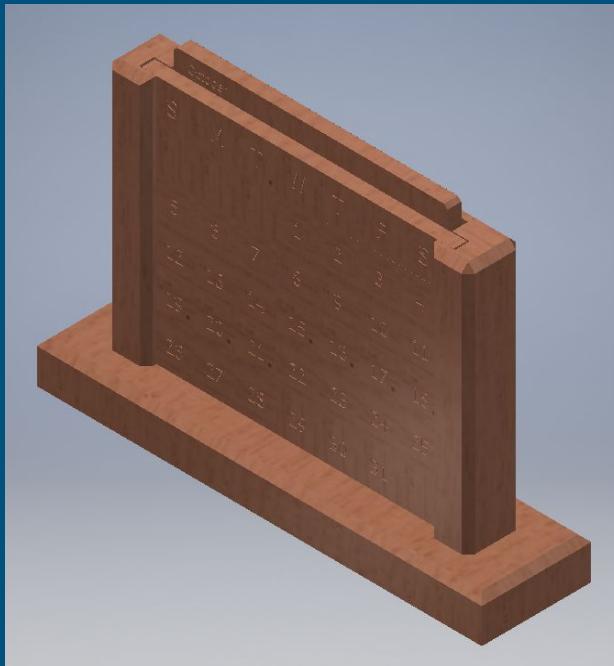


Sophomore: Intro to Engineering Design II

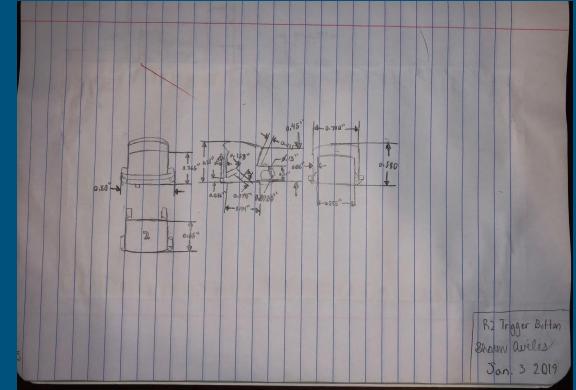
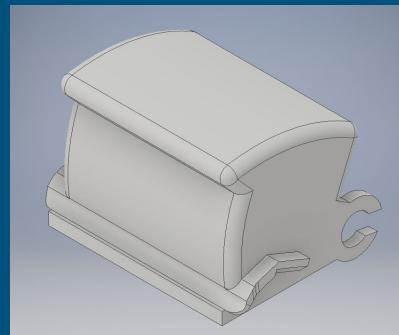
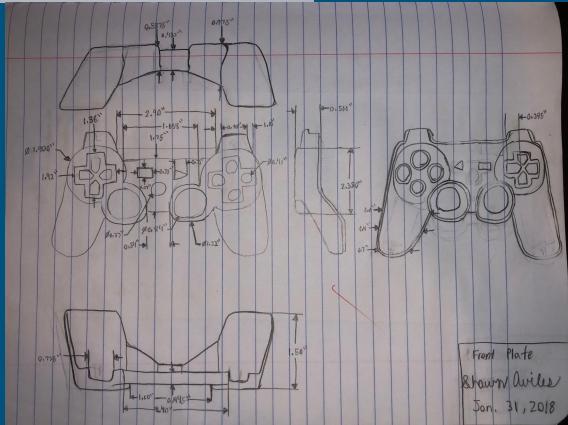
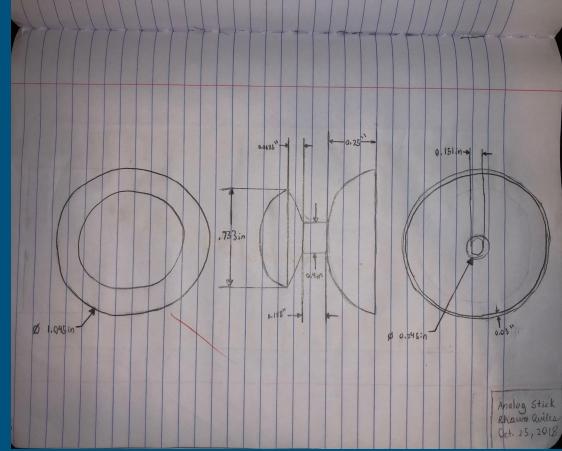
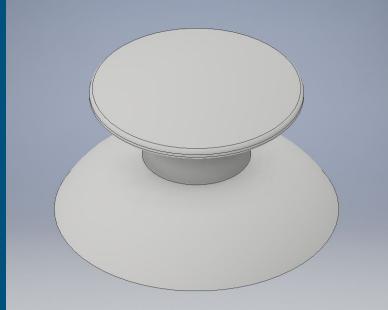
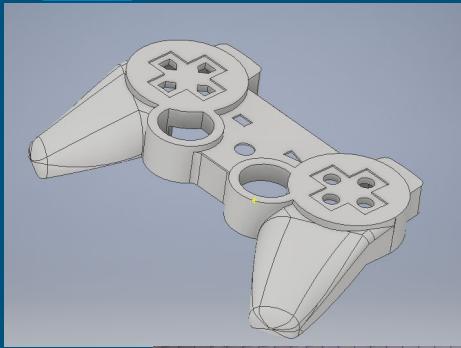
Perpetual Desktop Calendar - *Pieces*



Perpetual Desktop Calendar - Assembly

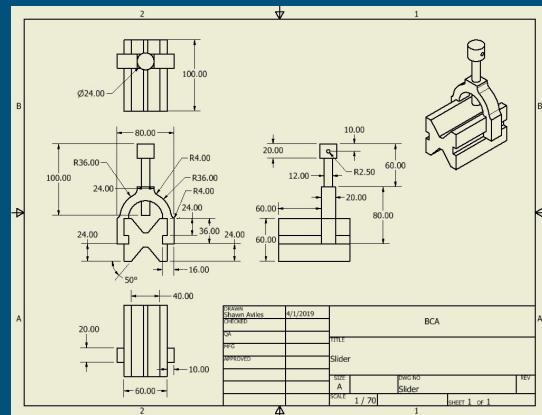
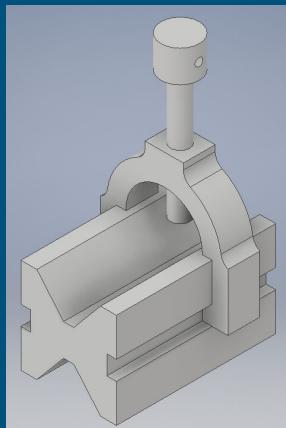
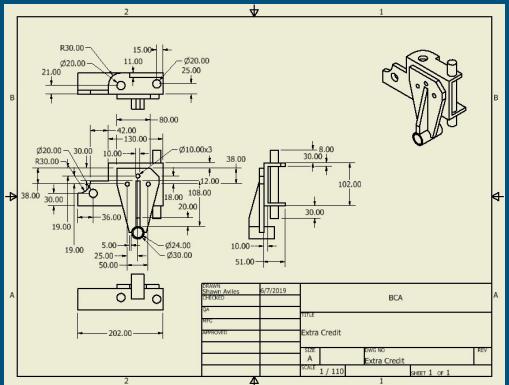
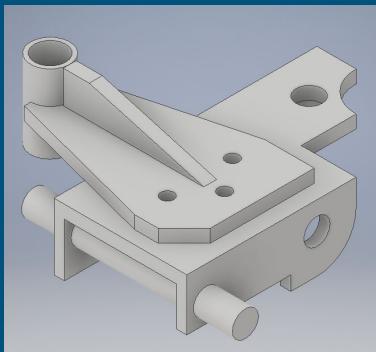
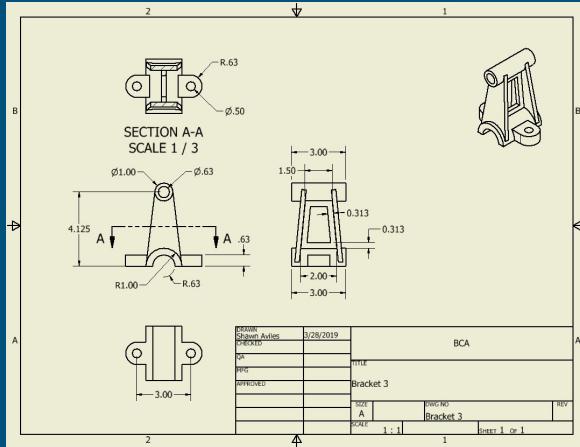
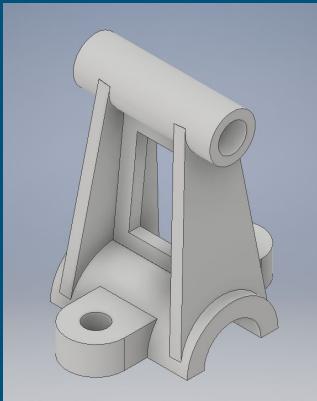
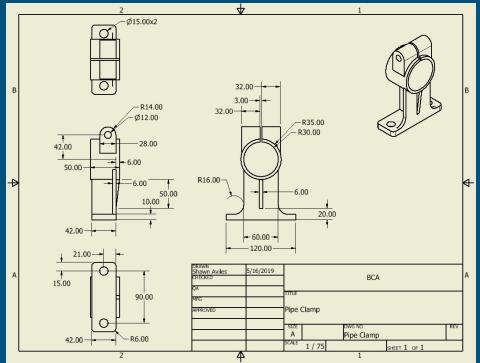
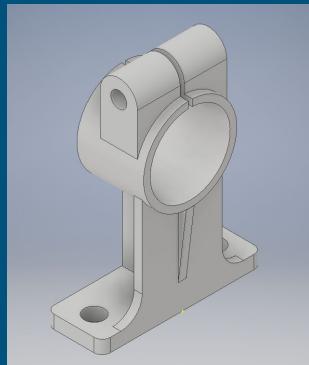


Reverse Engineering Project: PS3 Controller



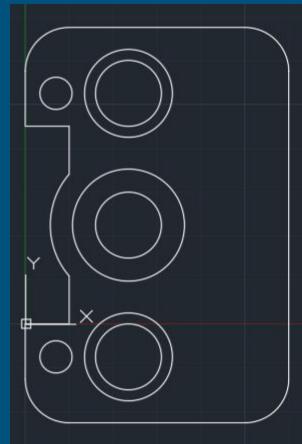
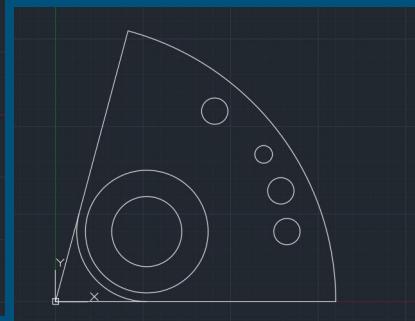
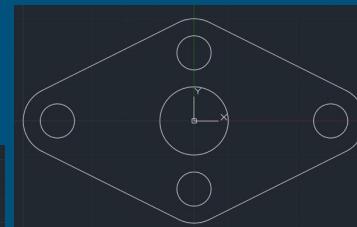
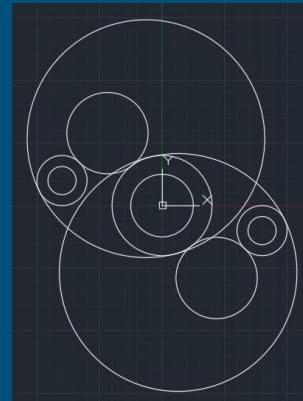
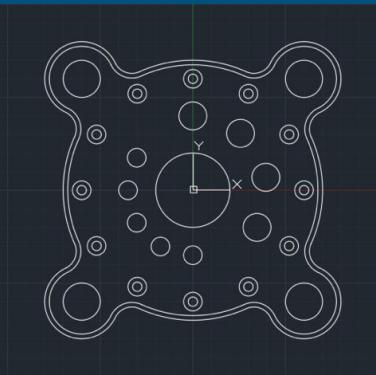
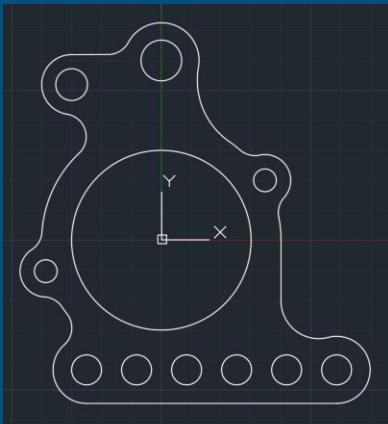
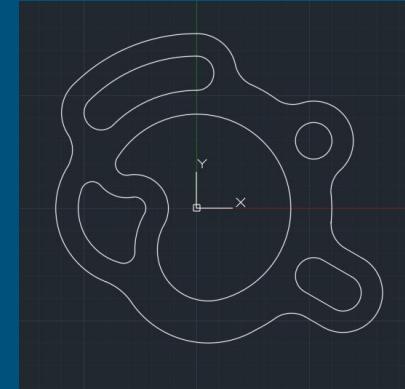
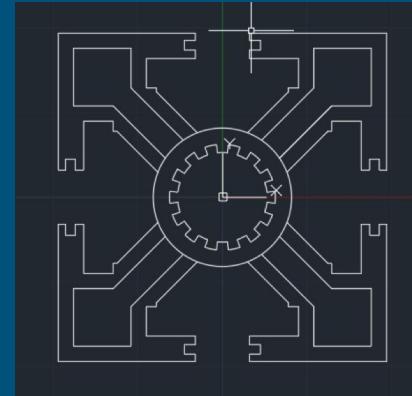
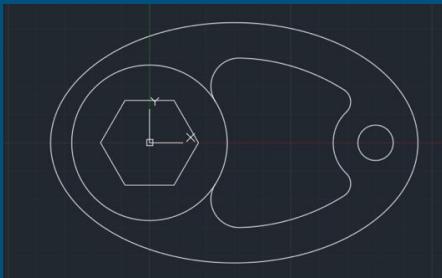
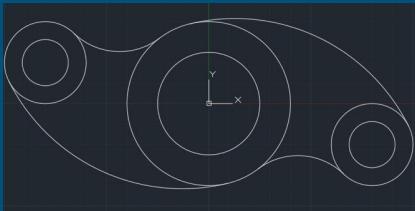
3D Exercises: *Highlights*

Autodesk Inventor



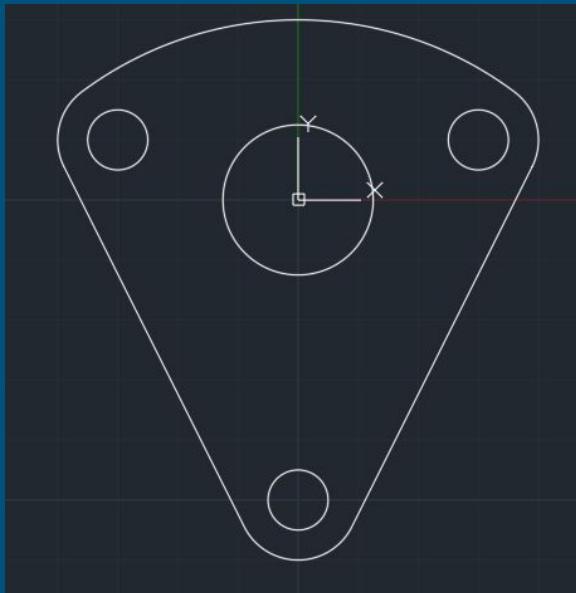
Junior: Computer Integrated Manufacturing

AutoCAD: 2D Sketches



Laser Cutting

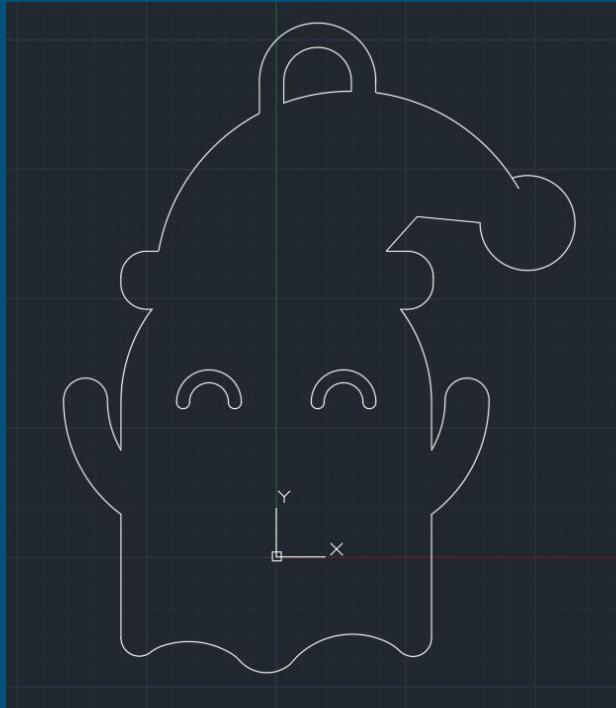
2D AutoCAD Sketch



Final Laser-Cut Product



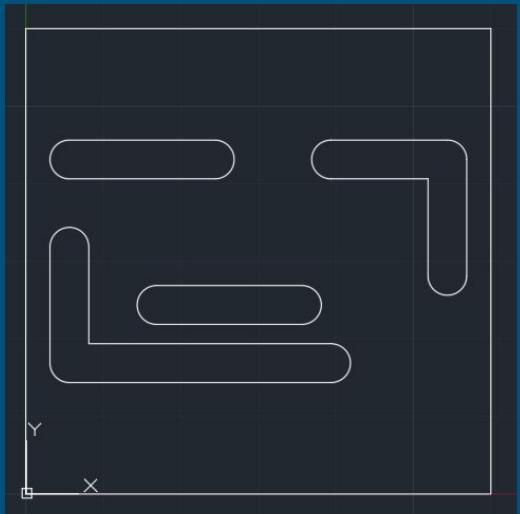
Christmas Ornament Project



CNC Mill: Design

Program 1:

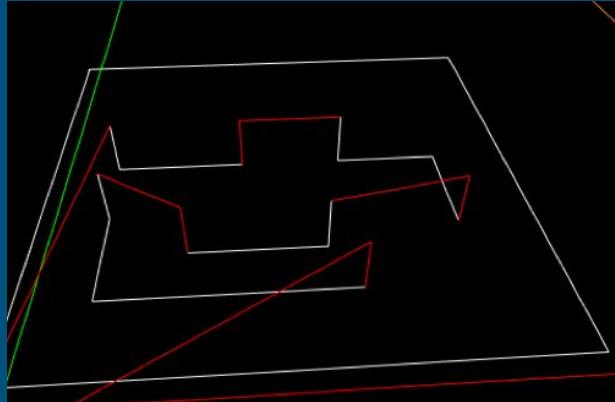
2D AutoCAD Sketch



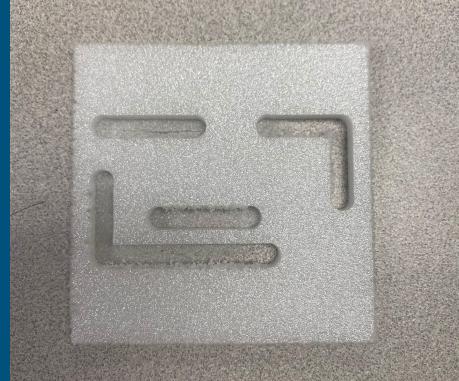
G-Code

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N10M06T2  
N15M03S1000  
N20G00Z.20  
  
' A TO B  
N25G00X.281Y2.157  
N30G01Z-.19  
N35G01X1.219Y2.157  
N50G00Z.19  
  
' B TO C TO D TO E  
N55G00X1.969Y2.157  
N60G01Z-.19  
N65G01X2.719Y2.157  
N70G01X2.719Y1.407  
N80G00Z.19  
  
' E TO F TO G  
N85G00X1.781Y1.219  
N90G01Z-.19  
N95G01X.843Y1.219  
N110G00Z.19  
  
'G TO H TO I TO J  
N115G00X.281Y1.594  
N120G01Z-.19  
N125G01X.281Y.844  
N130G01X1.969Y.844  
N135G00Z.19  
  
'BOX  
N140G00X0Y-.375  
N143G01Z-.19  
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Simulation



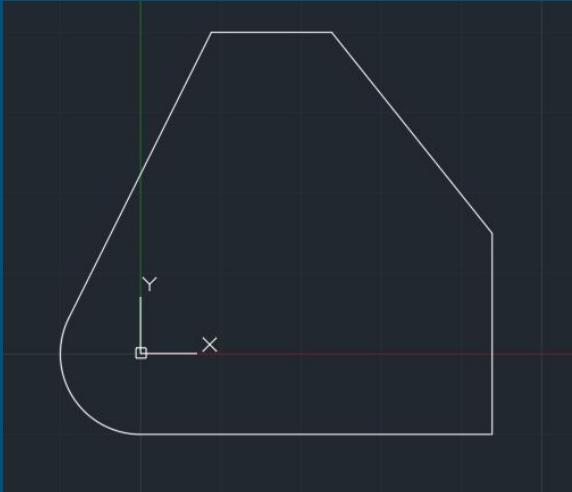
Final Milled Product



CNC Mill: Design

Program 2

2D AutoCAD Sketch



G-Code

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N15M03S1000  
N20G00Z.2  
'border  
N25G0X0Y0Z0.2  
N30G01Z-.2F20  
N35G01X0Y1.25  
N40G01X-1Y2.5  
N45G01X-1.75Y2.5  
N50G01X-2.6382Y0.725  
N55G03X-2.191Y0I.4472J-.225  
N60G01X0Y0  
N60G00Z.2
```

Simulation



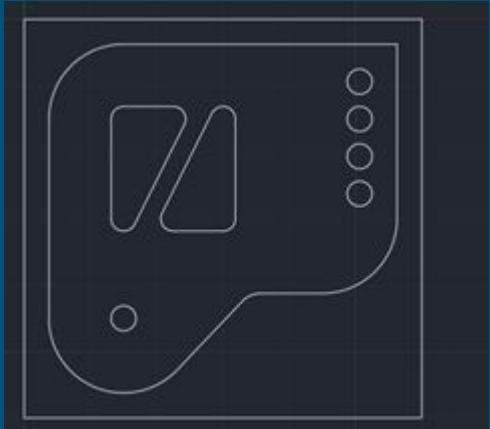
Final Milled Product



CNC Mill: Design

Program 3

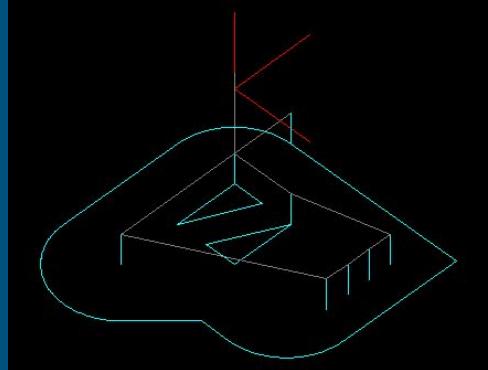
2D AutoCAD Sketch



G-Code

```
'Program 3
N5G70G90
N10M06T1
N15M03S1000
N20G0Z.2
'triangles
N25G00X0.75Y-0.75
N30G01Z-0.2F20
N35G01X0.75Y-1.50
N40G01X1.125Y-0.75
N45G01X0.75Y-0.75
N50G01Z0.2F20
N55G00X1.5Y-0.75|
N60G01Z-0.2F20
N65G01X1.5Y-1.5
N70G01X1.125Y-1.5
N75G01X1.5Y-0.75
N80G01Z0.2F20
'holes
N85G00X2.5310Y-0.4690
N90G01Z-0.2F20
N95G01Z0.2F20
N100G00X2.5310Y-0.75
N105G01Z-0.2F20
N110G01Z0.2F20
N115G00X2.531Y-1.031
N120G01Z-0.2F20
N125G01Z0.2F20
N130G00X2.531Y-1.312
N135G01Z-0.2F20
N140G01Z0.2F20
N145G00X0.75Y-2.25
N150G01Z-0.2F20
N155G01Z0.2F20
'
'border
N160G00X0.75Y0Z0.2
N165G01Z-0.2F20
N170G01X2.9380Y0
N175G01X2.938Y-1.5
N180G02X2.188Y-2.25I-.75J0
N185G01X1.8107Y-2.25
N190G01X1.2803Y-2.7803
N195G02X0Y-2.25I-0.5303J0.5303
N200G01X0Y-0.75
N205G02X0.75Y0I.75J0
N210G01Z0.2F20
```

Simulation



Final Milled Product



CNC Mill: Design

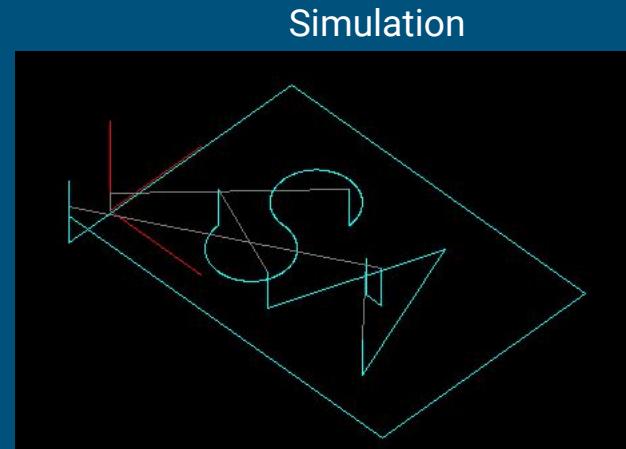
Program 4

2D AutoCAD Sketch



G-Code

```
'PROGRAM 4 - Your Initials'  
'  
N5G70G90  
N10M0GT1  
N15M03S1000  
N20G00Z.2  
  
'FIRST INITIAL "S"  
N25G00X1.2868Y1.3472  
N30G01Z-.2F20  
N35G03X0.927Y0.988I-0.36J0  
N40G02X0.567Y0.628I0J-0.360  
N45G01Z0.2  
  
'SECOND INITIAL "A"  
N50G00X1.4827Y0.2545  
N55G01Z-0.2F20  
N60G01X2.0058Y1.6932  
N65G01X2.5290Y0.2545  
N70G01Z0.2F20  
N75G00X1.93Y0.9034  
N80G01Z-0.2F20  
N85G01X2.0817Y0.9034  
N90G01Z0.2F20  
  
'BORDER 3"x2"  
N95G00X-.125Y-.325  
N100G01Z-.2F20.  
N105G01X-.125Y2.125  
N110G01X3.125Y2.125  
N115G01X3.125Y-.125  
N120G01X-.325Y-.125  
N125G01Z.2  
M06M02
```

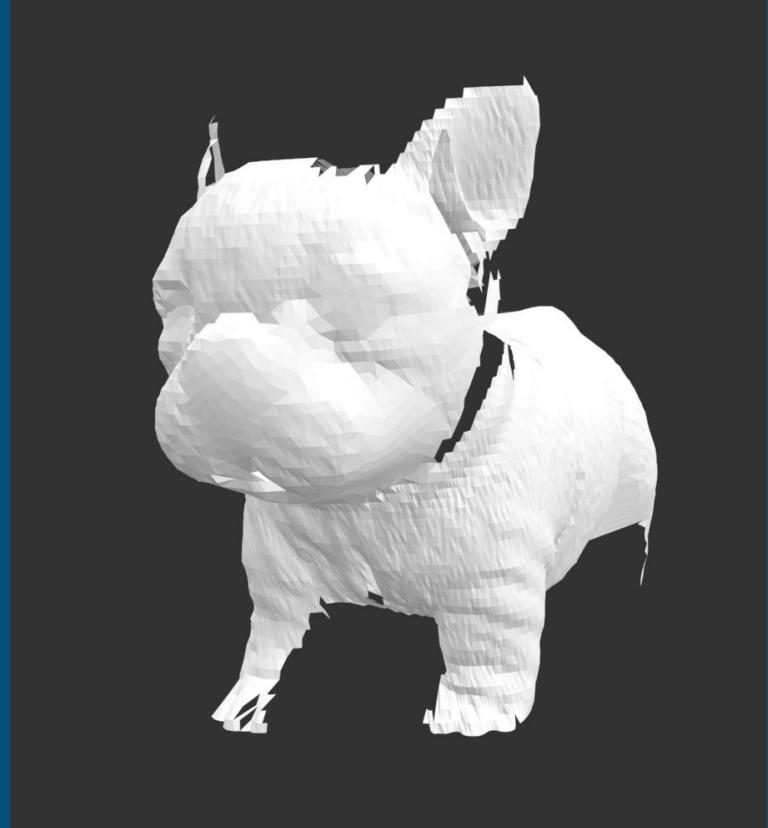


Final Milled Product

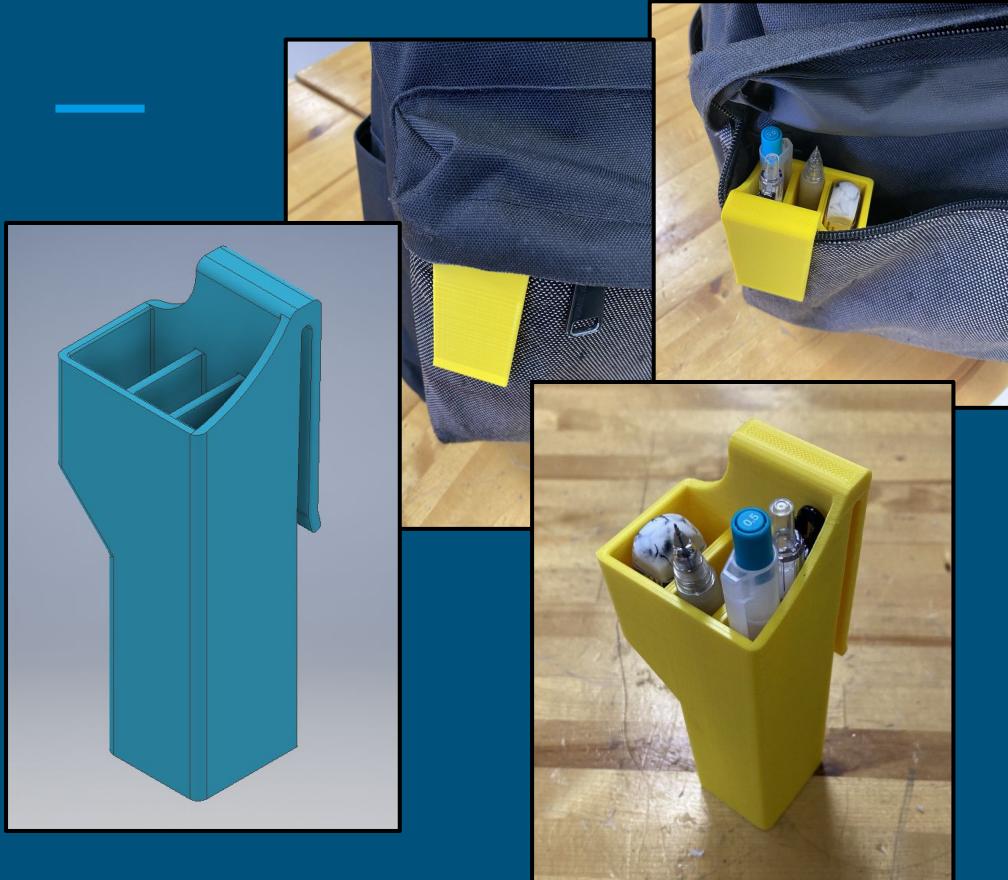


Simulation

Laser Scanning

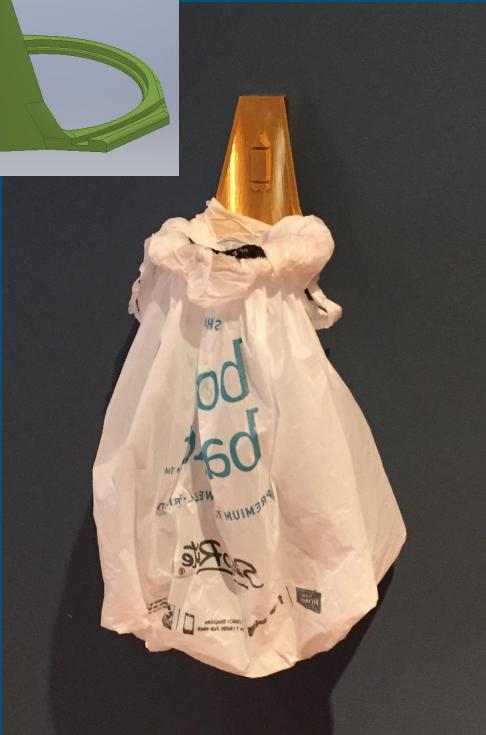
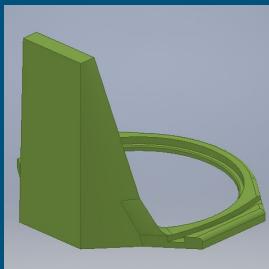
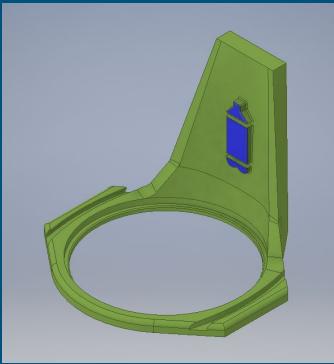


Extreme Redesign: Bag Pal



The item displayed to the left is the newly designed Bag Pal for your school supply needs. Have you ever thrown your pencils in your bag and later go back to find them all the way at the bottom? Then you have to go rummaging through your bag to find the pencils you need for your next class. Other solutions for this problem would be to simply have a pencil case that you must first remove from your bag, open, and take your needed writing utensil out. This process is inefficient and wastes vital time where your instructor could be going to the next slide of notes. However with the Bag Pal your writing utensils are held upright to the inside of your bag for ease of access at all times.

Extreme Redesign: Ez-Recycle Rim



The item displayed to the left is the newly designed EZ-Recycle Rim for recycling with ease. All you need is a plastic bag that you typically get from grocery shopping and you can now recycle in an organized manner without breaking a sweat. Most people stay clear of recycling because of the hassle. However with the EZ-Recycle Rim you can just wrap the plastic bag through the rim to make a secure fit and then start separating your recycling. You can use multiple of this item for many separations. Likewise, the size is compact and can easily be attached to a wall or to the side of a table with double sided tape.

Personal Projects 2017-2020

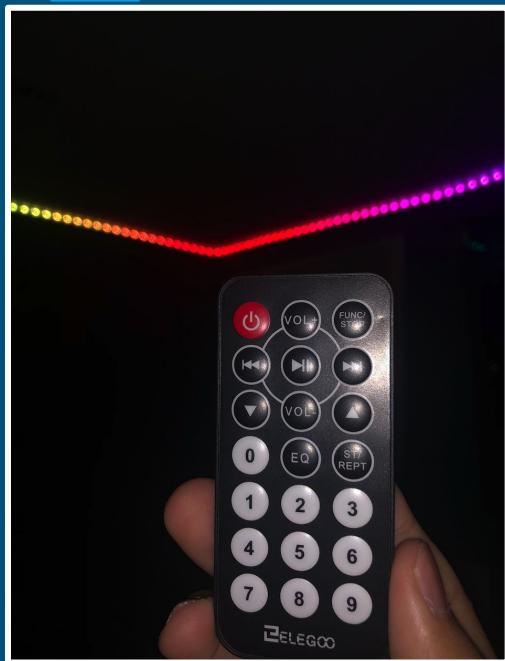
Creality Ender 3 - 2018



I purchased and assembled a **Creality Ender 3** 3D Printer for home use in 2018. I worked with cura and 3D modeling at school and with my research so I was interested in it early on. I have used it many times since then to 3D print models for my engineering class, gifts, helpful gadgets, and other projects. Some prints are outsourced and others are self made.



Controllable RGBW LED Strip - 2020



After learning about the fundamentals of Arduino in my junior year intermediate electronics class I wanted to apply what I learned to a project. I decided to buy and individually addressable LED strip and code an arduino to control it with using an (random) IR remote and sensor. I used a 5V converter and utilized ADAfruit public libraries of code and adjusted them to create my own LED patterns as well.

Senior Capstone Design Ideas 2020-2021

Control-Door

**Submitted as an initial Capstone Proposal
Shawn Aviles - AEDT 2021**

Problem Statement

The product was designed to be an addition to smart home appliances with the notions of ease-of-use and size kept in mind. The product is a smart bedroom door lock, opener, and closer that allows the user to open and close doors with a controller.

Design Brief:

Product Name: Control-Door

My idea is quite simple. I am hoping to create an automatic door mechanism that can be easily applied to doors within households. The system will utilize servos, Arduino, and whatever else to lock, open, and close doors by the click of a button on a controller. I am aware more sizable versions of this idea exist in malls and public areas but I wish to create a smaller home-gear product that can be set up alongside current smart-home accessories in the market.

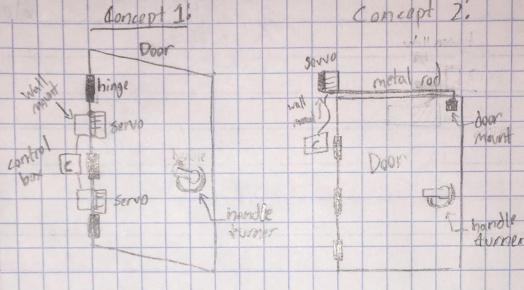
Features and Specifications

The product will utilize servos, arduinos, plastic/ metal rods, basic hand tools, laser cutter, CNC mill, 3D Printer, and other electronics to lock, open, and close doors by the click of a button on a controller. All supplies needed will be purchased by me.

Ideas

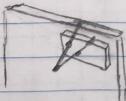
Brainstorming / Sketches

* Door Opener/Closer *



Concept 1: utilizes 2 servos in similar manner to the hinges;
high torque needed to open door

Concept 2: utilizes 1 servo similar to how ~~door~~ ^{SA} doors use an extended arm to retract doors when closing them. Weight is also greater for metal doors so I plan to use a metal rod to connect to the door at a point further away from axis of rotation → less torque needed

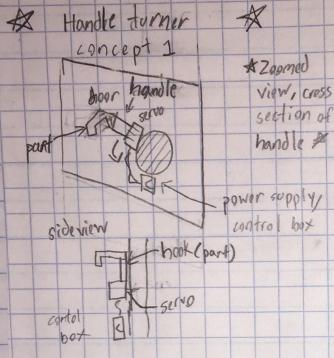


Prototype 1 will utilize concept 2 for opening & closing the door.

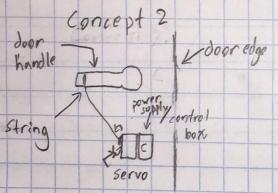
Sharmy Aniles

11/12/2020

Ideas



Concept 1: utilized a servo and 3d-printed hook to pull the door handle down to prohibit the deadbolt from holding the door closed; very large, ugly, can be improved; door knobs = no



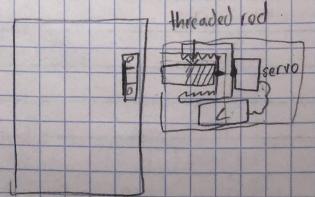
Concept 2: utilizes 1 servo and a string connected to the tip of handle or on a door knob to a servo that can wind up the string to open the door; smaller, annoying string (handle) constantly present; can be used on handles & knobs

Concept 1: based on barrel bolt door lock (used in bathrooms); uses a servo to extend a threaded rod in & out of a box mounted on a wall, and has a part mounted on door,

Revision: use push/pull solenoid

Door lock:

concept 1



Parts List



180 Degree Metal Gear Servo: [link](#)

- Size: 22 x 12 x 21 mm
- Torque: 2.0kg.cm (6.0v)
- Speed: 0.12sec/60deg (4.8v) - 0.10 sec/60deg (6.0v)
- Voltage: 4.8-6.0v

High Torque Metal Gear Servo: [link](#)

- Dimension : 40 x 19 x 43mm
- Weight: 69g; Operation Voltage: 4.8 - 7.2Volts
- Operating Speed: 0.17sec/60 degrees(4.8V no load)
- Operating Speed: 0.13sec/60 degrees(6.0V no load)
- Stall Torque: 13 kg-cm (1.2 Nm) at 4.8V
- Stall Torque: 15 kg-cm (1.5 Nm) at 6V



Push Pull DC Solenoid Magnet:

[link](#)

- 300mA 5N/10mm
- Body Size: 30x16x15mm
- Plunger Bar Size: 6x58mm
- Mounting Hole Dia.: 2.5mm



$\frac{1}{8}$ in. by 36 in. metal rod: [link](#)

- Need about 28"-30"

CAD Model(s)

Handle Turner: Concept 1

