

Installation Manual & Parts List

Puzzle of Secrets

Parts List

- 2 1inch servo
- 2 limit switches
- 2 breadboard
- 4 segments of WS2812B LED strip
- 8 rocker switches with LEDs
- Wires
- LCD screen (Groove Kit)
- 4 hinges
- 1 set of Laser cut pieces
 - 8 files necessary for box
 - 1 file for the pencil holder
- 2 3D printed lock mechanism
- 2 3D printed handles
- Black and White vinyl
 - Puzzle of Secret (Black)
 - Advice/Secret (White)
 - The Fool (Black)

Note: 3D print, Laser Cut, Vinyl cut, and code files can be found on [GitHub](#)

Please read the full
instructions before building!!

Instructions are not in full
chronological order - they are
organized by section

Instruction Manual

Plinth

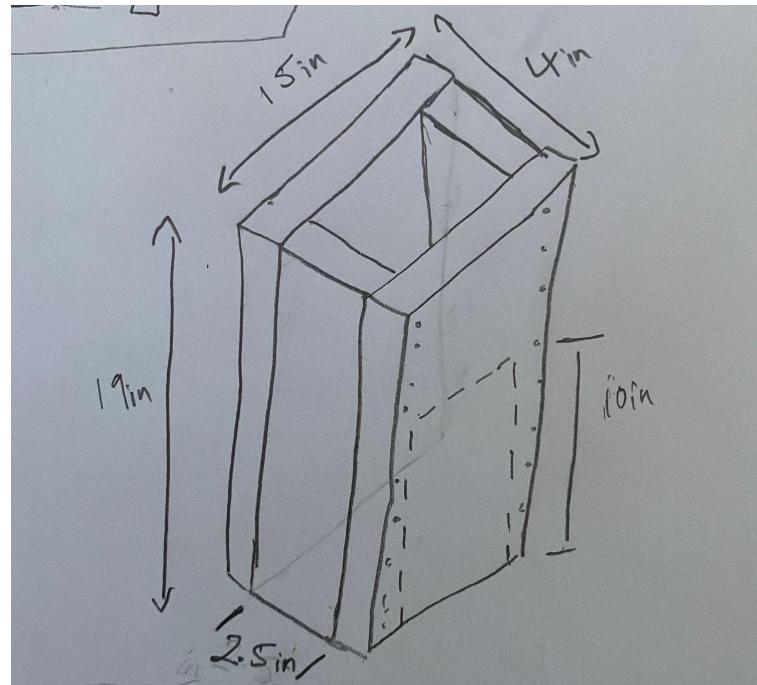
Overview

The base is constructed using $\frac{3}{4}$ inch MFD wood. It is recommended you go to a woodshop so all tools are accessible.

- Section 1: Headboard
 - a. Two 15 X 19 inch Sheet(s)
 - b. Two 2.5 X 19 inch Sheets
- Section 2: Controller
 - a. Two 4 X 2 inch Sheet(s)
 - b. One 15 x 3 inch Sheet(s)
 - c. One 15 x 1.5 inch Sheet(s)
 - d. One 15 x 1.6 inch Sheet(s)
 - e. One 15 x 19 inch sheet
- Section 3: Bottom Base
 - a. Two 34 x 19 inch Sheet(s)
 - b. Two 34 x 13.5 inch Sheet(s)

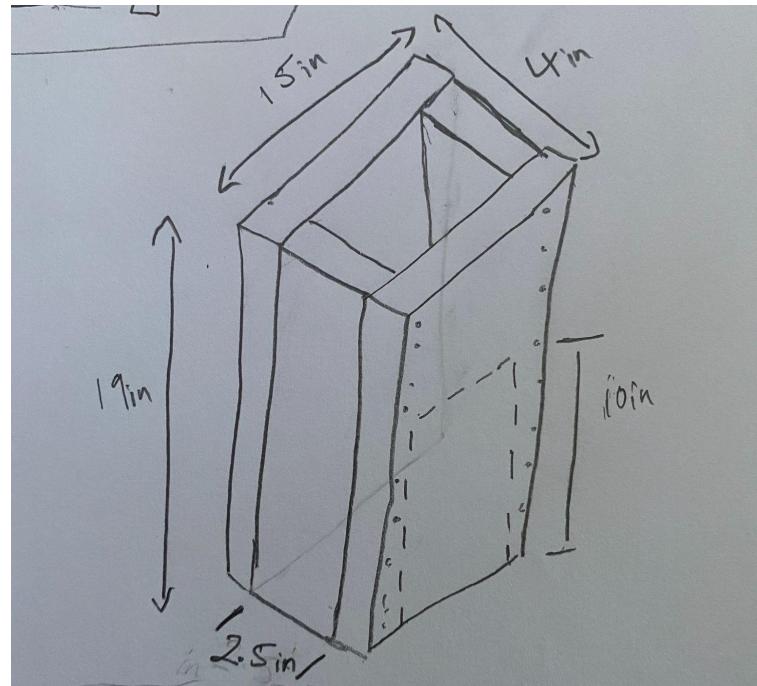
Section 1: Headboard (Phase 1)

1. Place wood glue along one side of the one of the 2.5 X 19 inch Sheets
2. Place that sheet on one side of the face on the 15 X 19 inch board so that the 19 inch sides match
3. Use nail gun to secure the glued sides
4. Repeat step 1-3 for second 2.5 x 19 inch sheet using the second side of the 15 X 19 inch board
5. Apply wood glue to the unattached sides of both 2.5 x 19 inch sheets
6. Place the second 15 x 19 inch sheet on top
7. Use nail gun to secure the glued sides



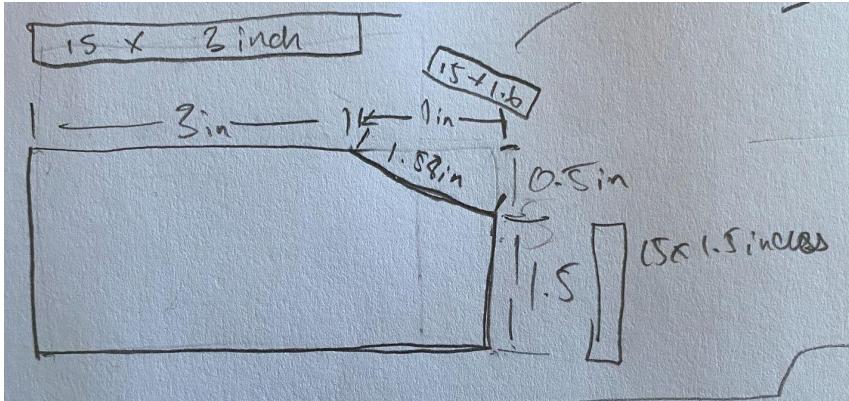
Section 1: Headboard (Phase 2)

1. Use hand saw and cut along the back from the bottom to accommodate space to access electronics
 - a. Potential measurements
 - i. 10 x 12 inch hole



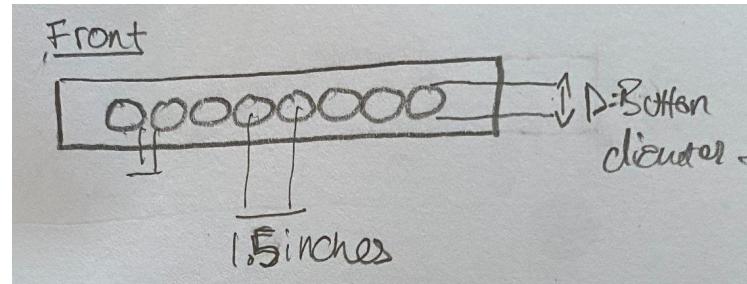
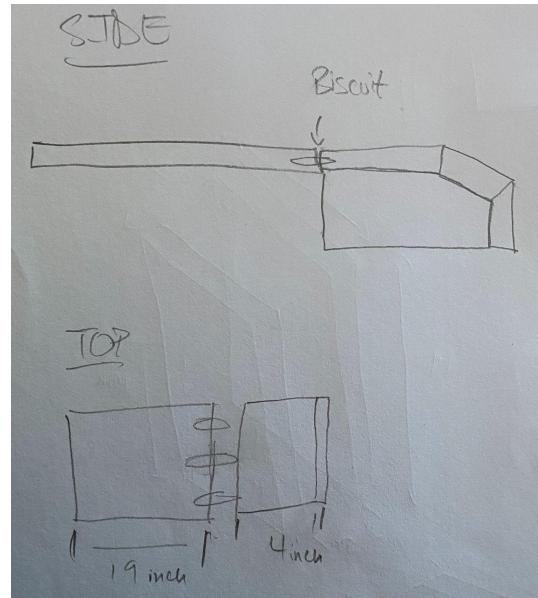
Section 2: Controller (Phase 1)

1. Use bandsaw to cut both 4 X 2 inch Sheets according to the figure on the right
2. Apply wood glue to 15 x 3 inch sheet along the 3 inch sides
3. Place on the newly cut 4 x 2 inch top side according to figure on the right
4. Sandpaper one 15 inch edge on the 15 x 1.6 inch sheet until it can sit on the 1.58 inch edge of the newly cut 4 x 2 inch sheet while aligned with 15 x 3 inch sheet edge
5. Place wood glue along the connecting sides and place on 4 x 2 inch sheet according to right figure
6. Repeat steps 4-5 for the 15 x 1.5 inch sheet so that it sits on the 1.5 inch face of the 4 x 2 inch sheet according to the right figure



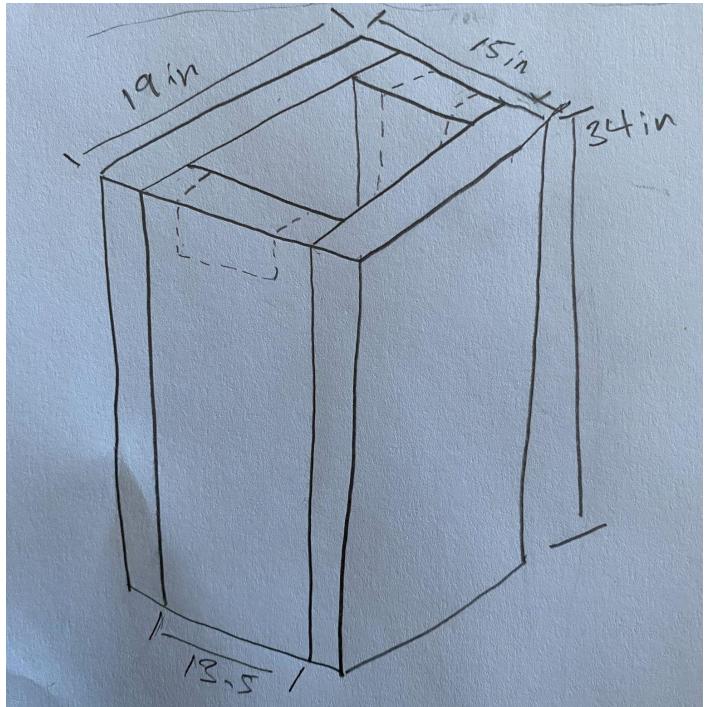
Section 2: Controller (Phase 2)

1. Along the back edge of 15 x 3 inch sheet and the 15 inch edge of the 15 x 19 inch sheet, use biscuit joint drill and apply in three equidistant locations from edge to edge
2. Use wood glue and biscuit joints to fuse them together
3. Lastly, go to hand drill and place equidistant holes into the face of the 15 x 1.6 inch sheet according to figure on the right



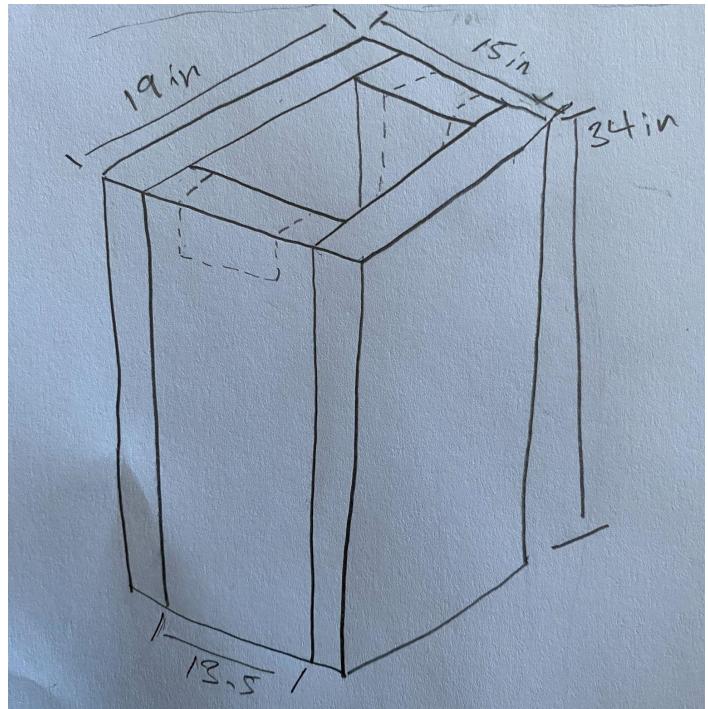
Section 3: Bottom Base (Phase 1)

1. Place wood glue along one side of the one of the 34 x 13.5 inch Sheets
2. Place that sheet on one side of the face on the 34 x 19 inch board so that the 34 inch sides match
3. Use nail gun to secure the glued sides
4. Repeat step 1-3 for second 34 x 13.5 inch sheet using the second side of 34 x 19 inch board
5. Apply wood glue to the unattached sides of both 34 x 13.5 inch sheets
6. Place the second 34 x 19 inch sheet on top
7. Use nail gun to secure the glued sides



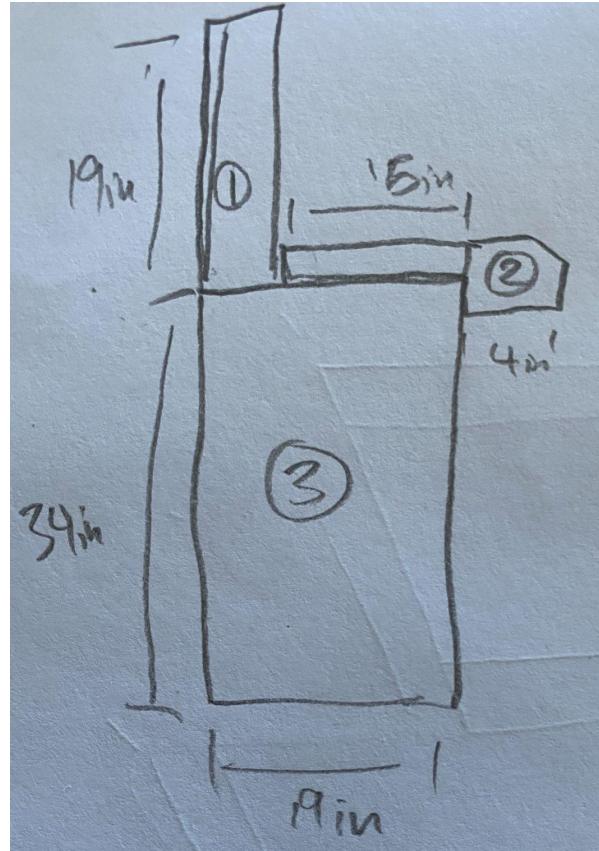
Section 3: Bottom Base (Phase 2)

1. Use hand saw and cut a section from the front on the top 13.5 inch edge (for button wires to pass through)
 - a. Potential measurements
 - i. 1×10 inch
2. Use hand saw and cut a section from the back on the top 13.5 inch edge (for electronics access)
 - a. Potential measurements
 - i. 10×12 inch



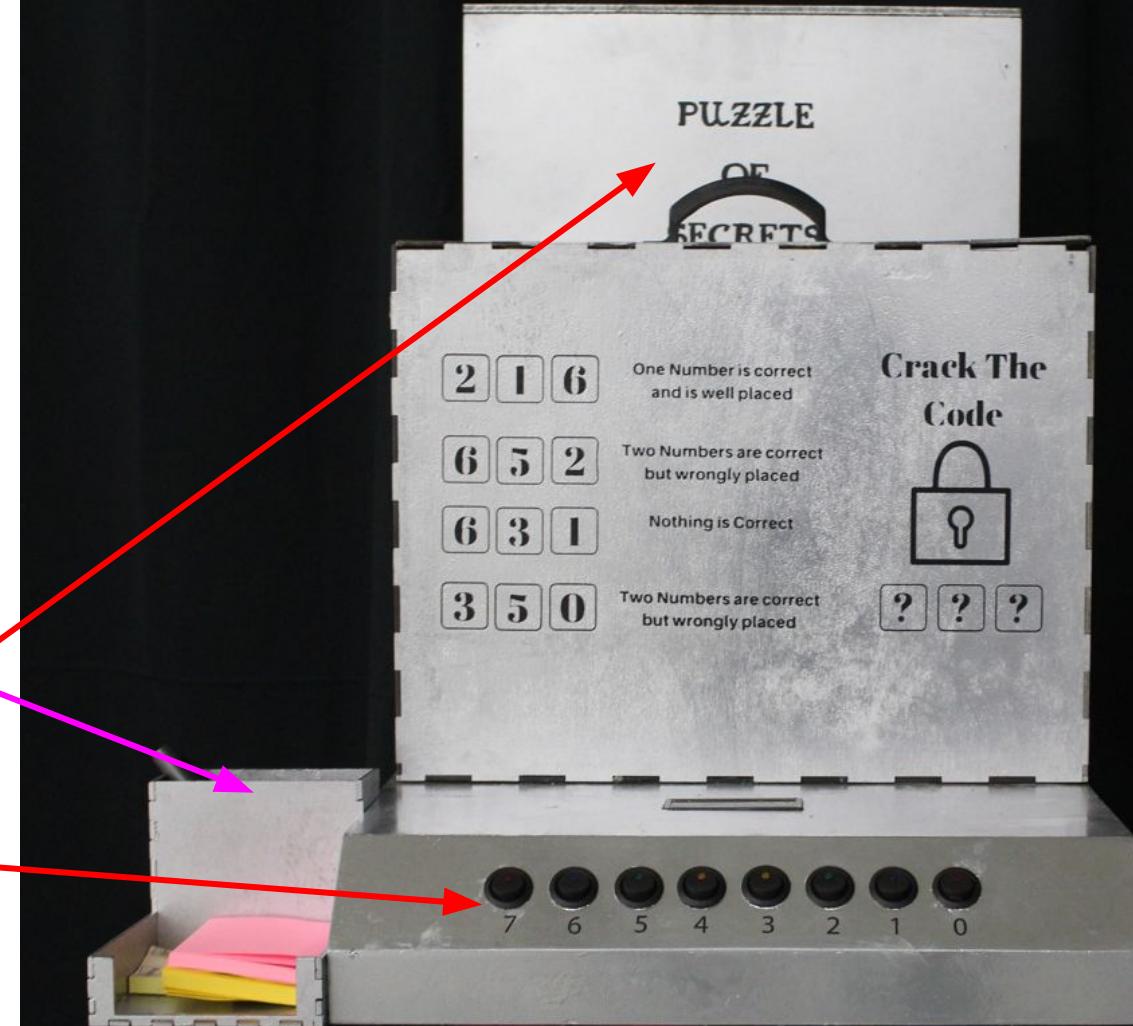
Assembly

1. Place Controller on top of bottom base and secure using screws and drill gun
2. Place headboard along back of controller standing up
3. Secure using L-bracket and screws from the inside to connect base and headboard
4. Ensure it is assembled according to image on the right



Assembly

- Paint the controller and the headboard silver
- Paint the bottom base black with white specks/stars and colourful question marks (see final product in subsequent pages)
- Glue the pencil holder to the side of the controller using contact cement
- Attach the vinyl on the headboard and the controller



Instruction Manual

Puzzle Box

Manufacture the Necessary Parts

- <https://github.com/HariSelva/PuzzleOfSecrets>
- Download the STL and DXF files from GitHub
- 3D Print Parts
 - Add supports for 3D prints as necessary (i.e handles)
 - Original parts printed in PLA, other filaments will likely work as well
- Laser Cut Parts
 - Make sure to use quality plywood (uniform and flat) - will make assembly much easier
 - Laser cut files are designed for 12 x 24 inch plywood sheets
 - Paint the pieces - refer to later instructions for which parts are which
 - Small box - all black
 - Big Box - Inside black, outside silver

Pencil Holder

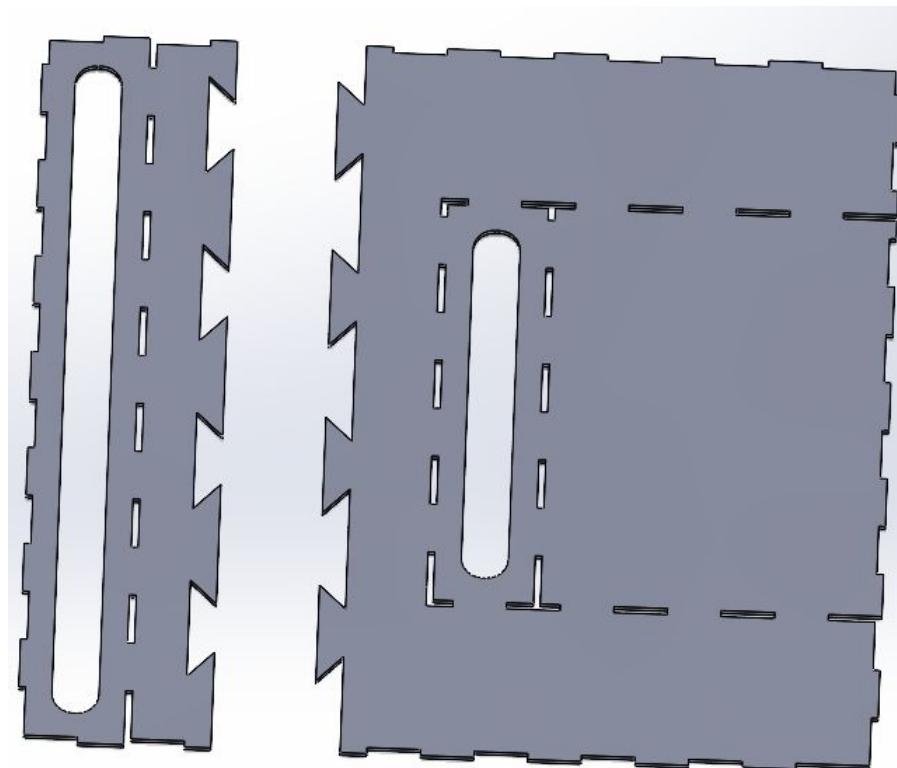
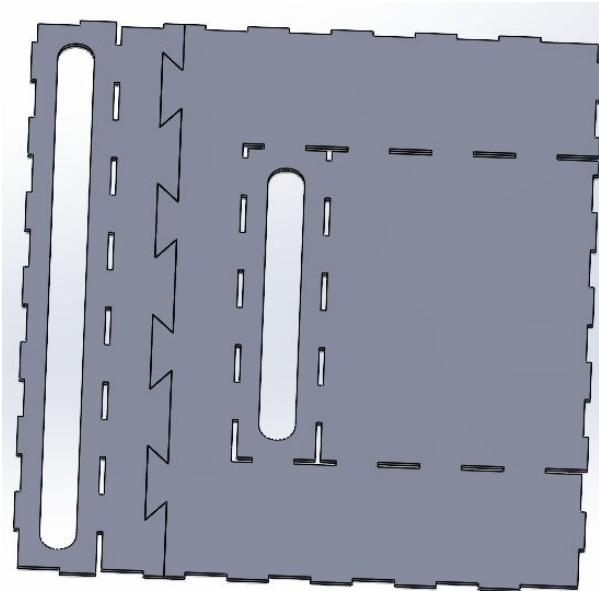
- File from
<https://3axis.co/laser-cut-pen-paper-holder-3mm-dxf-file/eoxl3kxo/>
- When Laser cutting remember to remove the logo
- Paint it silver
- Build it based of the picture provided



<https://3axis.co/laser-cut-pen-paper-holder-3mm-dxf-file/eoxl3kxo/>

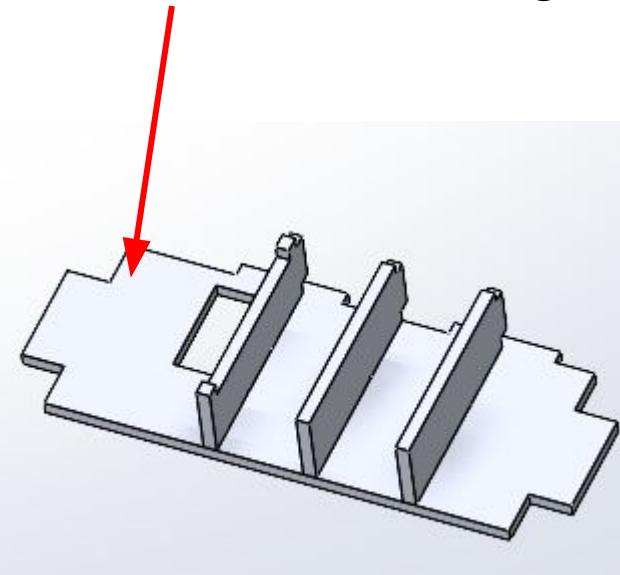
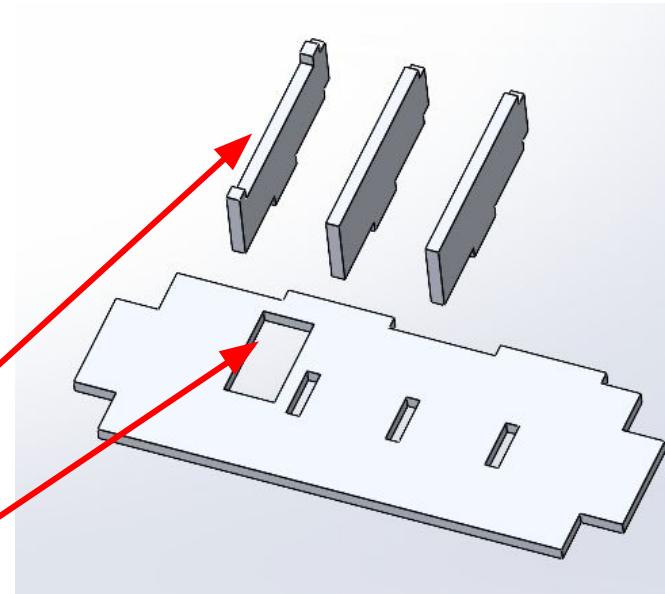
Attach the two base pieces together with wood glue

If necessary, the bottom can also be taped, as that side is not visible

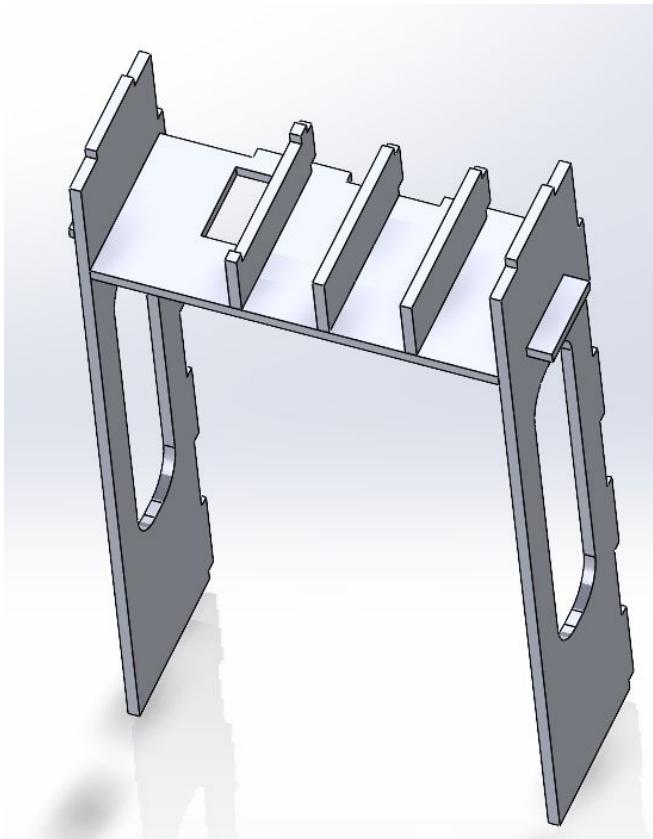


Attach & Glue the lock tray supports onto the small holding plate

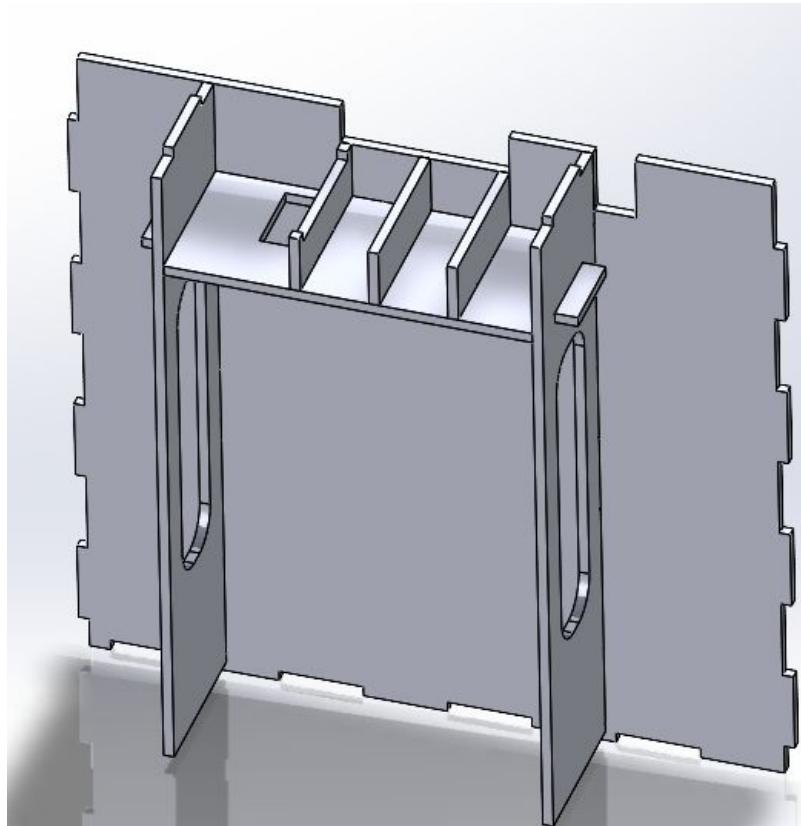
- There are two similar holding plates, the smaller one is what is needed now
- Make sure the lock tray support with the cutout is near to the large rectangular hole (servo slot)



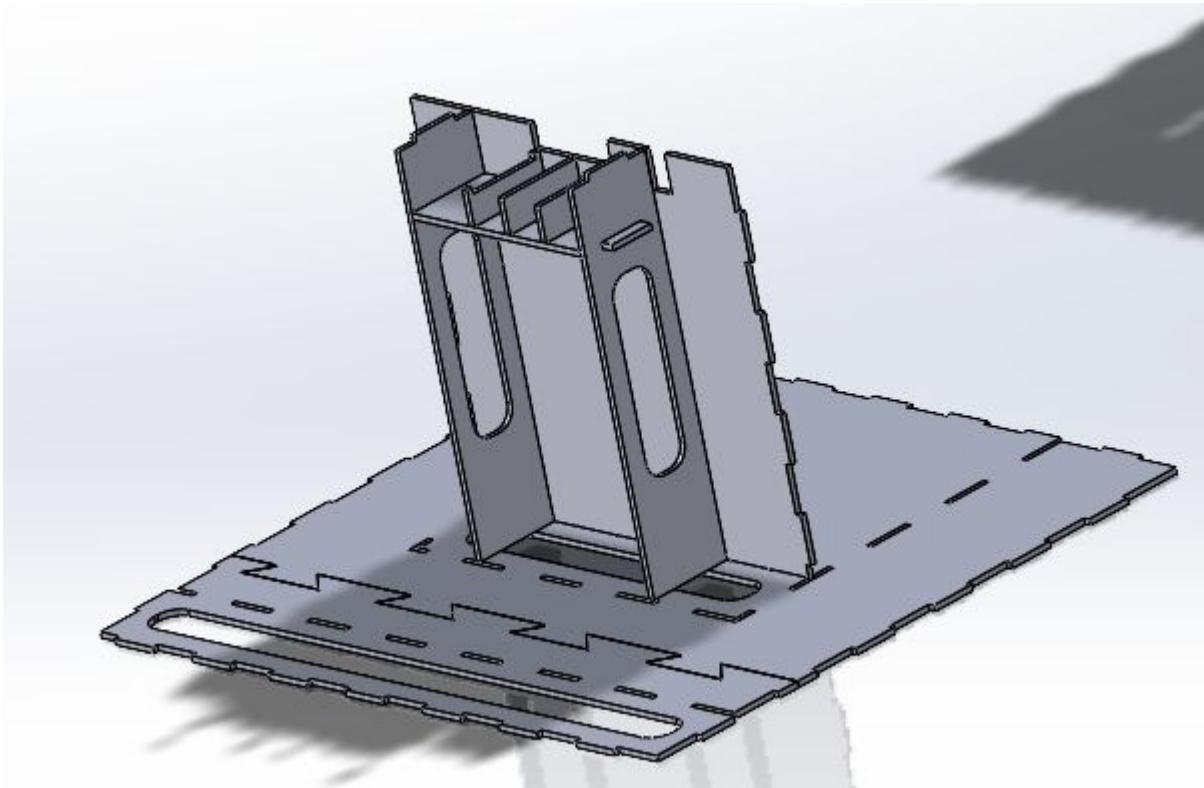
Attach & Glue the small secret compartment divider plates



Attach & glue the small secret compartment front piece

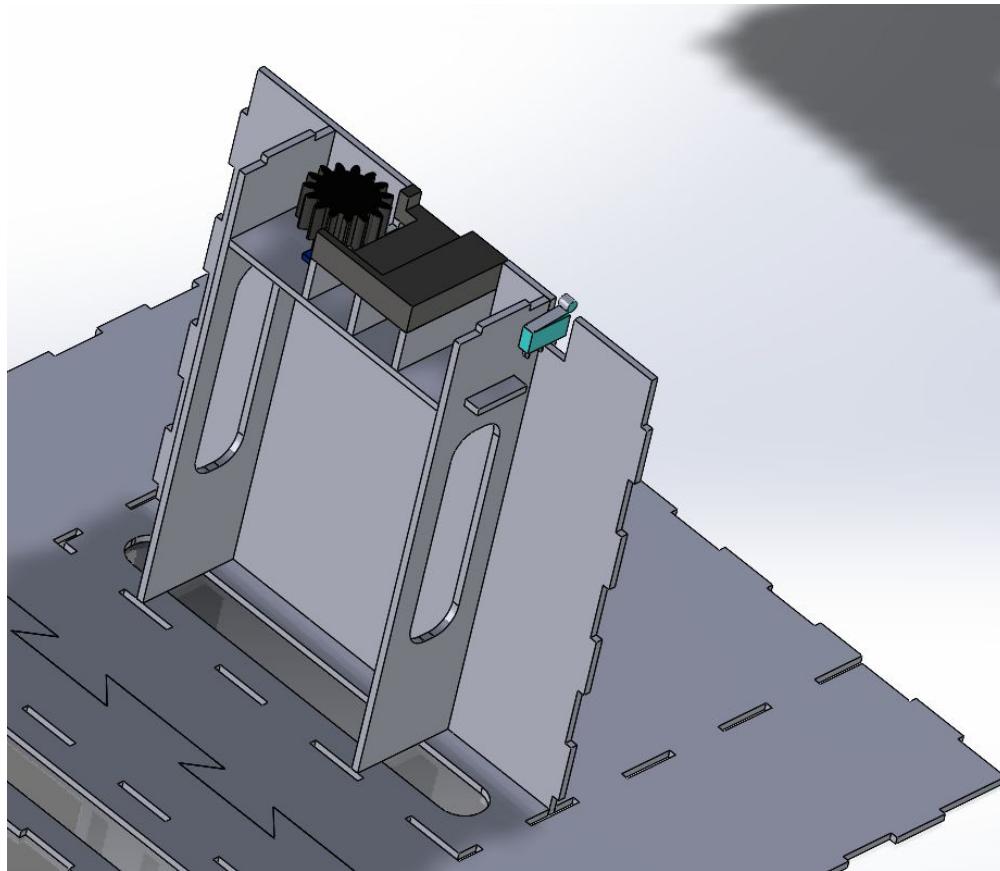


Attach and glue the small secret compartment to the base

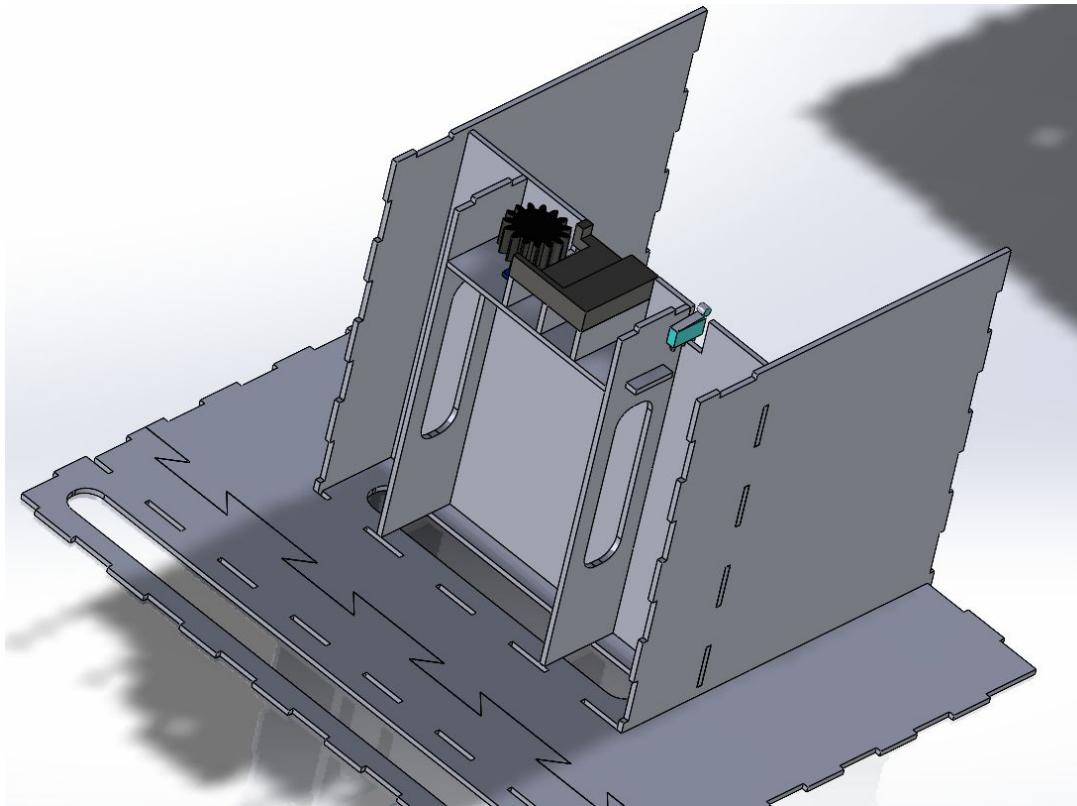


Install the servo and limit switch and glue in the rack tray

Make sure the wires are passed through the slot in the bottom, so as to not need to fish for it after everything is glued together



Attach and glue the small box side pieces

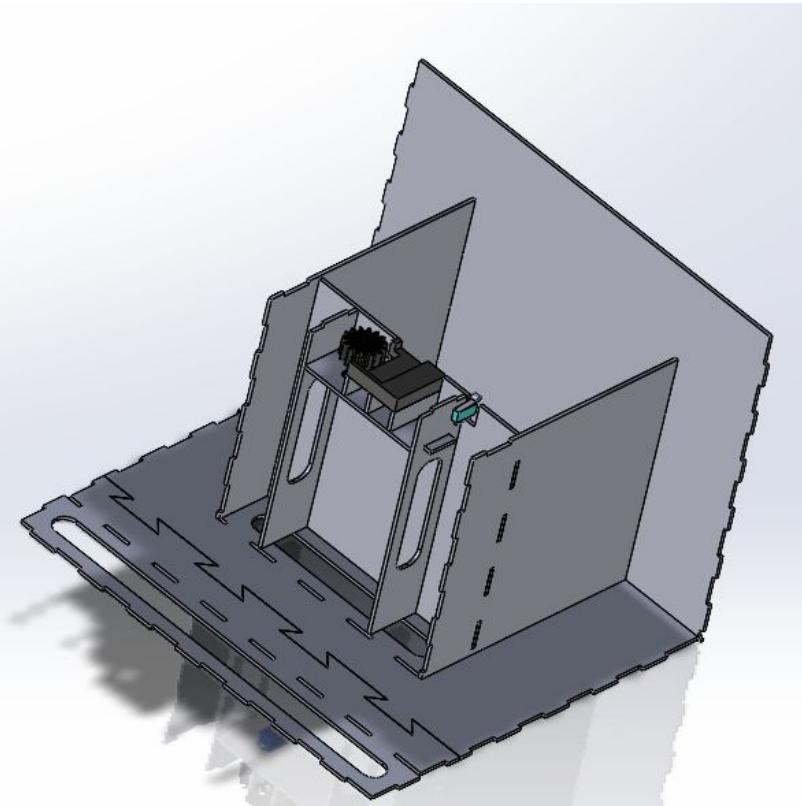
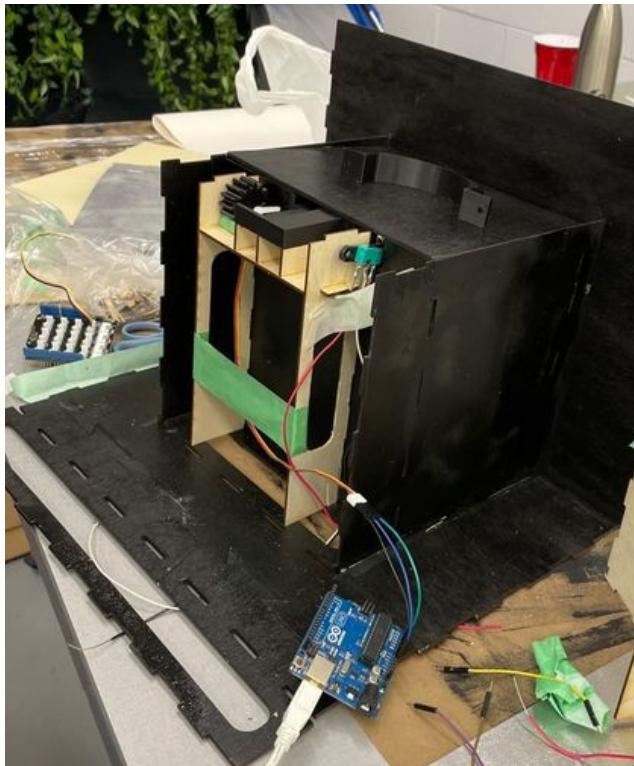


Attach the vinyl to the back

Make sure text is aligned in the centre of the small box

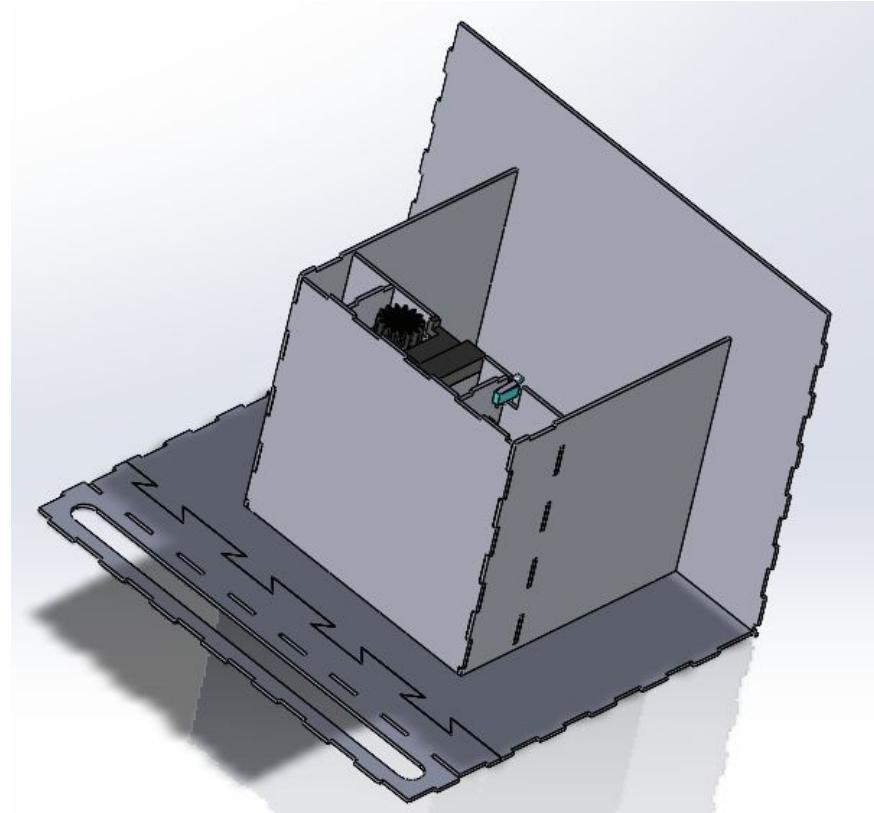


Attach and glue the back piece



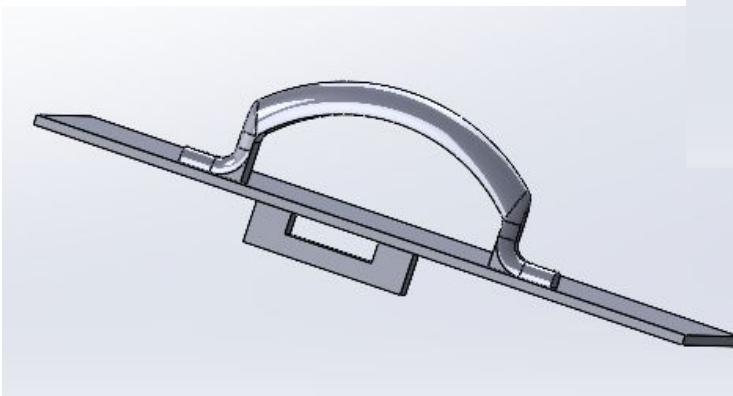
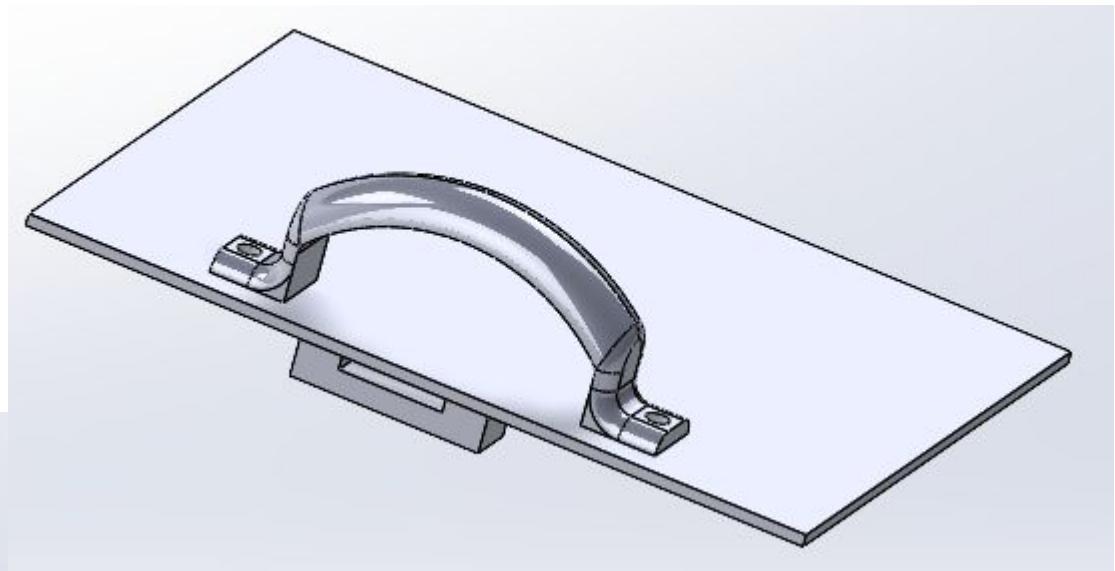
Attach the front of the small box

Make sure to test
the wiring and that
everything is
working before
gluing the front on,
so as to make life
easier later on



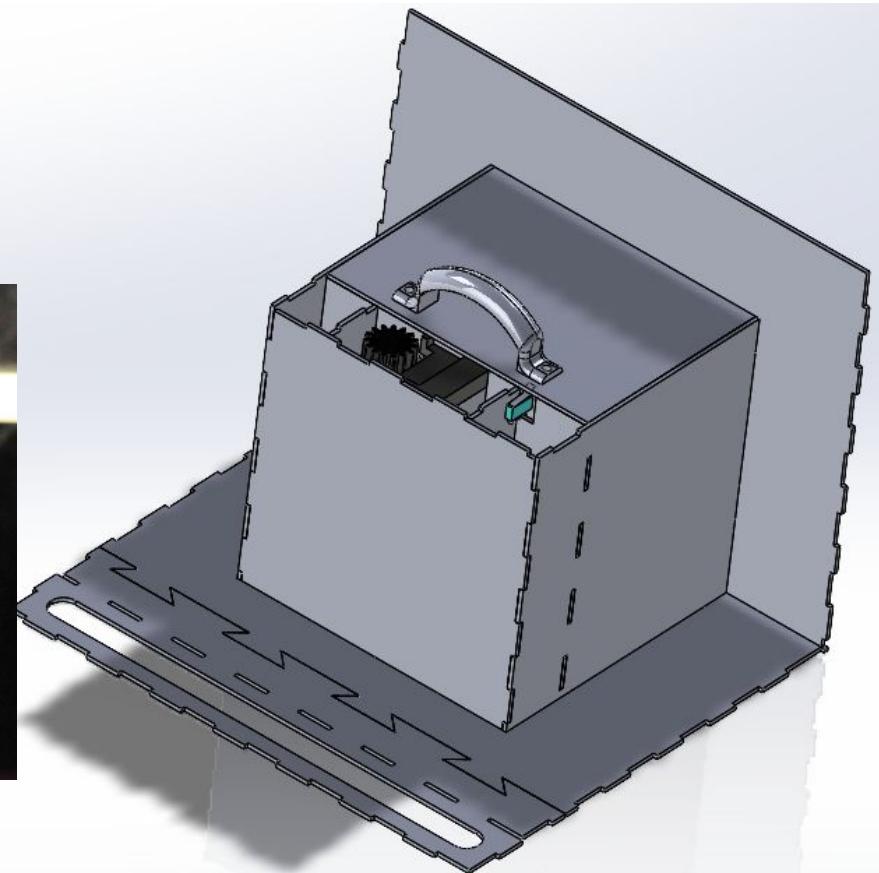
Attach the handle and the female portion of the lock to the small lid

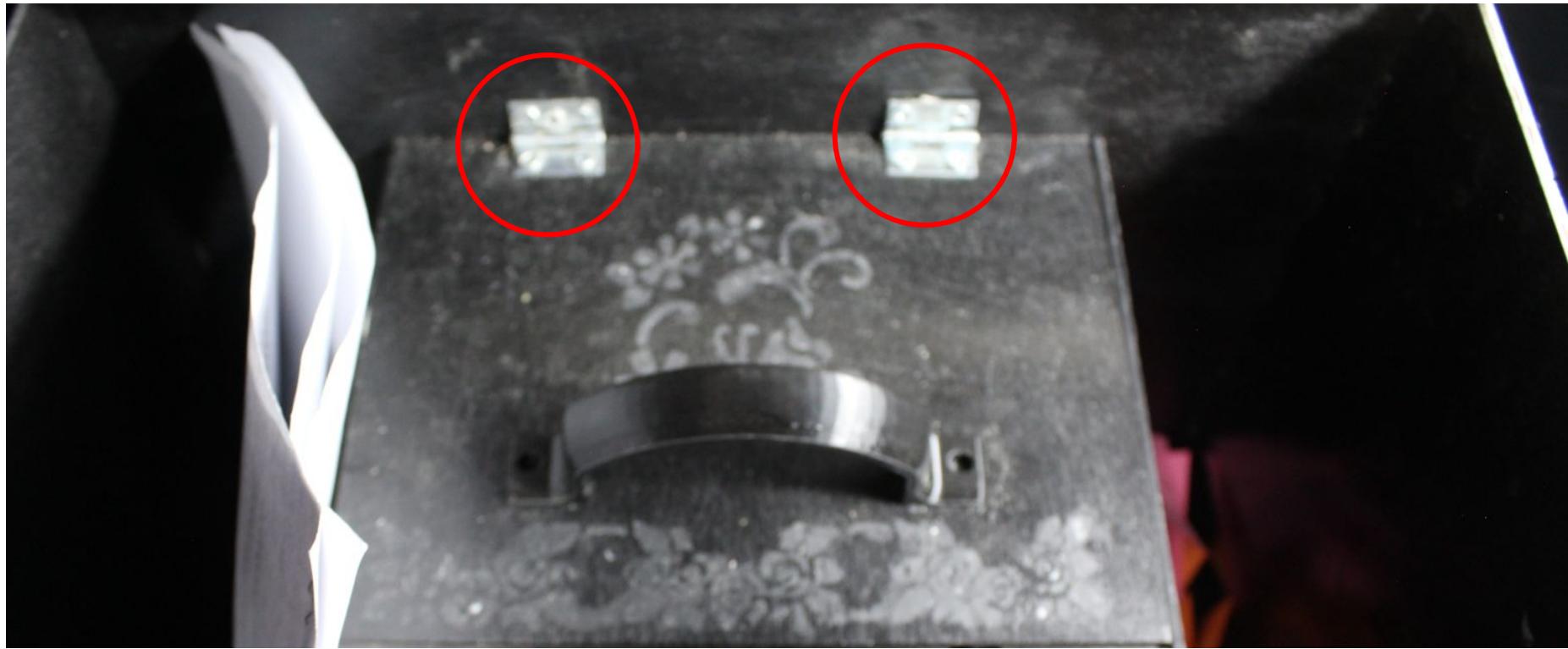
Note, that the female portion of the lock is not centred, make sure to align it with the lock mechanism in the secret compartment.



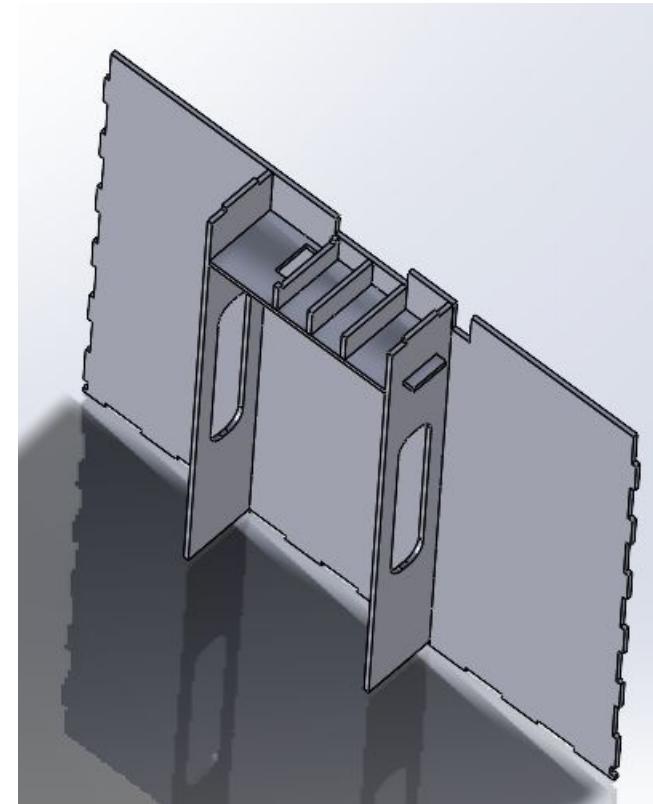
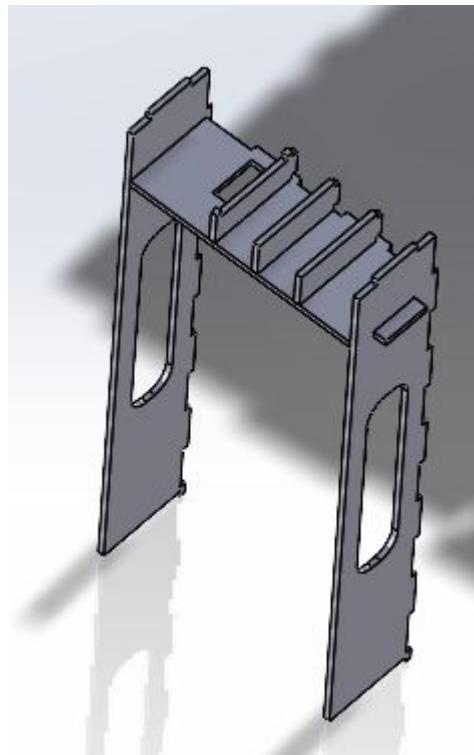
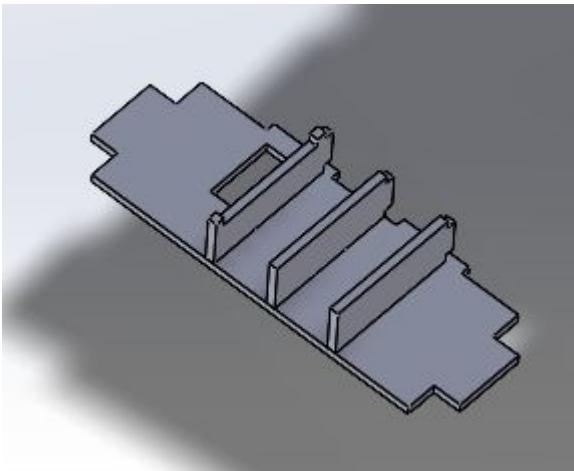
Attach the lid to the small box using hinges

Ensure the limit switch activates when the lid closes - May require an additional weight to be added to the lid to ensure it triggers

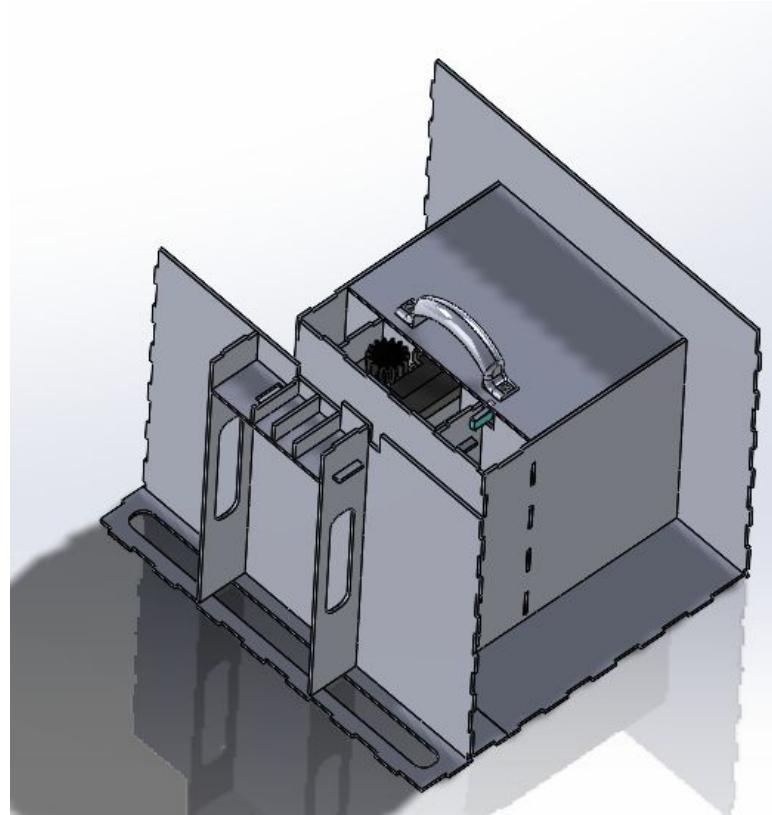




Build the big box lock holder (similar to small box)

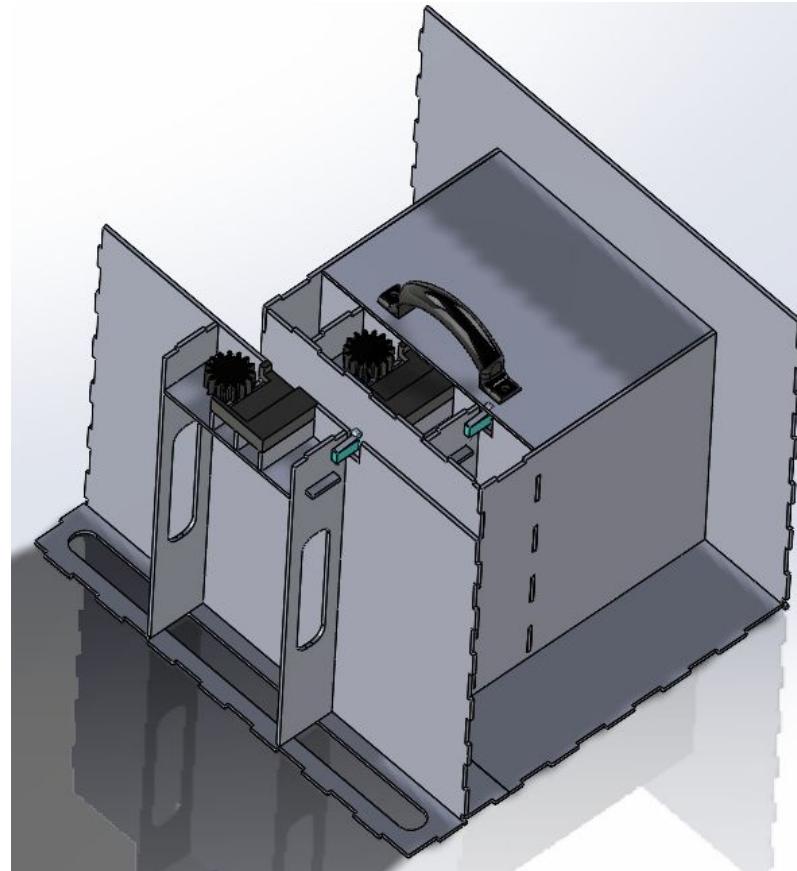


Attach and glue the big box secret compartment to the base

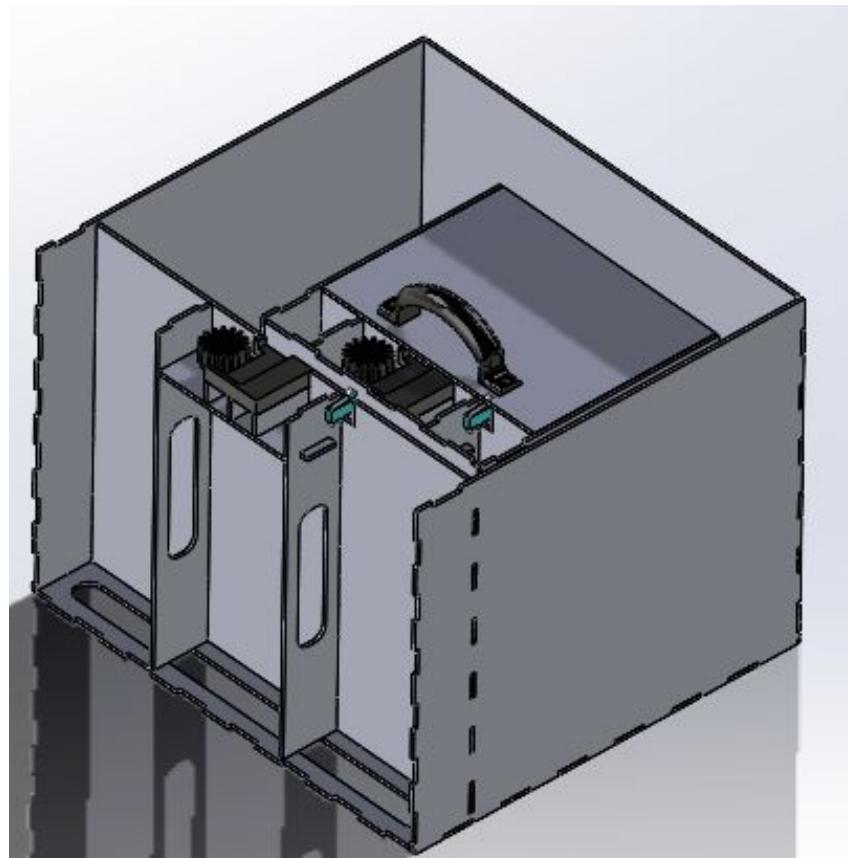


Install the servo and limit switch and glue in the rack tray

Make sure the wires are passed through the slot in the bottom, so as to not need to fish for it after everything is glued together



Attach and glue the sides of the big box



Vinyl the front of the big box

2 1 6

One Number is correct
and is well placed

6 5 2

Two Numbers are correct
but wrongly placed

6 3 1

Nothing is Correct

3 5 0

Two Numbers are correct
but wrongly placed

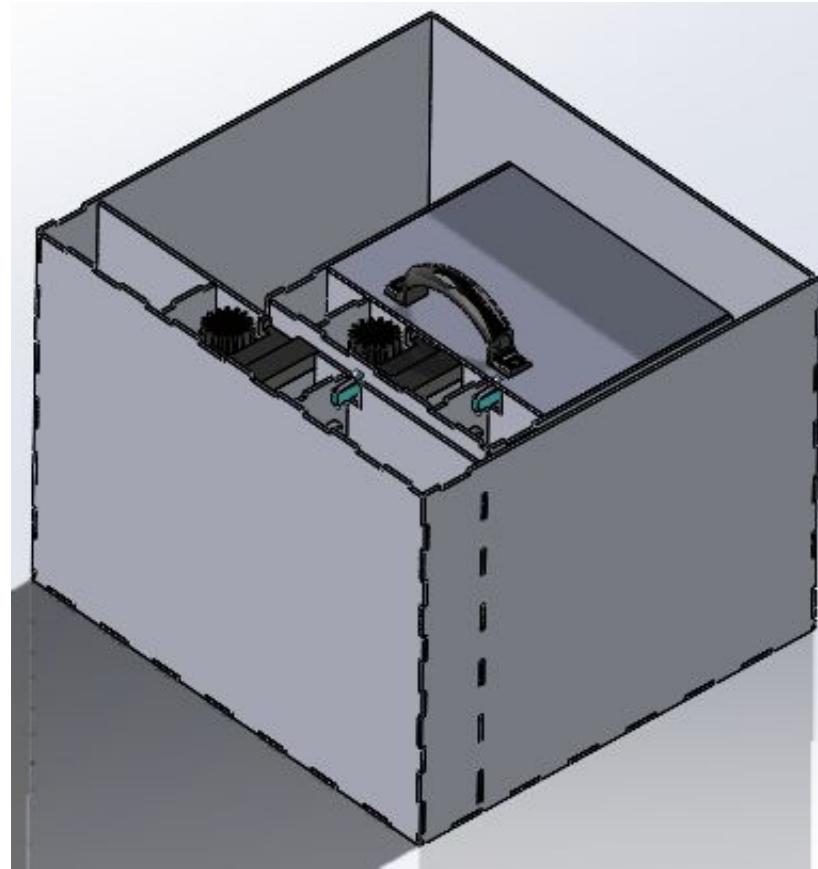
Crack The Code



? ? ?

Attach the front of the big box

Make sure to test
the wiring and that
everything is
working before
gluing the front on,
so as to make life
easier later on



Attach the vinyl

Outside: The Fool

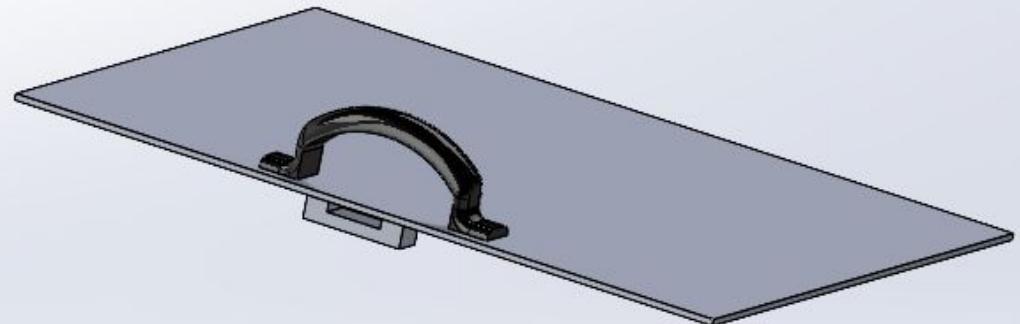


Inside: White Instructions



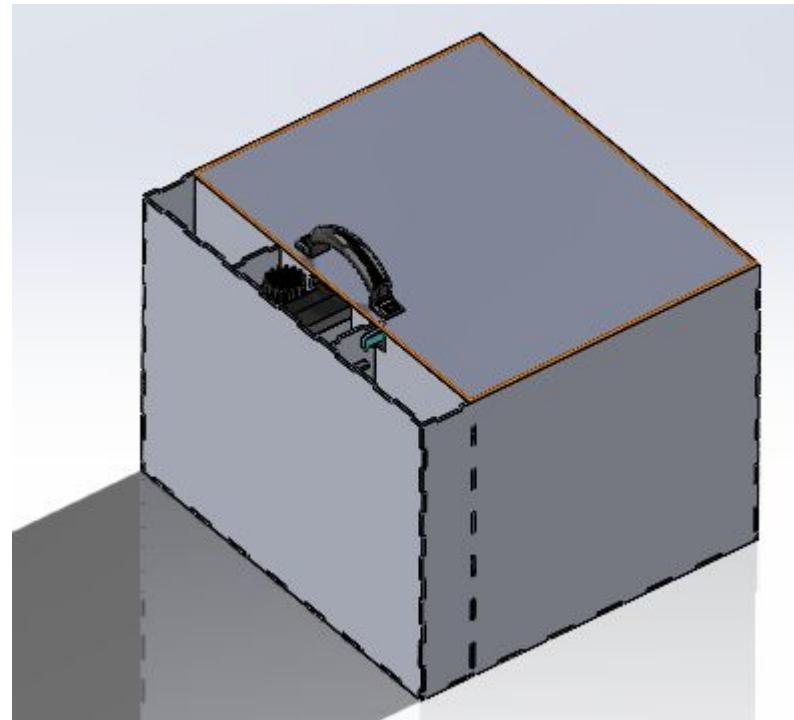
Attach the handle and the female portion of the lock to the big lid

Note, that the female portion of the lock is not centred, make sure to align it with the lock mechanism in the secret compartment.



Attach the lid to the big box using hinges

Ensure the limit switch activates when the lid closes

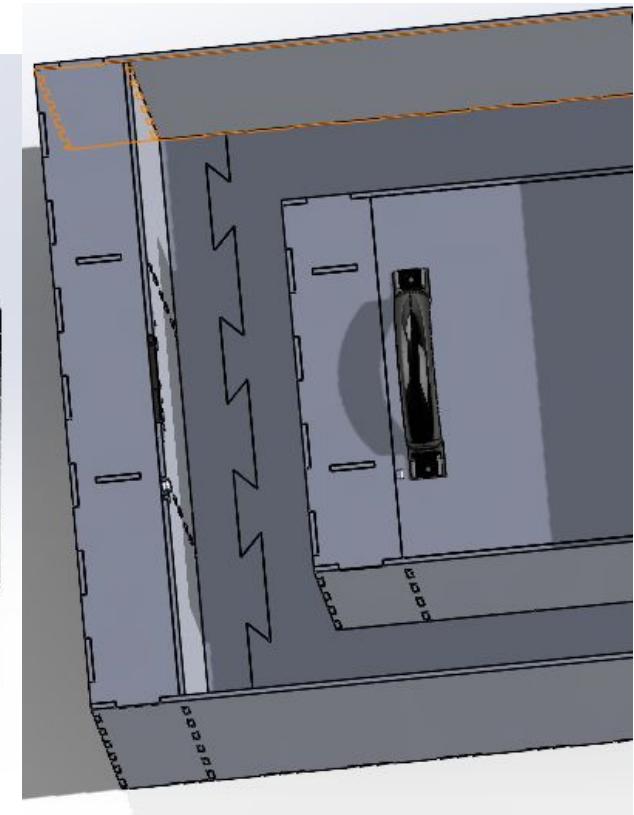
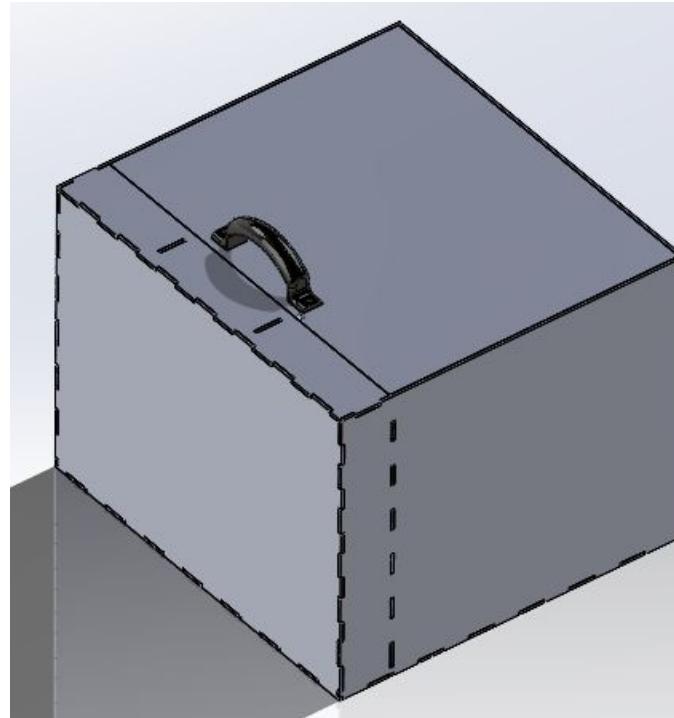


Attach the gear racks

- Insert the gear racks into the female portion of the lock on the lid, such that it reaches the end but doesn't go past.
- Close the lid, carefully without dropping the gear rack
 - This will align the gear rack with the rest of the locking mechanism and put it in the locked position.
- Do this for both the big and small boxes

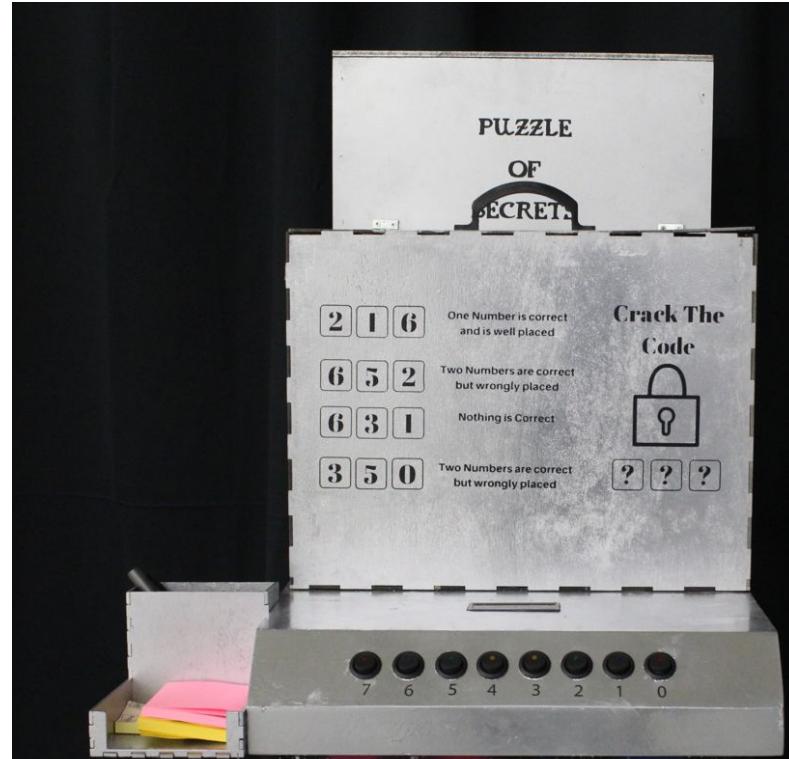
Attach and glue the secret compartment covers

First place the covers and hold them down, while testing the lock mechanism. Make sure it is working properly before gluing it down, so that you don't need to pop it open again later

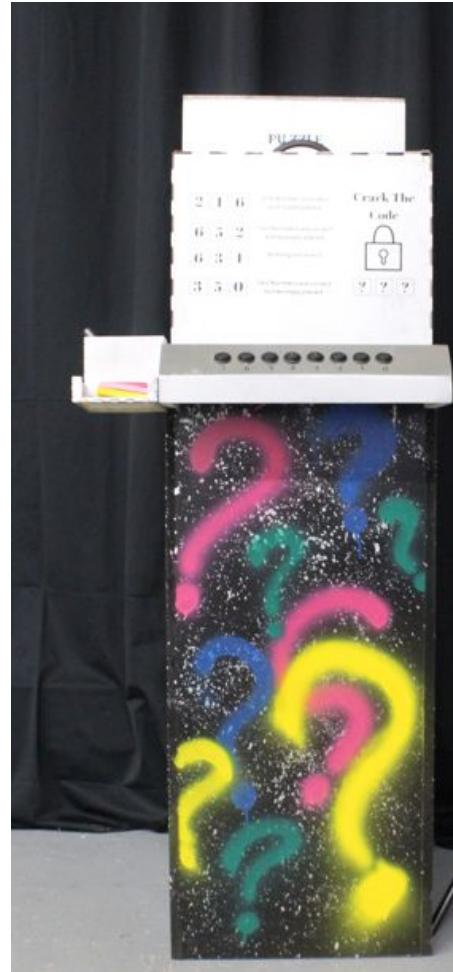
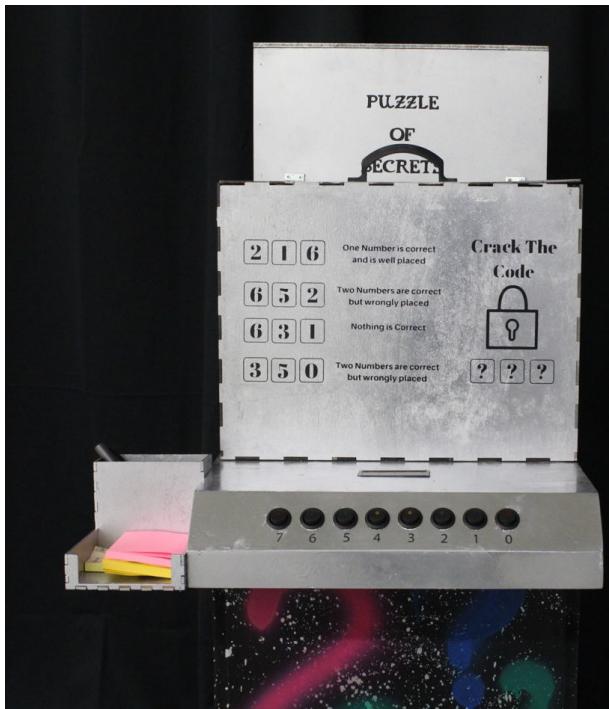


Attach the box to the plinth

- Make sure to pull all the wires through the holes in the controller
- Attach the box to the controller board using screws
- Attach the controller board to the bottom base
- Place hint booklet inside the big box
- Fill with some starting advice + secrets



Final Product



Instruction Manual

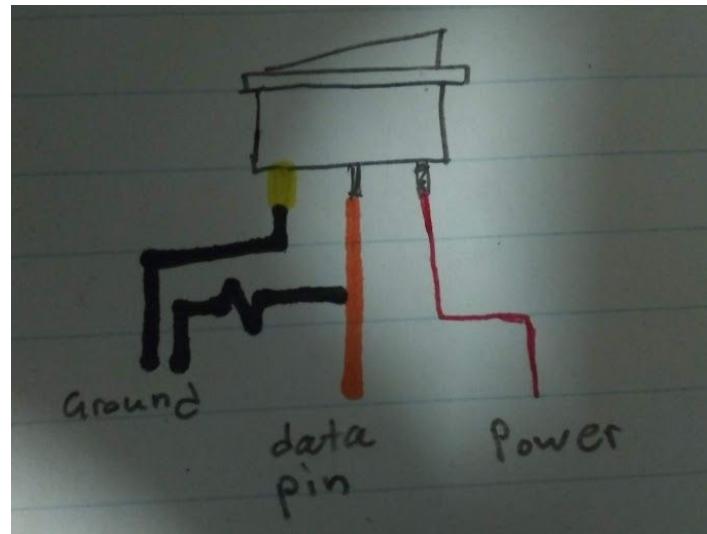
Electronics

Buttons



- The rocker buttons have 3 pins
 - Gold/bronze - Ground
 - Middle - Data pin + pull-down resistor
 - Remaining Pin - Power (5V)
- Wire all the buttons and place them into the button holder, making sure to wire it such that button 0(aka 1) goes to data pin 2, and button 7(aka 8) goes to pin 9

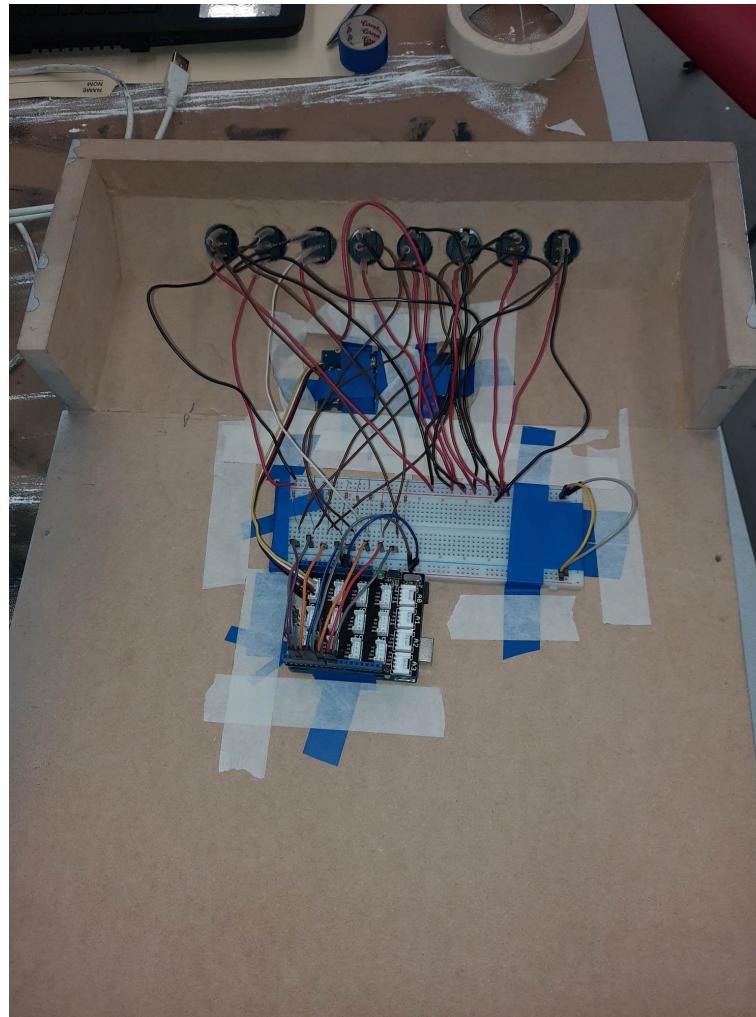
```
const int button1Pin = 2;  
const int button2Pin = 3;  
const int button3Pin = 4;  
const int button4Pin = 5;  
const int button5Pin = 6;  
const int button6Pin = 7;  
const int button7Pin = 8;  
const int button8Pin = 9;
```



Buttons

Use a breadboard to make the connections easier - Especially as you need multiple ground connections (more than what is on the arduino)

Ideally an appropriately sized stool can be found or made to fit inside the plinth. The electronics can then rest on that instead of being taped.



Limit Switch

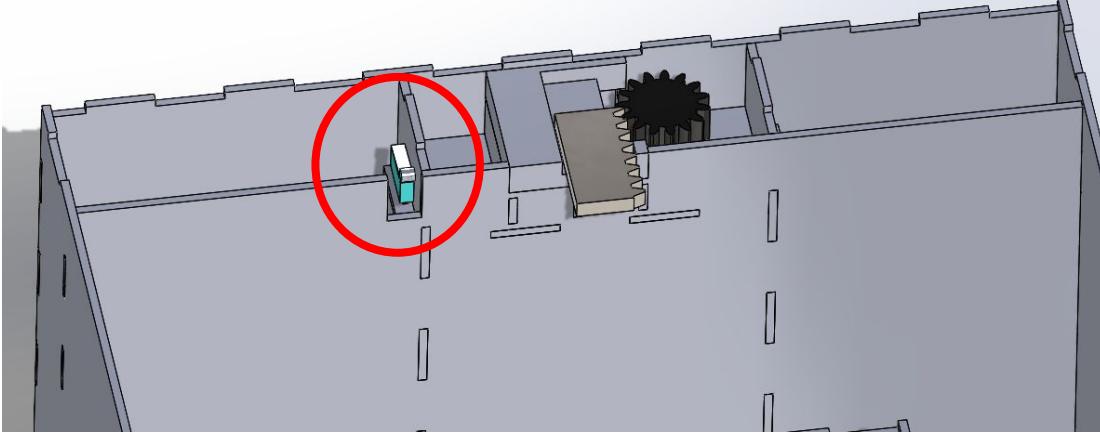
```
const int limitswitch1Pin = 13;  
const int limitswitch2Pin = 14;
```

- The limit switch has 3 pins
 - Common - Ground
 - Normally Closed (NC)Open (NO) - Data pin (+ internal pull-up resistor - activated in code)
 - Normally Open (NO) - Not required
- Note: the limit switch can be NO but the corresponding changes need to be made in the code.
- Note: D14 aka A0



Limit Switch

- Place the limit switch in the secret compartment
 - Ideally use screws and the mount to fasten it to the laser cut pieces within the compartment
 - If that isn't possible, glue scrap laser cut pieces to create a platform for the limit switch to be mounted on.
- It should be positioned such that when the lid closes, the limit switch is triggered



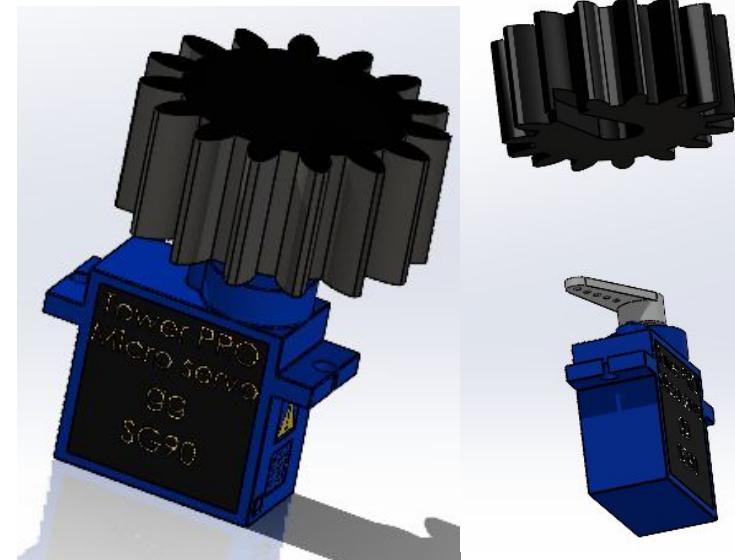
Servos

```
const int servo1Pin = 10;  
const int servo2Pin = 11;
```

- Wires can be extended and converted from groove port using dupont wires. Make sure to connect power to power, ground to ground and data to data (see the groove shield to determine which is which).
- Servos need to be externally powered
 - Connect the data wire to the arduino
 - Connect the power to the external supply
 - Connect the ground to the ground of the eternal supply
 - Ground of the external supply should also be connected to the ground of the Arduino
- Attach the gear to the servo
- Place in secret compartment in the servo slot



<https://wiki.seeedstudio.com/Grove-Servo/>

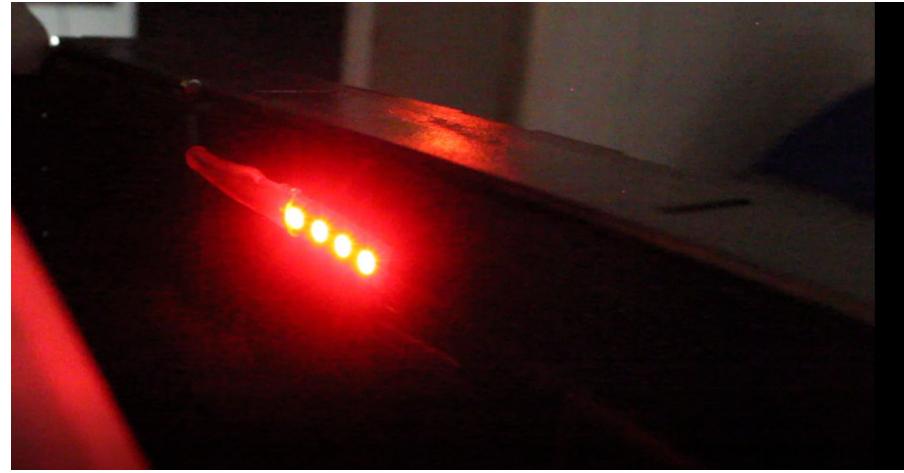


LED Strip

- You only need a strip with 4 LEDs (cut it down to size and solder on the connecting wires - Beware of the direction)
- LED strip has 3 pins
 - 5V - Power
 - DIn - Data pin (attach a resistor in series to reduce noise)
 - GND - Ground
- Feed the wire, through the limit switch hole and attach to the inside of the big box



```
const int ledPin = 12;
```



LCD Screen

- Connect to I2C port of Grove-Base Shield
 - If need to extend wires, connect the LCD screen to one shield, then connect another shield (with the arduino) to the first shield by connecting the I2C ports.
 - The I2C ports on the shield are shared and thus the signals are the same
- Place into the slot for the LCD screen



https://wiki.seeedstudio.com/Grove-LCD_RGB_Backlight/