

# Barrel Clock

Group 7

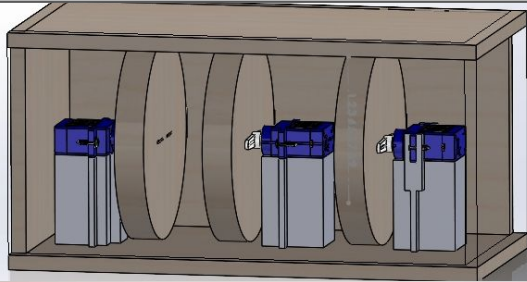
Ilan Felberg, Sawyer Bailey Paccione, James Staley

HW 2. September 23rd, 2021.

# Mechanical Design

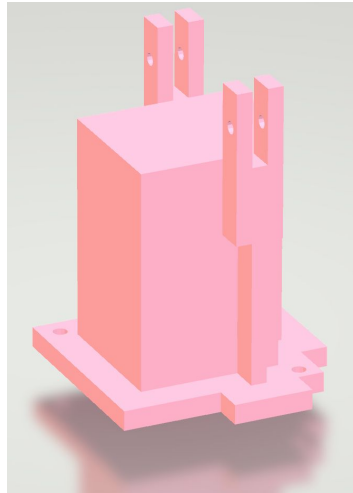
## Original CAD

- Three “Barrels” one for hours, one for minutes and another for seconds.



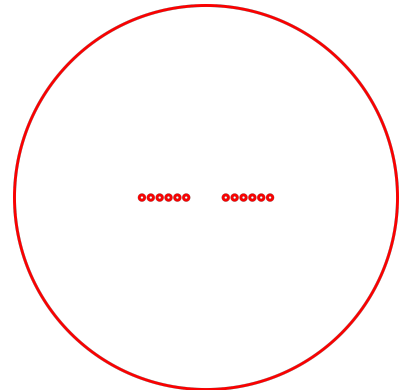
## Servo Stands

- Holds the servo in the middle of the barrel with screwable clips.



## Barrel Design

- Two Lasercut  $\frac{1}{4}$  inch circles glued together



# Electronics Design

## Servo Motors

- Servo HAT Allows for:
  - External libraries which simplifies communication with multiple servo motors without leaning on PWM
    - Simplifies control to i2c where we only need
  - Flexible Power Supply (Battery or Wall)
- Use of Smaller Servo Motors allows for more compact design

## Getting The Time

- `time.time()`
  - Returns the number of seconds since EPOCH (1/1/1970)
- `time.localtime(t)`
  - Takes an input in seconds
  - Returns the Date and Time of that input as a struct containing hours, minutes, seconds, current month, year, and more
- Data converted to 12 hour clock format
- Time Multiplier:
  - Subtract current time and initial time, multiply by factor

# Software Design

## User (Top Level Script)

- Sets time multiplier
- Initializes and starts Clock

```
### MAIN ###
time_multiplier = 1. # how fast time should run
clock = Clock()

while (True):
    clock.run(time_multiplier)
    time.sleep(0.1)
```

## Robot Control (Clock Class)

- Stores previous servo positions (prevent twitch)
- Holds Lookup Tables
- Sets servo positions based on processed system time

Seconds  
Minutes  
Hours



Lookup Tables



Servo0 Position  
Servo1 Position  
Servo2 Position

## Open Source

### *Adafruit-circuitpython-servokit*

- Setups register-level configuration of servos
- i2c comms
- PWM communication for position control
- Easy API to access / control servos

```
kit = ServoKit(channels=16)
kit.servo[0].angle = desired_angle
```

Thank You