ClothSense

CASA0016

DY Lim

When is it going to be dried?

No dryer.

Energy Bill, Damage on cloth, Noise...

Every time I needed to touch the cloth to check whether it is dried or still wet.
However, it is ***hard to predict*** even if i do so.
Also, I want to ***boost the drying process*** and want to ***know the condition*** where it is located(Bad air quality, weather).

ClothSense is going to **monitor**:

- Temperature

- Humidity
- ~~Air Quality~~

ClothSense is going to **boost**:

- Dry State

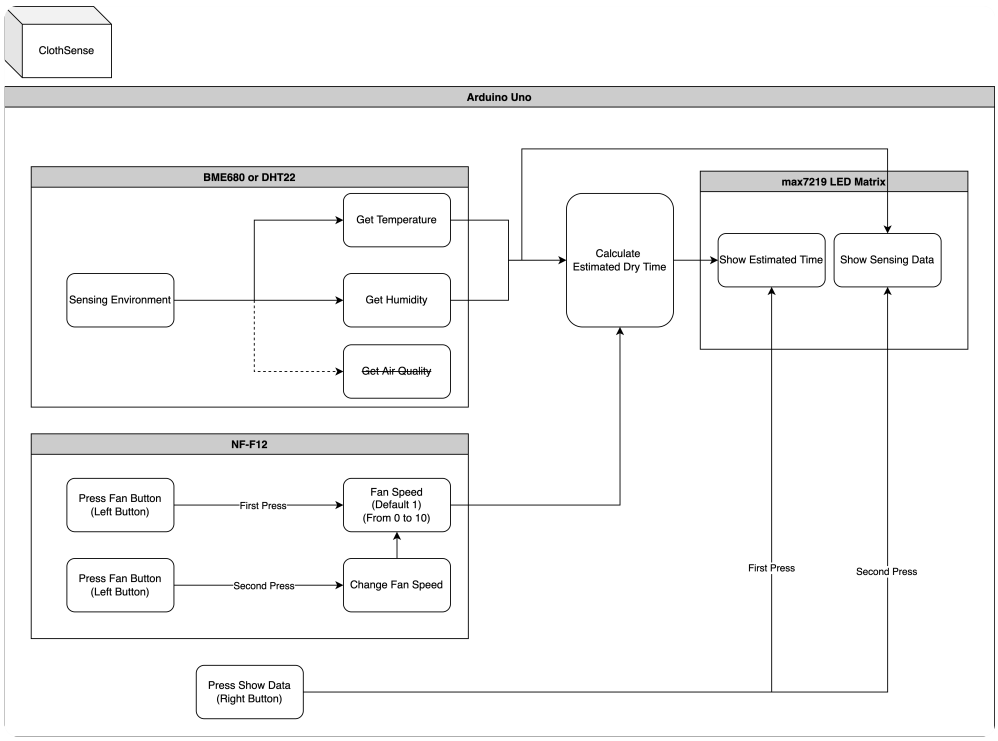
ClothSense is going to **show**:

- Estimated Time to dry
- Current Environmental Condition

Component

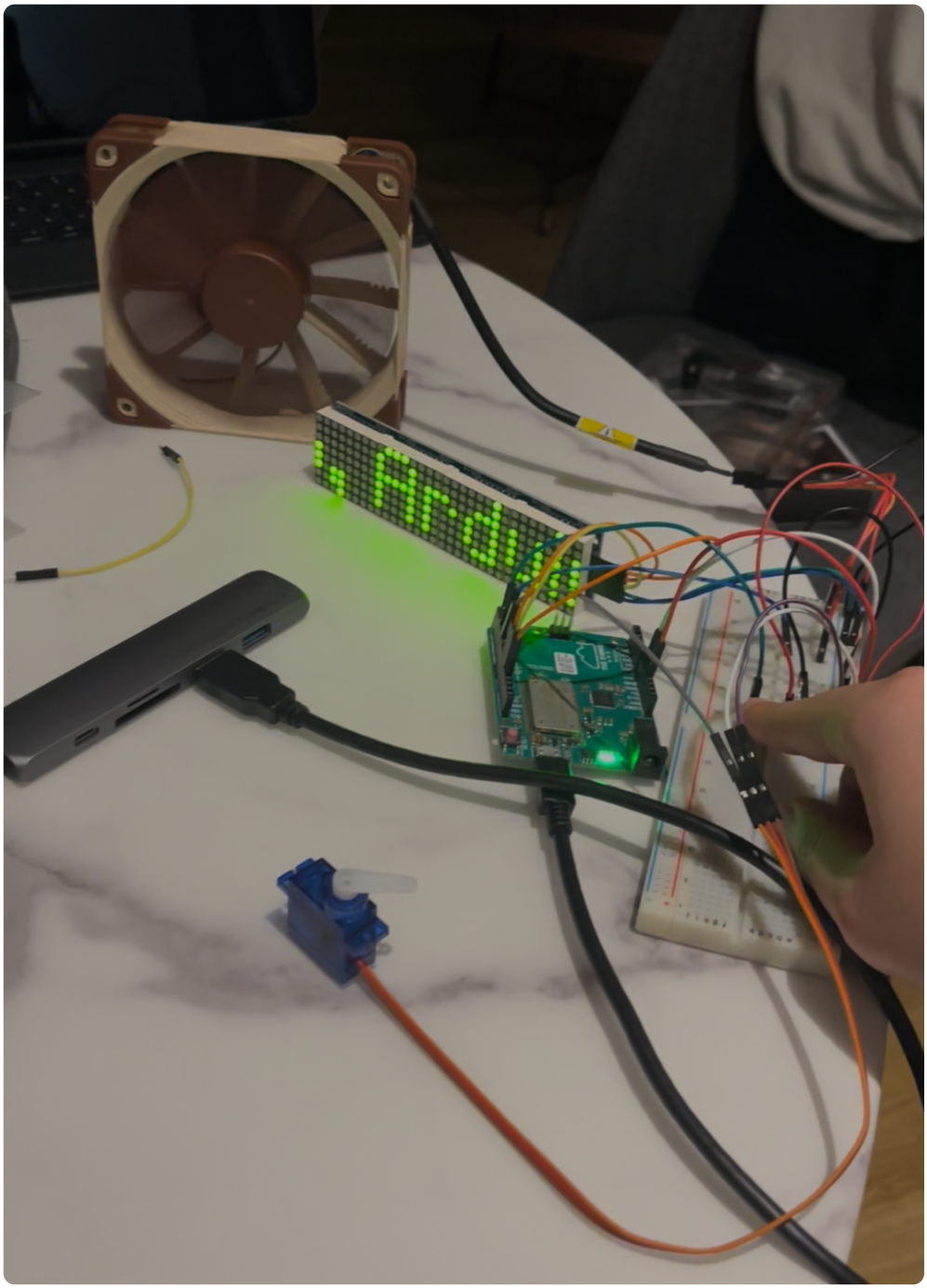
- Arduino Uno (MCU)
- ~~BME680~~ DHT22 (Environment Sensor) - Digital Pin
- max7219 LED Matrix 8x32 (Display) - SPI
- NF-F12 5V PMW (Fan) - PWM
- Buttons - Digital Pin

Workflow



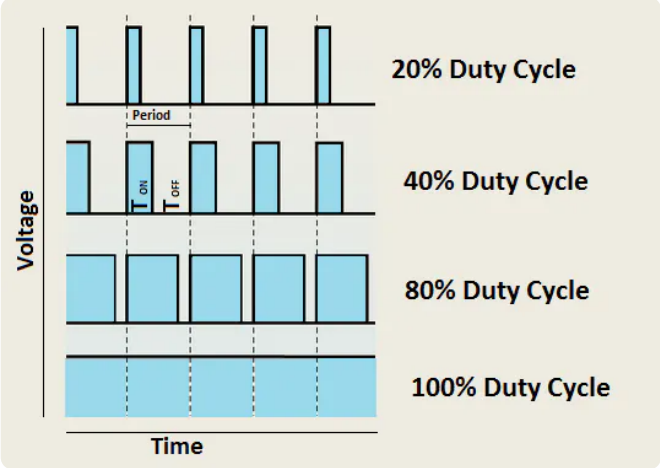
Build Process

First Prototype



Tested Fan Control using PWM control

By pressing button, Uno changes fan speed for noise control.

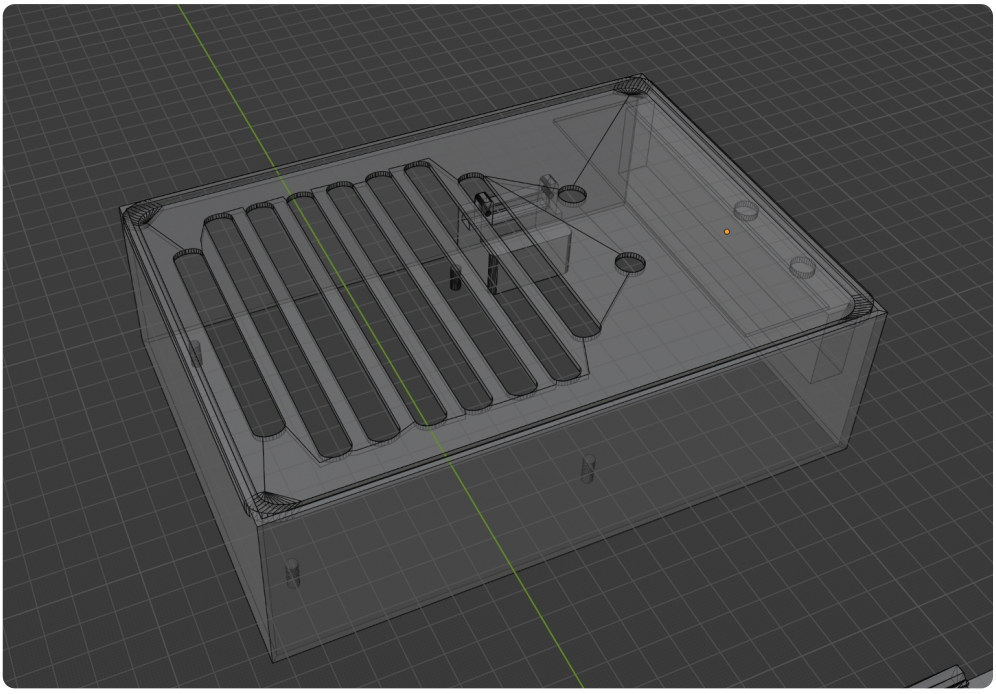


[Arduino PWM Tutorial - Arduino Project Hub]

Second Prototype

[Old-fashioned vintage radio isolated on a white background - | CanStock (canstockphoto.com)]

Inspired by the old fashion radios, got the idea from Prof. Andy.



3D Printing Enclosure

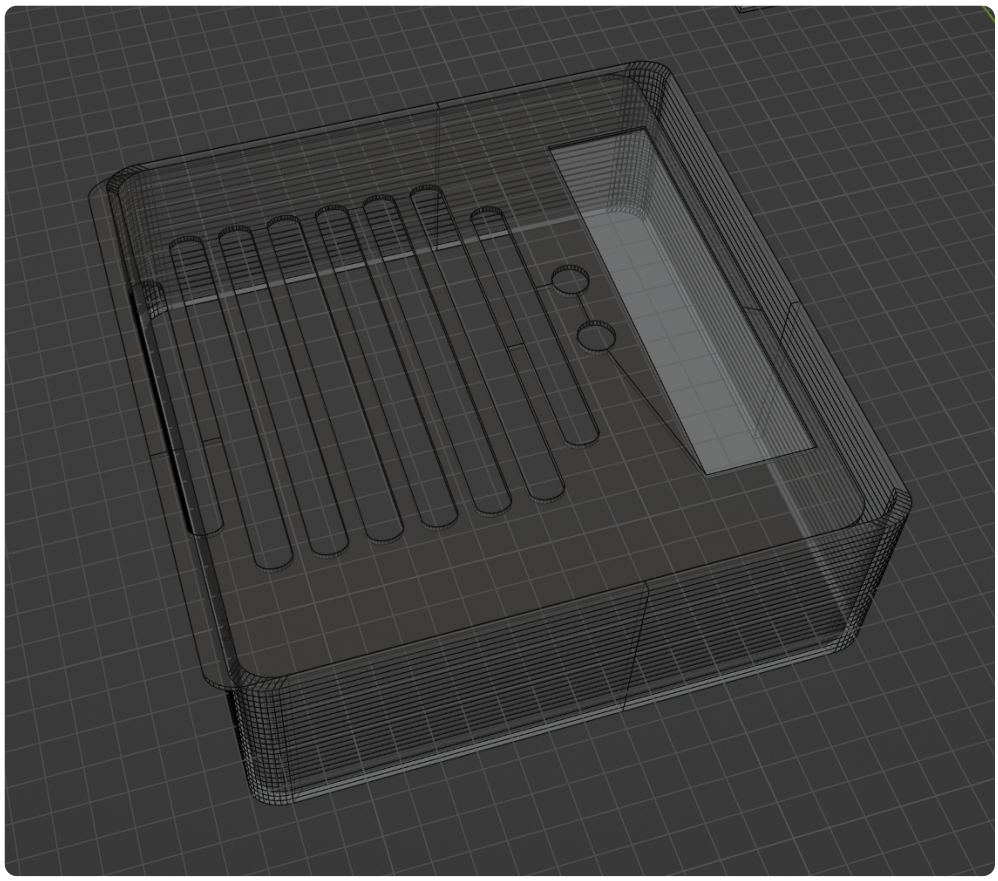
- Slow
- Not Precise
- Good for 3d solid object prototyping

Removed servo

Moved LED Matrix

Changed sie

Third Prototype



Laser cut wood enclosure

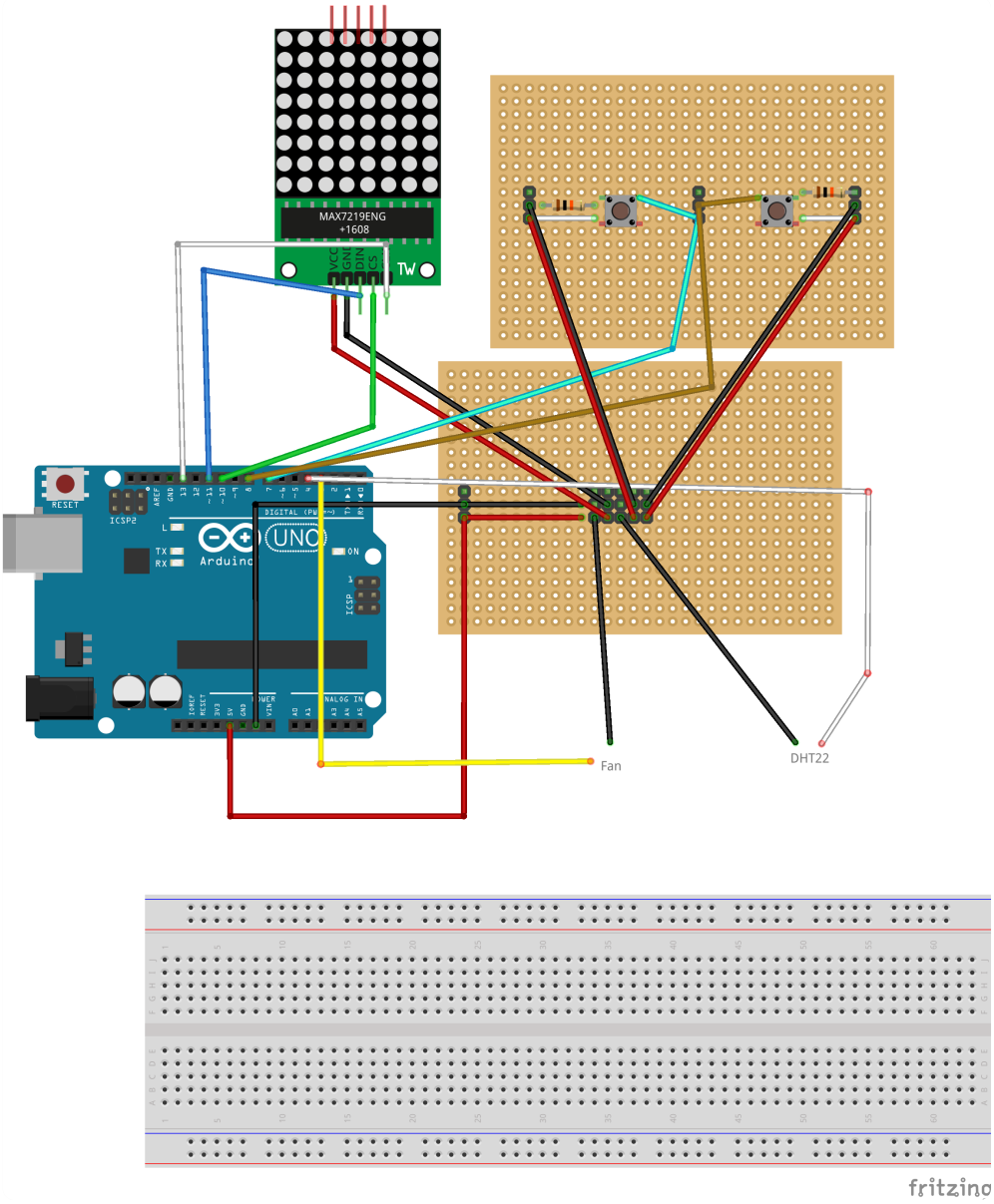
- Fast
- Precise

3D Printed top lid to hide LED matrix and for aesthetic reason

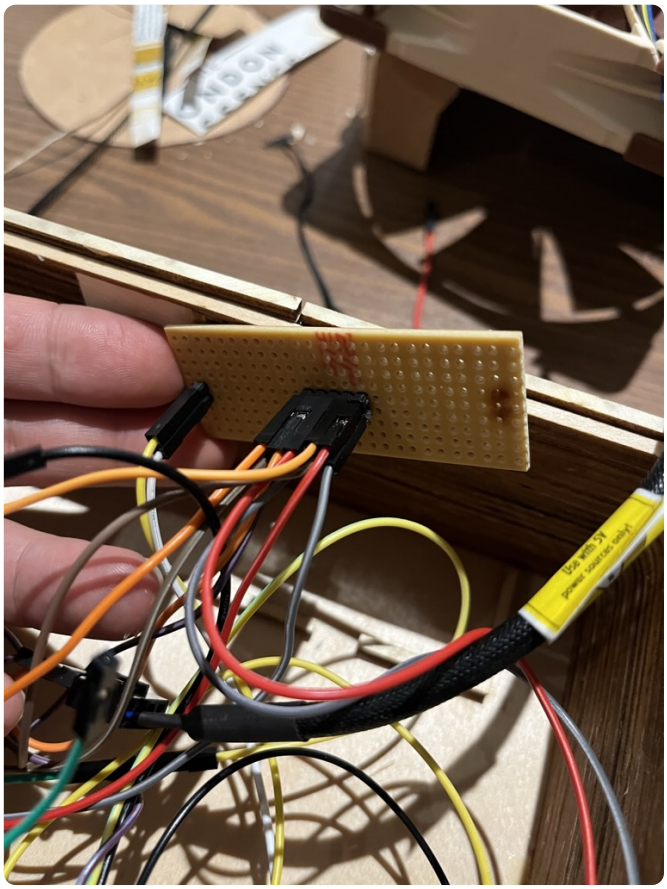
with the enclosure, the device was tested and some problems are found:

1. BME680 library uses more than 30% of maximum sketch storage. (From 70% to 117%)
    - Reduce the size and memory usage of your sketch – Arduino Help Center
    - Remove BME680 and use DHT22
    - Use Arduino Uno instead of Leonardo (LoRa Library)
    - Optimised variables and functions
2. Did not design the component mounting
    - Made some mounting brackets
    - 

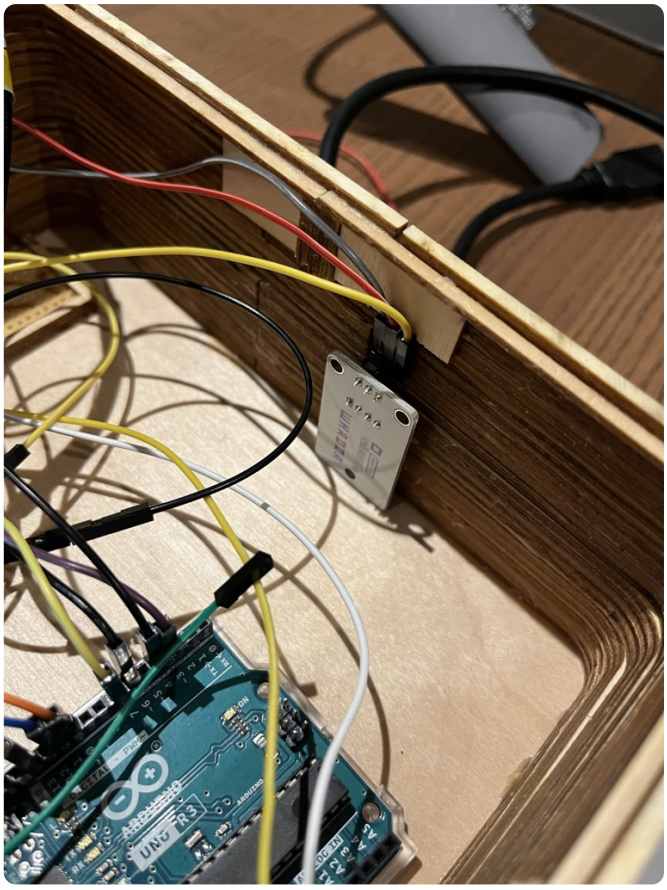
Final Build

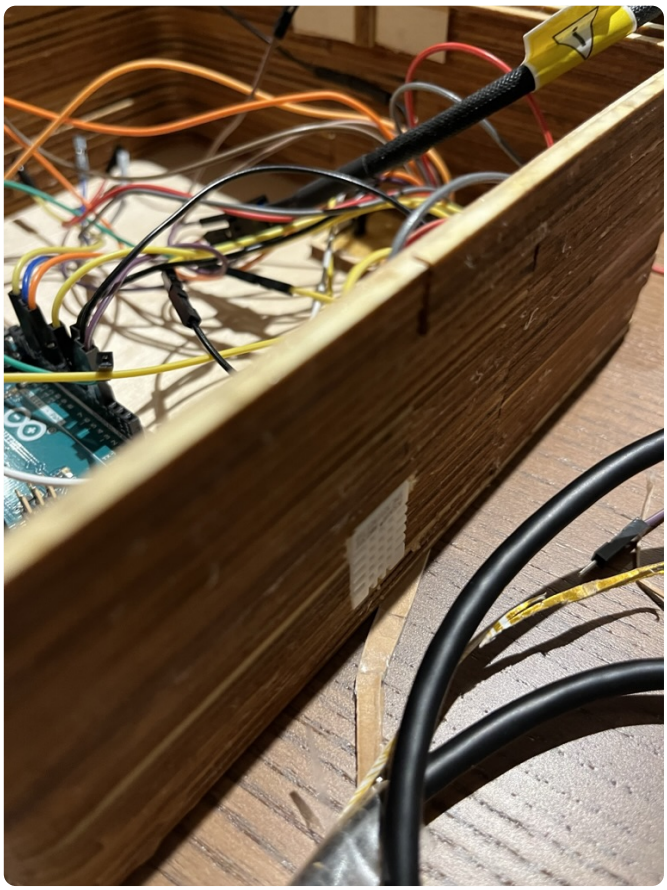


Modularised parts

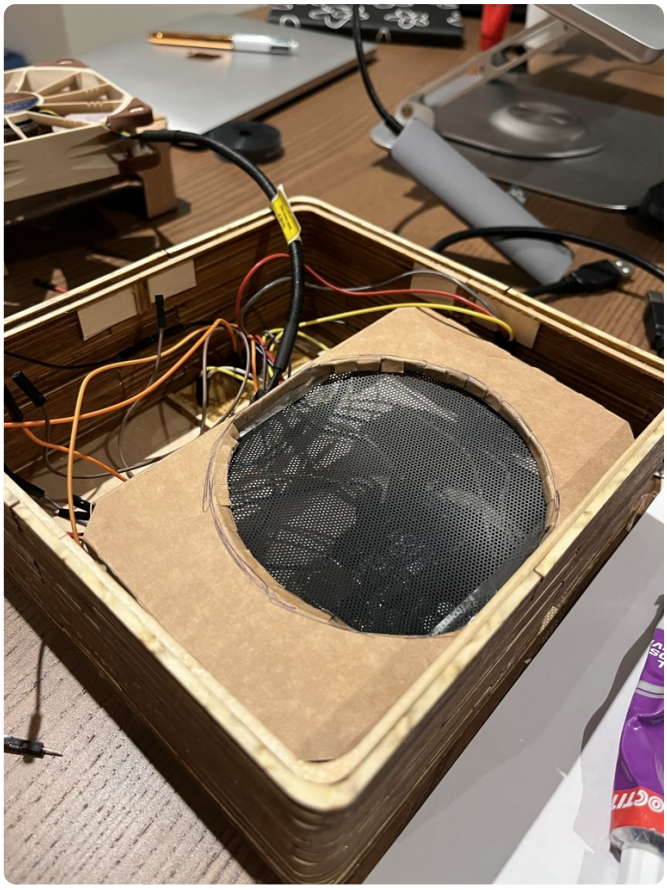


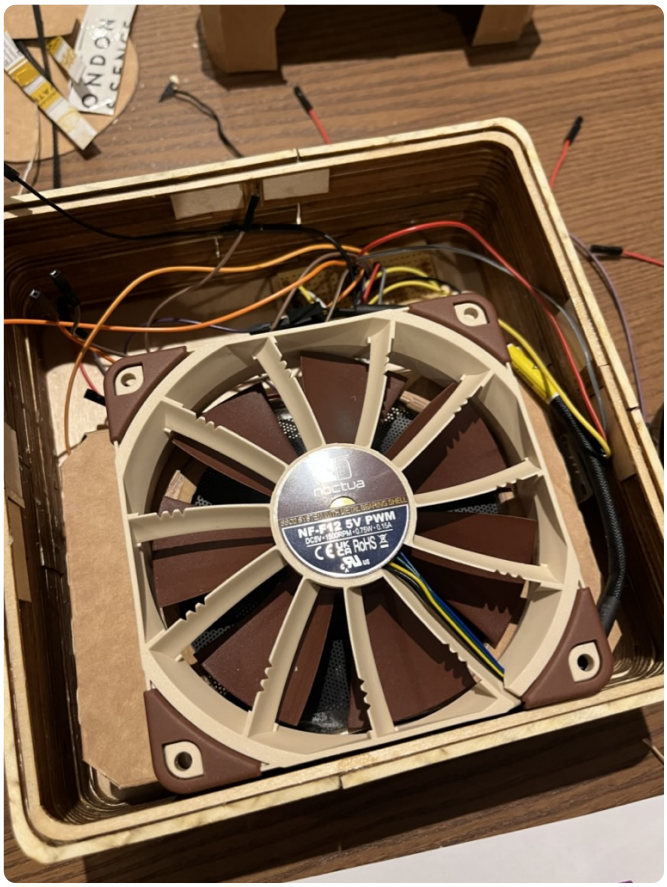
Used DHT22



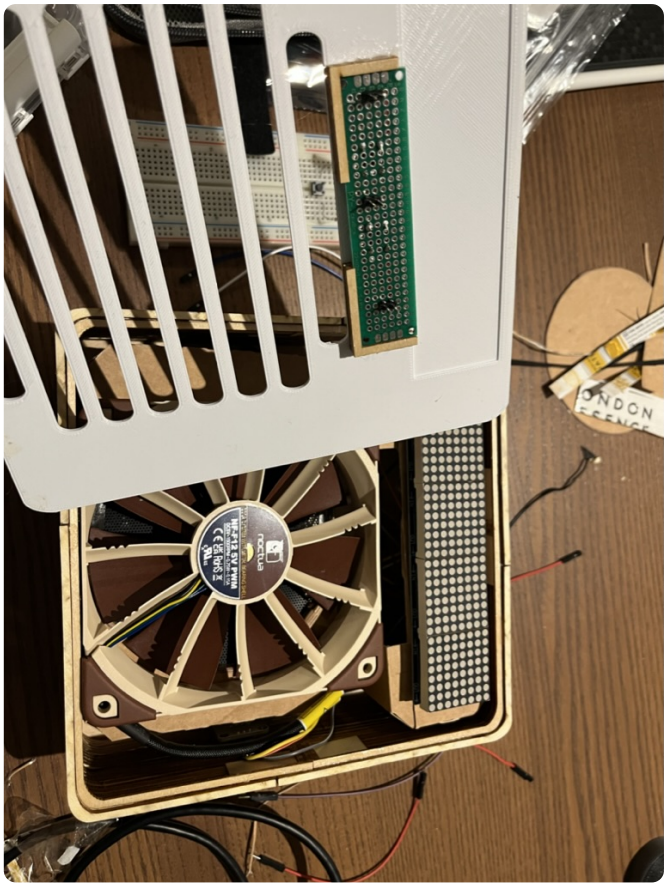


Added mesh to prevent the interference between the fan and wires



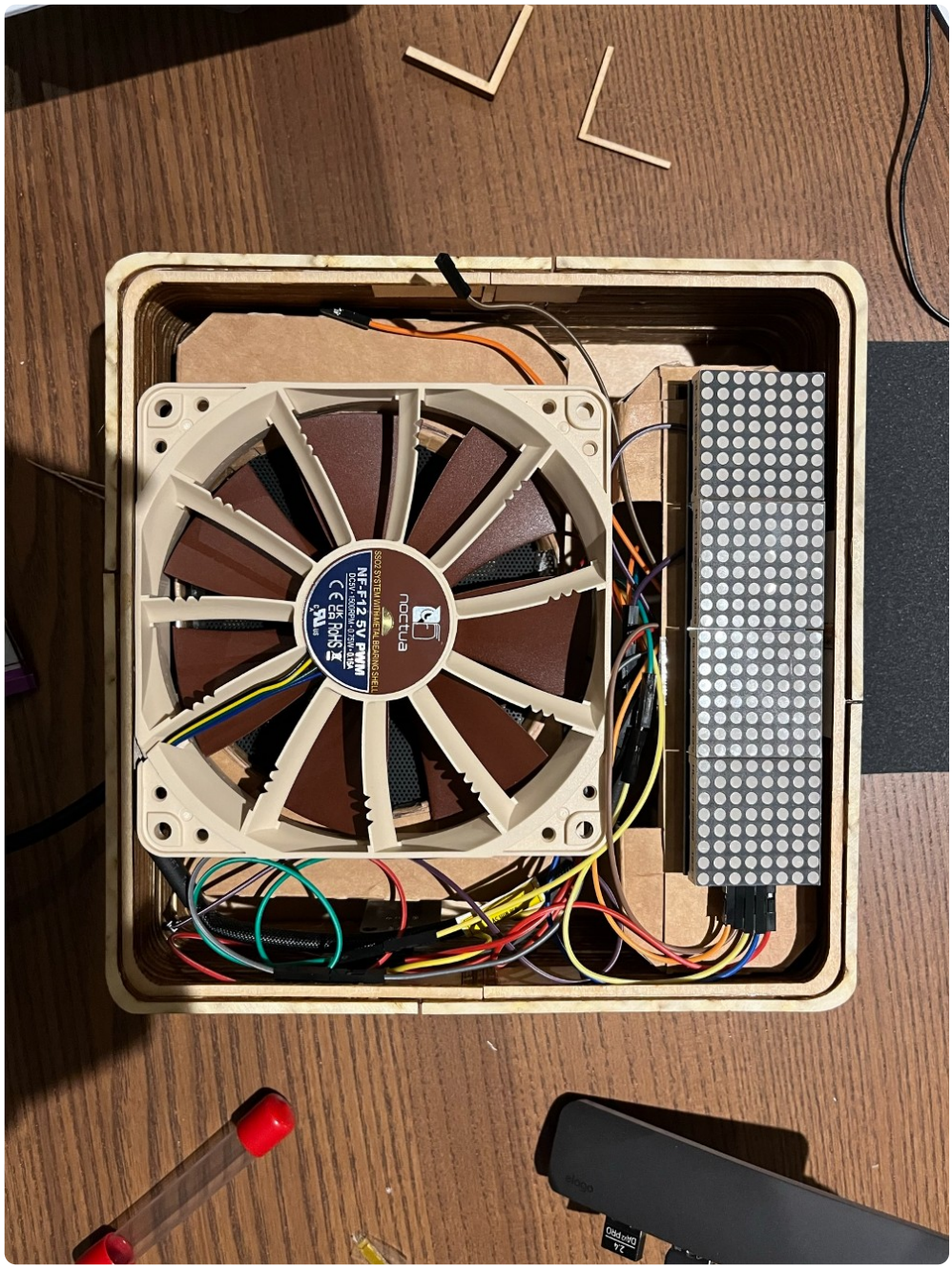


Introduced the mounting bracket



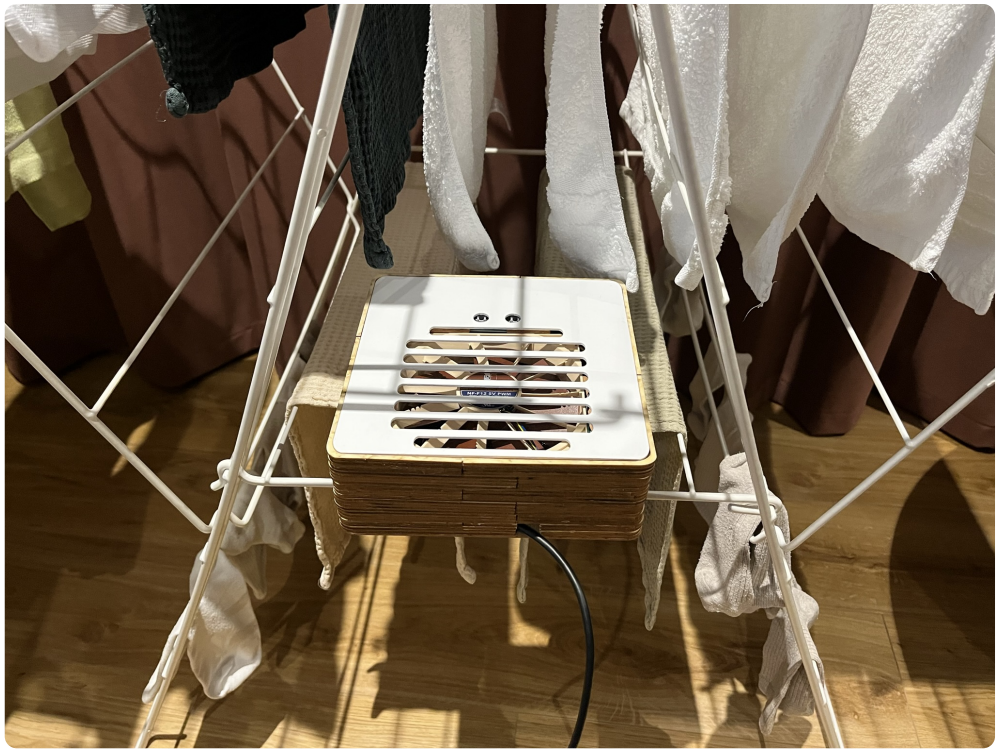
Result

[demo]




help
NF-F12 5V PWM
noctua


NF-A12 5V PWM
noctua



If i had more time, I would

- Use wireless data transmission such as WiFi, LoRa...
- Improve the enclosure
- Order a custom PCB board to reduce the device size

Where can it be used?

[A Grade Dehydrated Vegetables, Pan India, Packaging Size: 5 Kg at Rs 350/kg in New Delhi (indiamart.com)]

[9 Hat and Coat Storage Ideas When You Don't Have a Coat Closet | Apartment Therapy]

Lesson Learnt

- Test, Test, Test and Test.
  - Even though the several design, Some improvement can be made.
- Laser Cutter is better than what I expected.
  - If the prototype shape is not complicate, Laser cutter is a good option.
- The bouncing issue is too difficult (If you only use software debouncing).
  - Depends on the type of button, wire, etc..., the button needed to be calibrated.

Reference

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UNO R3 | Arduino Documentation (no date). Available at: https://docs.arduino.cc/hardware/uno-rev3 (Accessed: 14 December 2022).

Link

Github - https://github.com/Lionel-Lim/ClothSense