

Project Name: Ultrasonic Security Detection & Notification

Members:

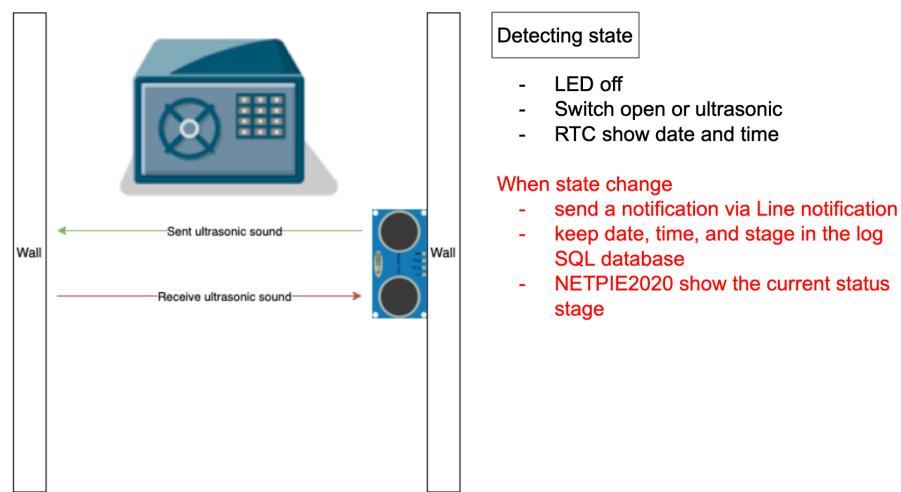
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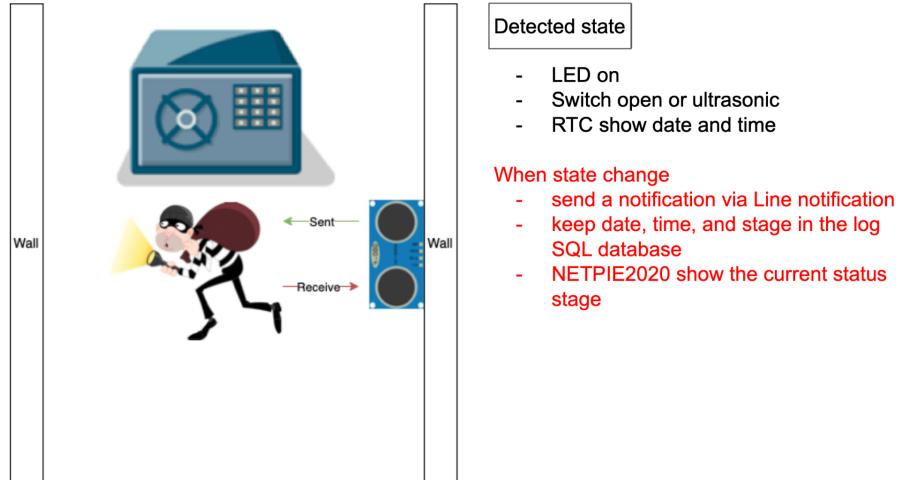
Objectives:

The purpose of this device was created to safeguard the property of the user. Normally, infrared sensors are frequently used to examine motion that has been detected. Thus, the use of ultrasonic in our project was inspired by the infrared which includes security devices that users use at present modified and upgraded by using 40KHz sound waves that are too high for humans to hear. This project evolved from project 1 and fully implemented by providing notifications to users for protection of the assets.

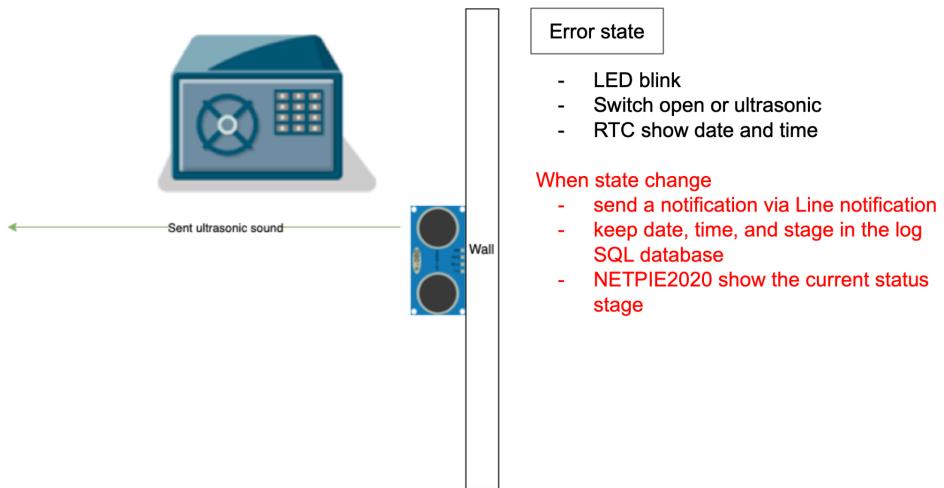
Scenarios



For the initial one(detecting state), the sent ultrasonic will send waves to the wall and reflect to be received. Next, the devices will remember how long sending and receiving took and calculate how far the ultrasonic wave traveled before hitting the wall. The distance will then be displayed and show the current state that detects foreign matter in addition to the date and time if a switch is turned on.



From the detected state, If the distance traveled was less than the initial state. state is transitioning from the first state to the detected state. For users of notice, led will be on and show the current state is detected.



The distance traveled cannot identify the wall from the initial state. It state will therefore be reported as the error state. Led will blink and indicate that the current state is error for users to see. In addition,

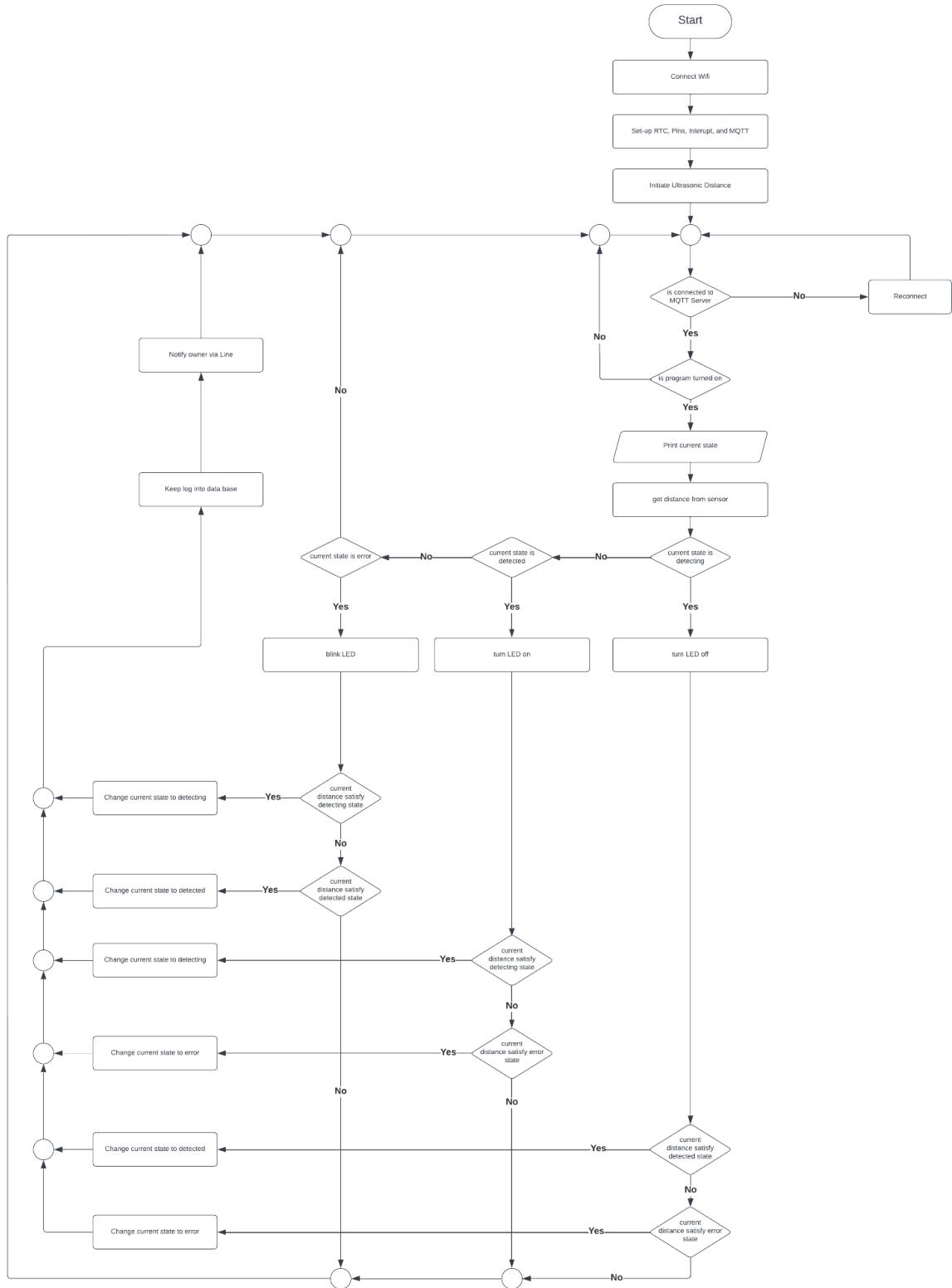
Back-end, we implement an SQL database to collect the data when the status state change with status, date, and time. In addition, we will notice to users via line notification consist of the date, and time until the status state will change to the detecting state. NETPIE2020, we will show the current state of the system.

Project Design

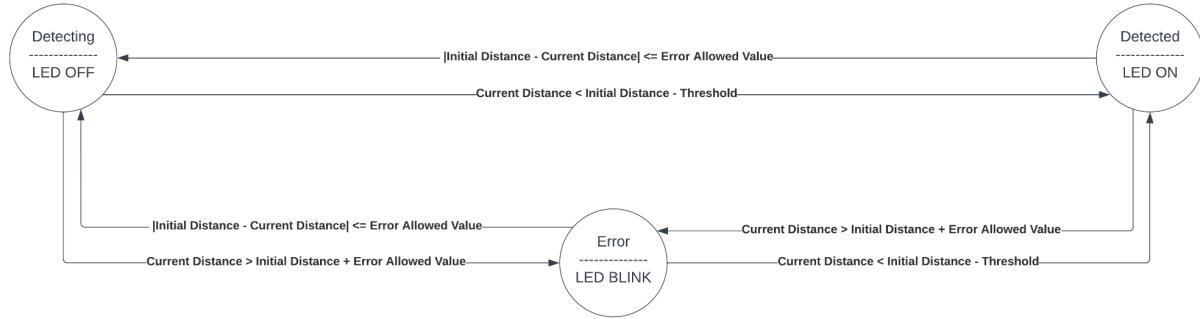
Components

Components	Use Case
 RTC	Use for retrieving and displaying the date and time
 Push Button	Use for turning the program on and off
 Ultrasonic Sensor	Use for object detection
 LED	Use for displaying the state (detecting, detected, and error)

Flow Diagram



Finite State Machine Diagram



Variables

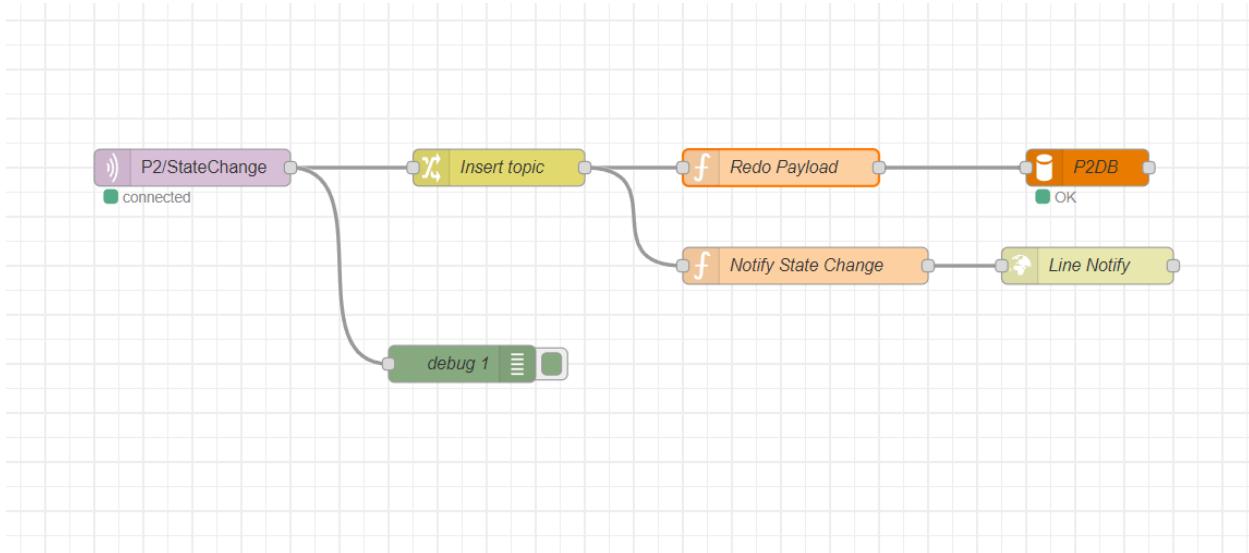
Initial Distance: Distance between the ultrasonic sensor and the wall

Current Distance: Distance that the ultrasonic sensor is reading

Error Allowed Value: Noise gate

Threshold: Use to determine whether that the passed object should be considered or not

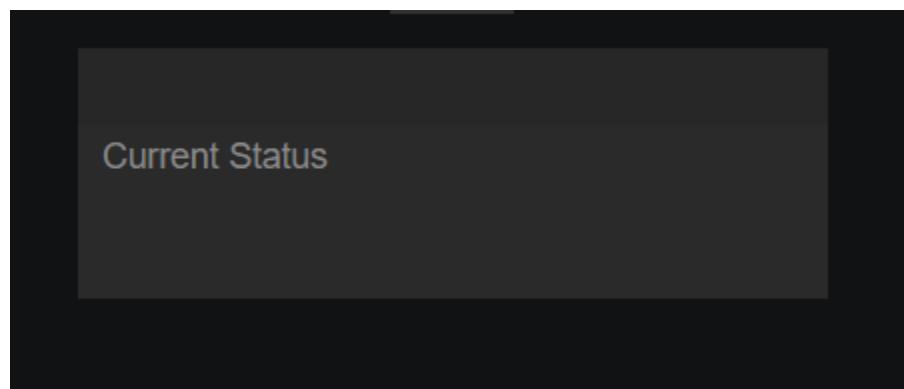
NodeRED Diagram



NETPIE2020 Schema

```
{  
    "additionalProperties": false,  
    "properties": {  
        "status": {  
            "operation": {  
                "store": {  
                    "ttl": "7d"  
                }  
            },  
            "type": "string"  
        },  
        "dateTime": {  
            "operation": {  
                "store": {  
                    "ttl": "7d"  
                }  
            },  
            "type": "string"  
        }  
    }  
}
```

NETPIE2020 Freeboard

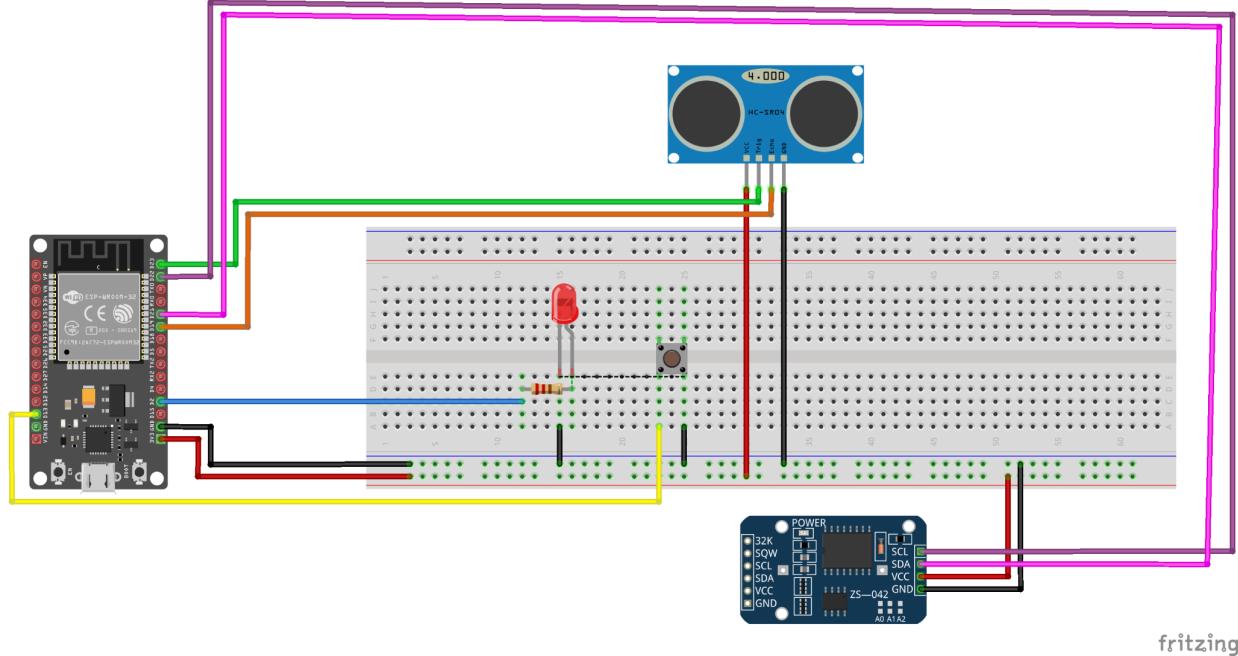


Circuit Schematic

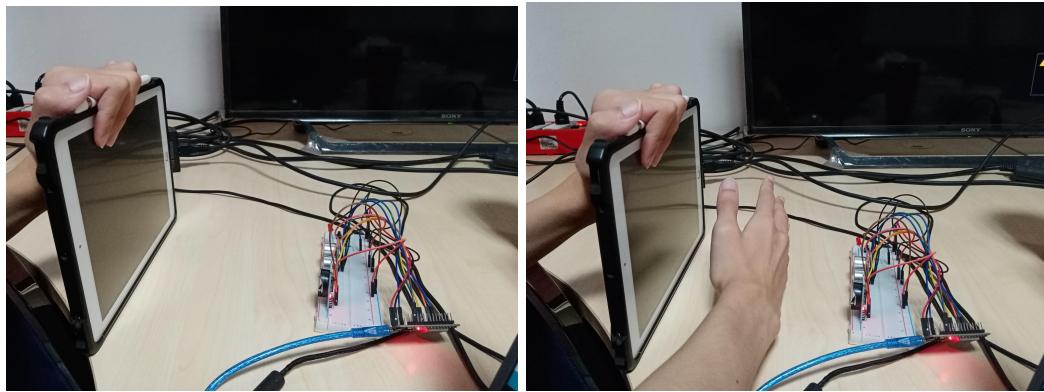
Pin	Pin Number
LED	2
Ultrasonic Echo	19
Ultrasonic Trig	23
Push Button	13
RTC SCL	22
RTC SDA	21

The schematic shows the following connections:

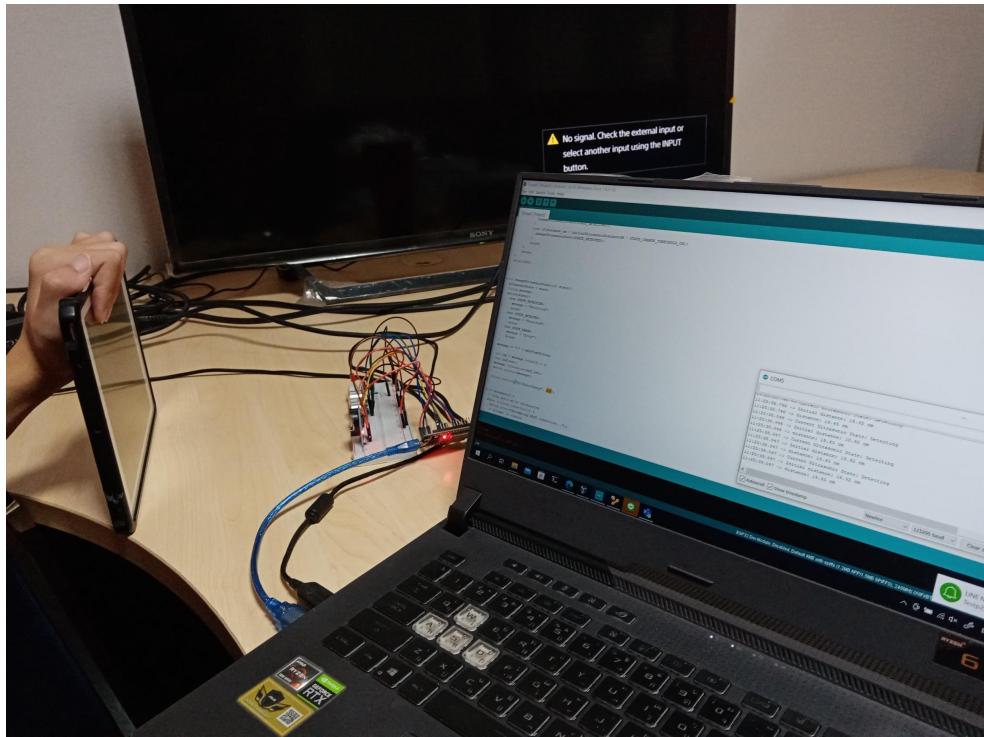
- HC-SR04 Ultrasonic Sensor:** Trigger (TRIG) connected to ESP32S GPIO23, Echo connected to ESP32S GPIO19.
- ESP32S WiFi Module:** VCC connected to 3.3V, GND connected to GND, I2C SDA connected to GPIO21, I2C SCL connected to GPIO22, and DIO connected to GPIO13.
- DS3231 RTC Module:** VCC connected to 3.3V, GND connected to GND, SDA connected to GPIO21, and SCL connected to GPIO22.
- Push Button:** Connected between 3.3V and GND.
- LED:** Connected between 3.3V and GND through a 220Ω resistor.



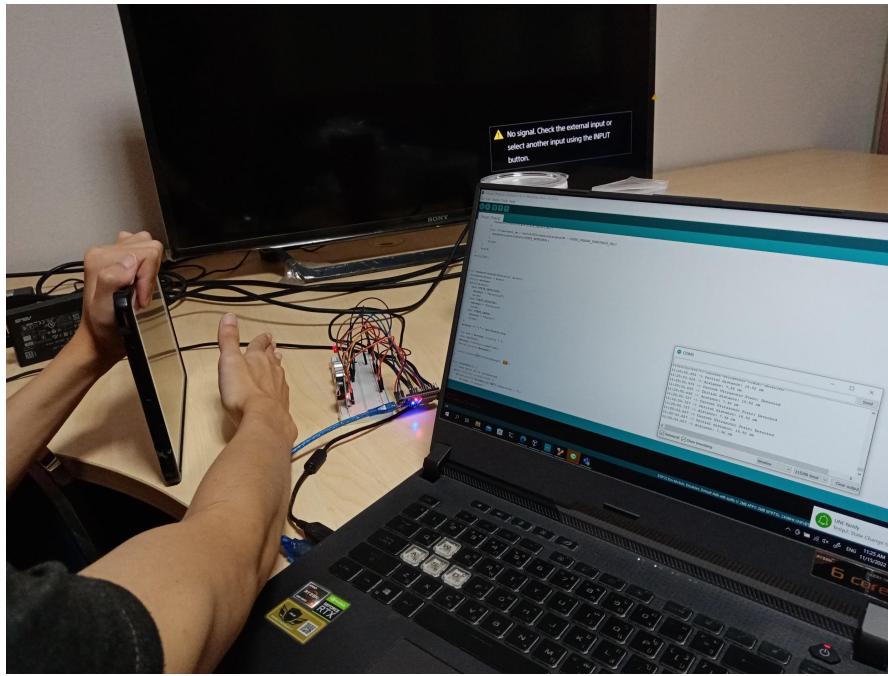
Project result (Please see the demo for more clarification)



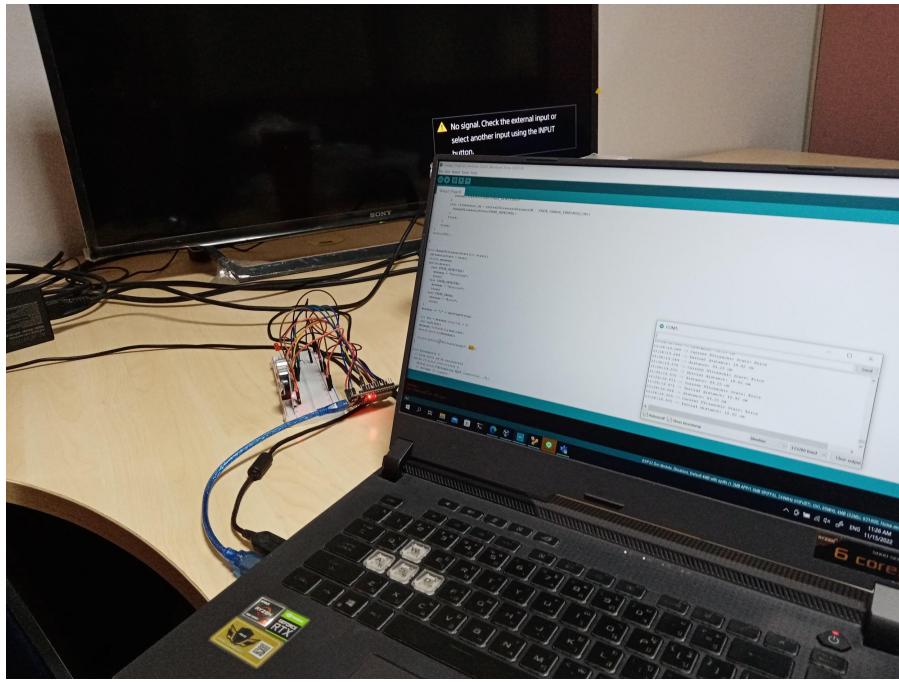
Turning Off



Turning On - Detecting



Turning On - Detected



Turning On - Error

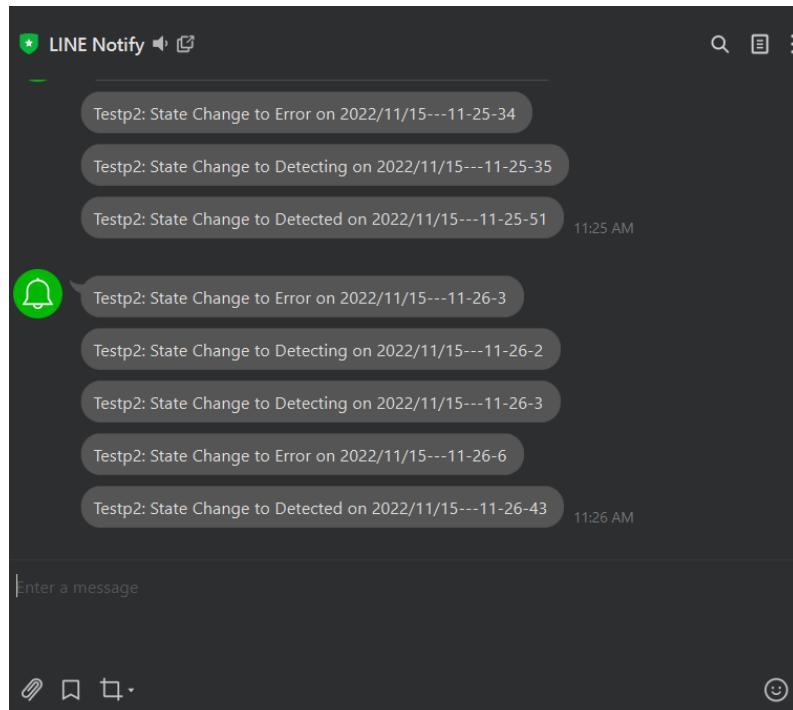
```

| Detected | 2022/11/15---11-13-30 |
| Error   | 2022/11/15---11-13-36 |
| Detected | 2022/11/15---11-13-38 |
| Error   | 2022/11/15---11-13-40 |
| Detected | 2022/11/15---11-13-41 |
| Error   | 2022/11/15---11-13-41 |
| Detected | 2022/11/15---11-13-41 |
| Error   | 2022/11/15---11-14-6  |
| Detected | 2022/11/15---11-14-23 |
| Detecting| 2022/11/15---11-14-26 |
| Error   | 2022/11/15---11-14-47 |
| Detecting| 2022/11/15---11-14-47 |
| Error   | 2022/11/15---11-14-49 |
| Detecting| 2022/11/15---11-14-49 |
| Error   | 2022/11/15---11-15-10 |
| Detecting| 2022/11/15---11-15-10 |
| Error   | 2022/11/15---11-15-11 |
| Detecting| 2022/11/15---11-15-12 |
| Error   | 2022/11/15---11-15-23 |
| Detecting| 2022/11/15---11-15-23 |
| Error   | 2022/11/15---11-15-24 |
| Detecting| 2022/11/15---11-15-24 |
| Error   | 2022/11/15---11-15-29 |
| Detecting| 2022/11/15---11-15-35 |
| Error   | 2022/11/15---11-17-26 |
| Detecting| 2022/11/15---11-17-27 |
| Error   | 2022/11/15---11-17-32 |
| Detecting| 2022/11/15---11-17-32 |
| Detected | 2022/11/15---11-19-40 |
| Detecting| 2022/11/15---11-19-56 |
| Error   | 2022/11/15---11-22-14 |
| Detecting| 2022/11/15---11-22-14 |
| Error   | 2022/11/15---11-22-15 |
| Detecting| 2022/11/15---11-22-16 |
| Error   | 2022/11/15---11-22-17 |
| Detected | 2022/11/15---11-25-17 |
| Error   | 2022/11/15---11-25-34 |
| Detecting| 2022/11/15---11-25-35 |
| Detected | 2022/11/15---11-25-51 |
| Detecting| 2022/11/15---11-26-2  |
| Error   | 2022/11/15---11-26-3  |
| Detecting| 2022/11/15---11-26-3  |
| Error   | 2022/11/15---11-26-6  |
| Detected | 2022/11/15---11-26-43 |
+-----+-----+
63 rows in set (0.00 sec)

mysql>

```

The log table on MySQL database



Line notification

Video Presentation (Link)

<https://drive.google.com/file/d/1Bseje16zkfBJ8djSA8cpSKmYDhSFFAO2/view?usp=sharing>