

Oral Breath solution

Breath better

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https://github.com/Yuanhl4/514_project



Mouth Breathing Helper

Project_1

Breathing only from your mouth in long-term will lead to health issues, includes:

- Malocclusion.
- Facial differences.
- Obstructive sleep apnea



Mouth Breathing

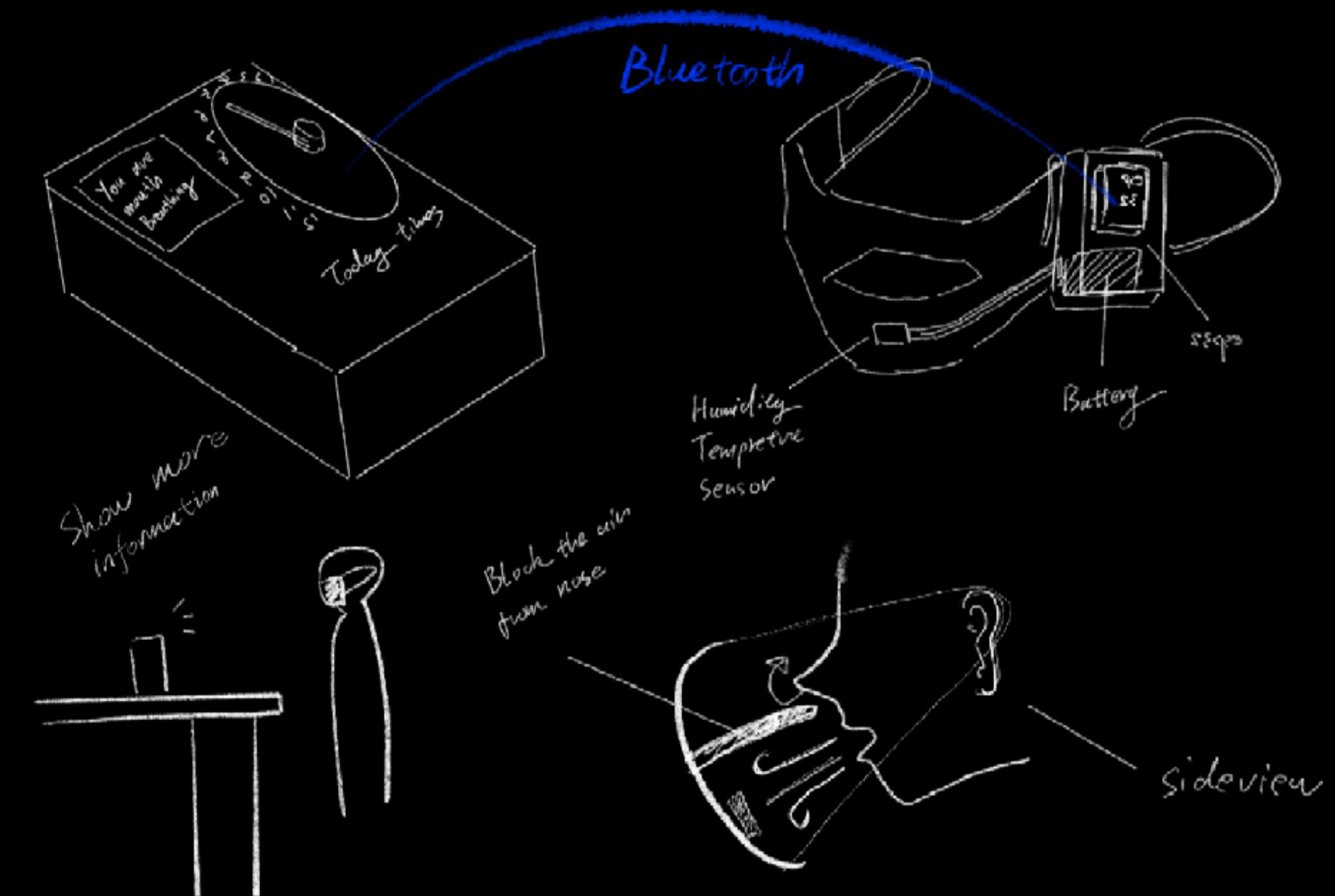


Nose Breathing

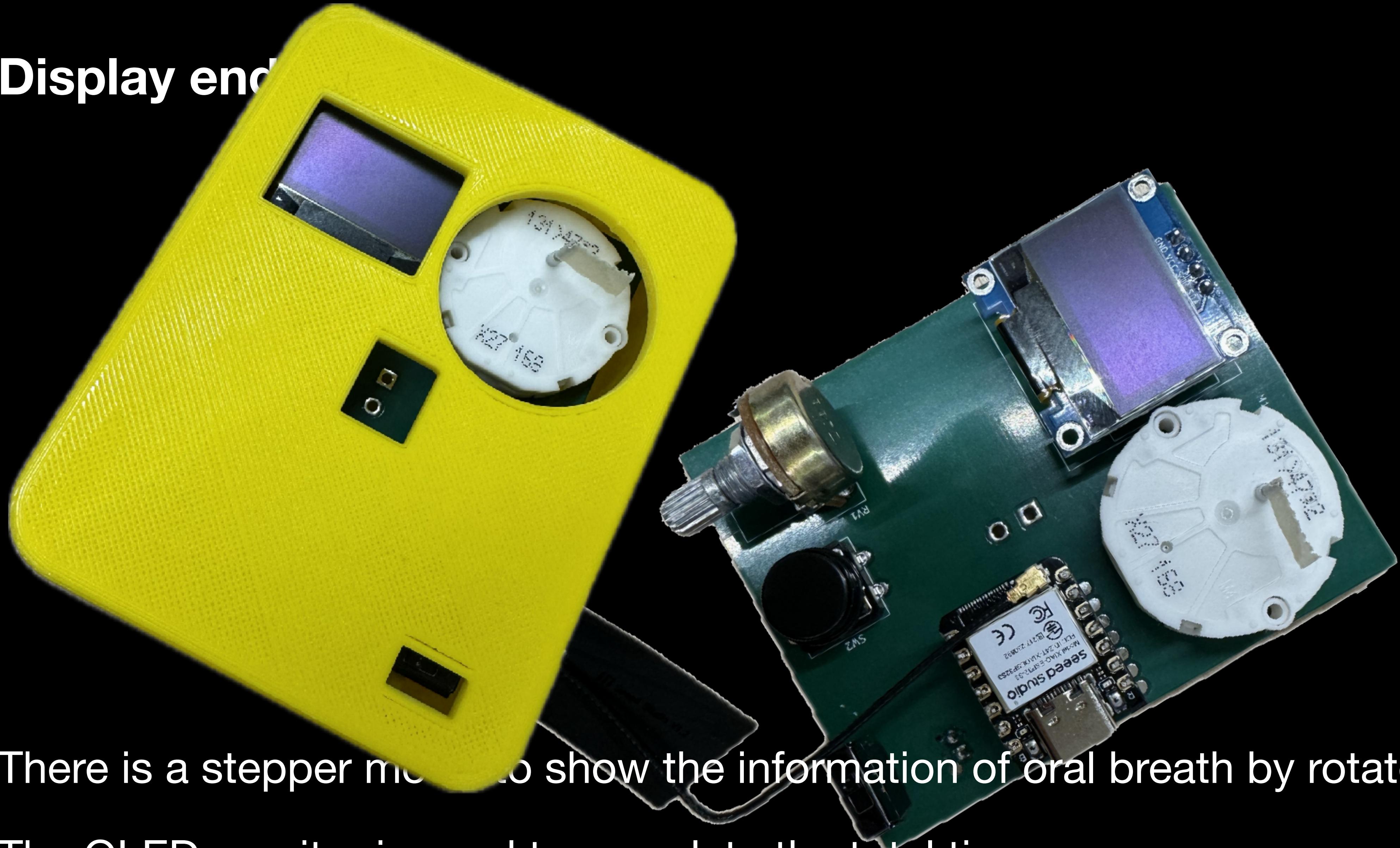
Mouth Breathing Helper

Project_1

- ESP32 with a humidity and temperature sensor will determine whether the users are breathing through mouth and remind them to stop.
- A remote terminal with a screen and a counter will show more information of mouth breathing in one day.



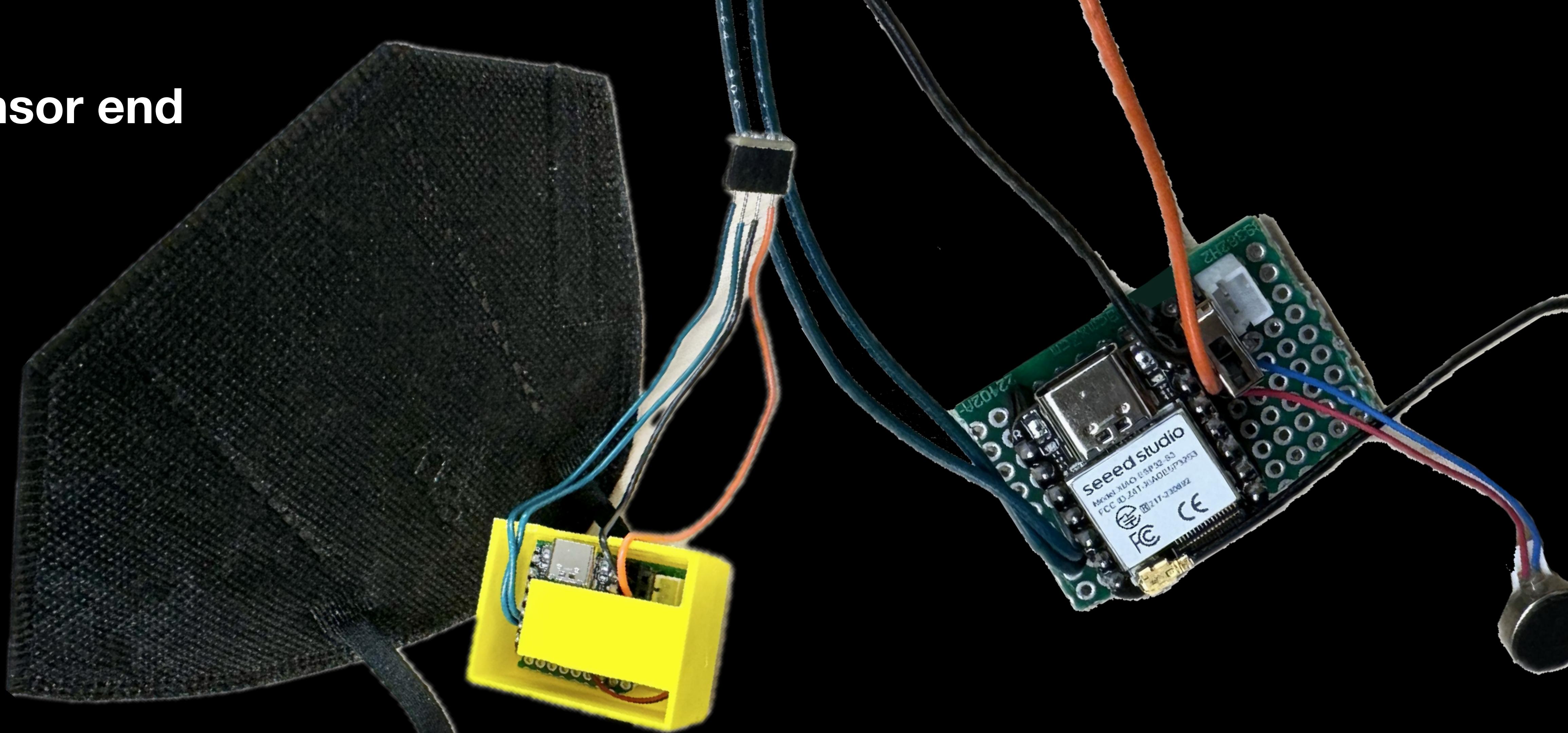
Display end



There is a stepper motor to show the information of oral breath by rotate the flag;

The OLED monitor is used to cumulate the total times

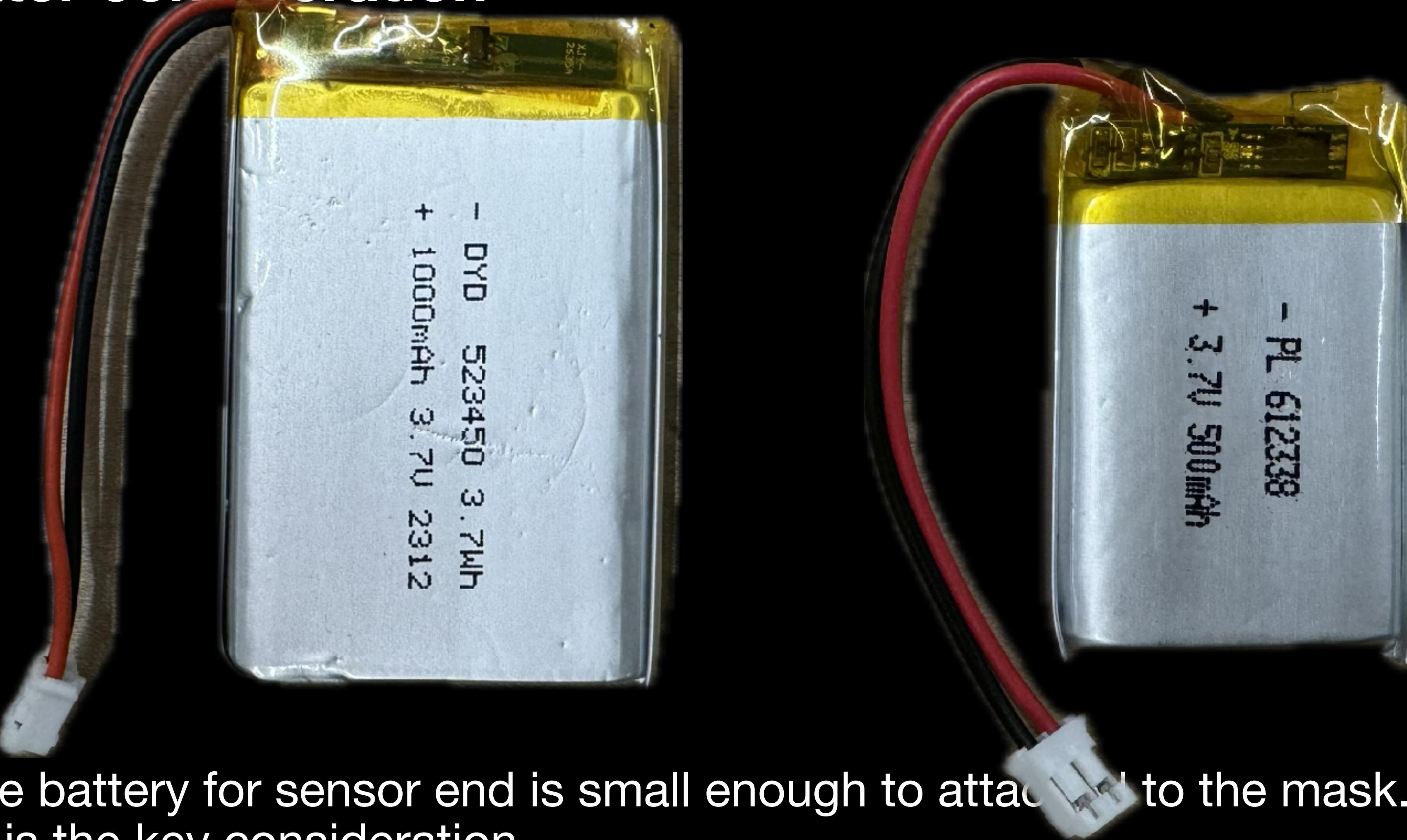
Sensor end



BME280 is used to detect the changed value of air humidity and temperature.

The Vibration motor, is used to remind people to stop breath incorrectly.

Batter consideration



The battery for sensor end is small enough to attach to the mask. The weight and size is the key consideration.

The Battery for display end is larger, because it is not likely to be moved.

Signal processing

```
// Define constants for DSP
const int bufferSize = 10; // Size of the buffer for storing sensor readings
float sensorBuffer[bufferSize]; // Buffer to store sensor readings
int bufferIndex = 0; // Index for the circular buffer

// Function to apply a moving average filter to the sensor readings
float movingAverageFilter(float newValue) {
    // Add the new value to the buffer
    sensorBuffer[bufferIndex] = newValue;

    // Increment buffer index with wraparound
    bufferIndex = (bufferIndex + 1) % bufferSize;

    // Calculate the average of the values in the buffer
    float sum = 0.0;
    for (int i = 0; i < bufferSize; i++) {
        sum += sensorBuffer[i];
    }
    return sum / bufferSize;
}

// Function to perform DSP tasks on sensor data
void processSensorData() {
    // Read sensor data
    float currentTemperature = bme.readTemperature();

    // Apply DSP algorithm (e.g., moving average filter)
    float filteredTemperature = movingAverageFilter(currentTemperature);
}

void loop() {
    // Call the function to process sensor data
    processSensorData();

    // Other code in the loop...
}
```

Digital signal processing (DSP)

The Moving average filter is applied to the temperature sensor readings using a circular buffer.

Future expectation

Modify the PCB design to make it compact

Use SMD sensor

Redesign the product

Thanks for listening

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