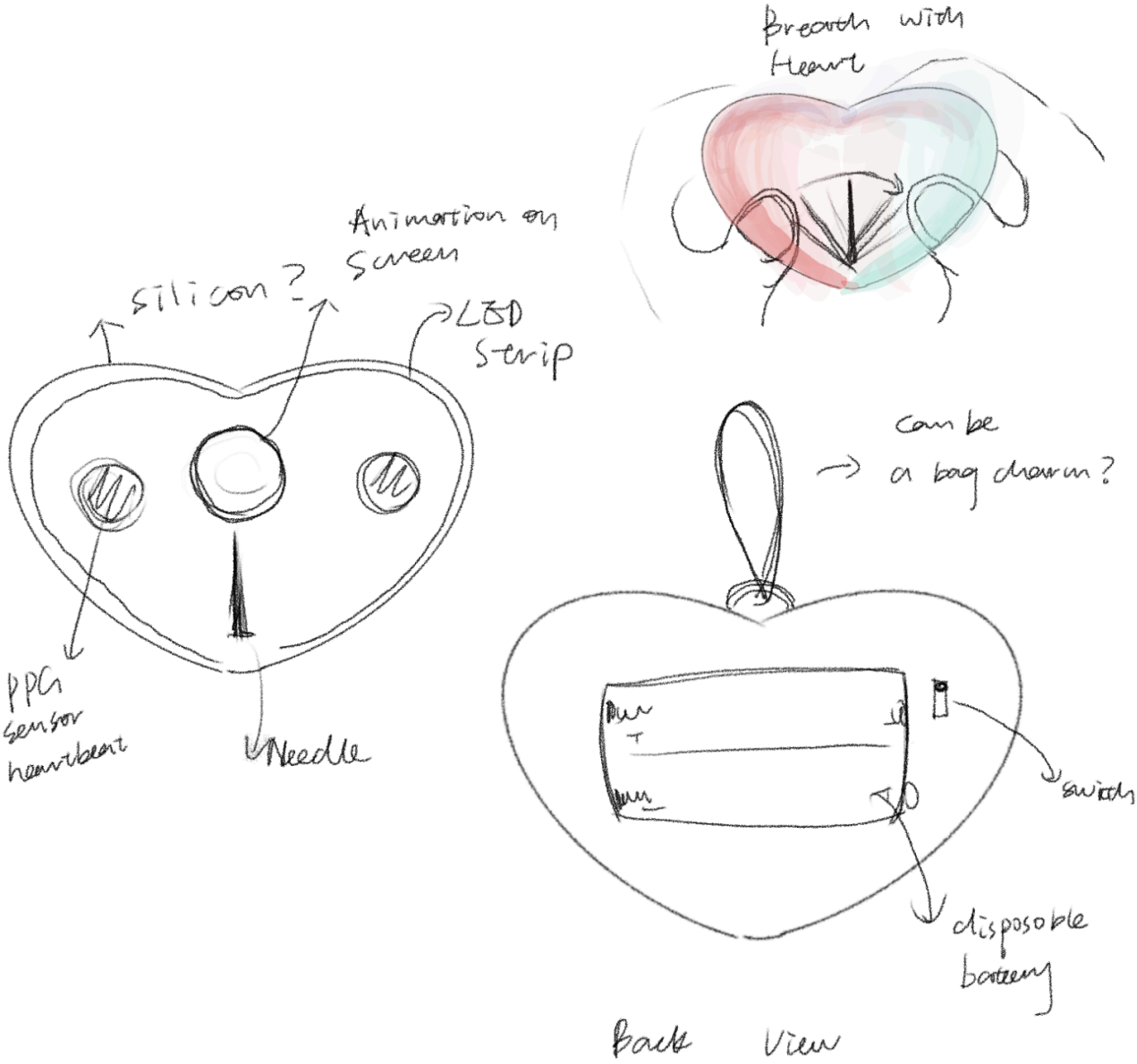
HWSW_Final_Project

Breathe with Heart

Introduction

This device is designed to help people reduce anxiety during a panic attack by guiding them to breathe mindfully. It tracks the user’s heartbeat in real-time and provides feedback (such as dimming lights) to prompt users to practice breathing meditation.

- LED light: Display users' anxiety level and suggest breathing tempo.
- Stepper Gauge Needle: Display users' anxiety level.

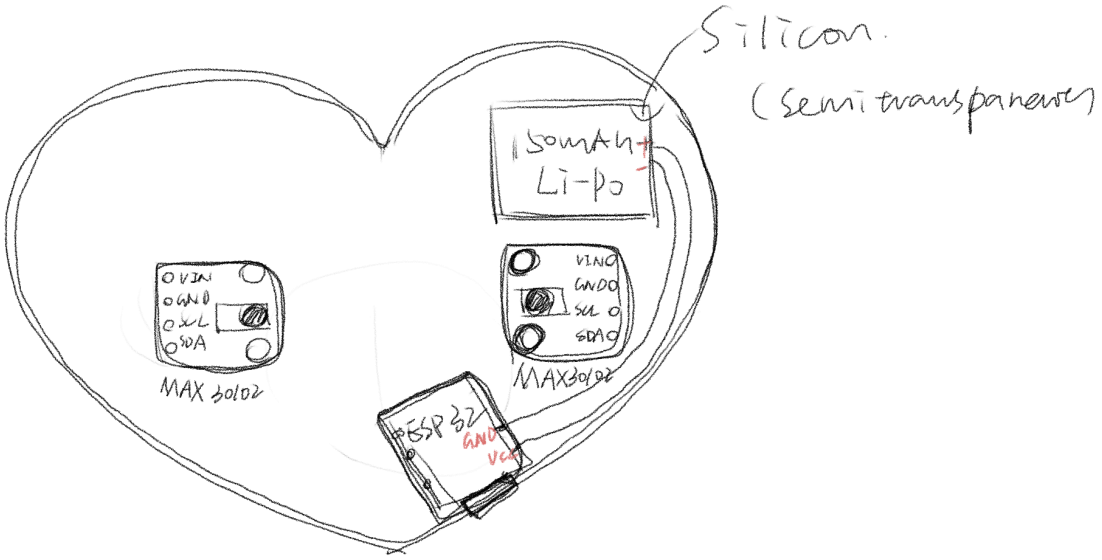


Sensor

PPG(photoplethysmography)-MAX30102 is chosed for this project. The sensor senses changes in blood flow caused by heartbeats using light absorption. It calculates:

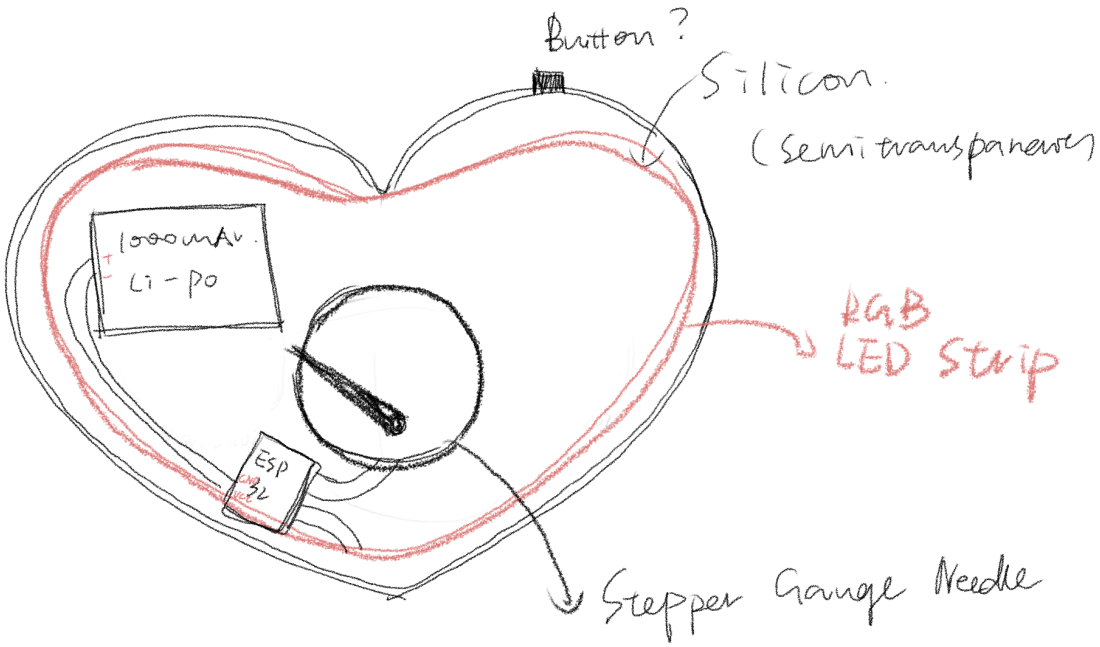
- **Heart Rate (BPM)**
- **Heart Rate Variability (HRV)** for stress analysis.
- Optionally, **oxygen saturation (SpO2)** and **perfusion index (PI)**

When user hold the device with their hands, the sensor will be sensing their thumbs to progress the data to ESP32 and analyse users' status.



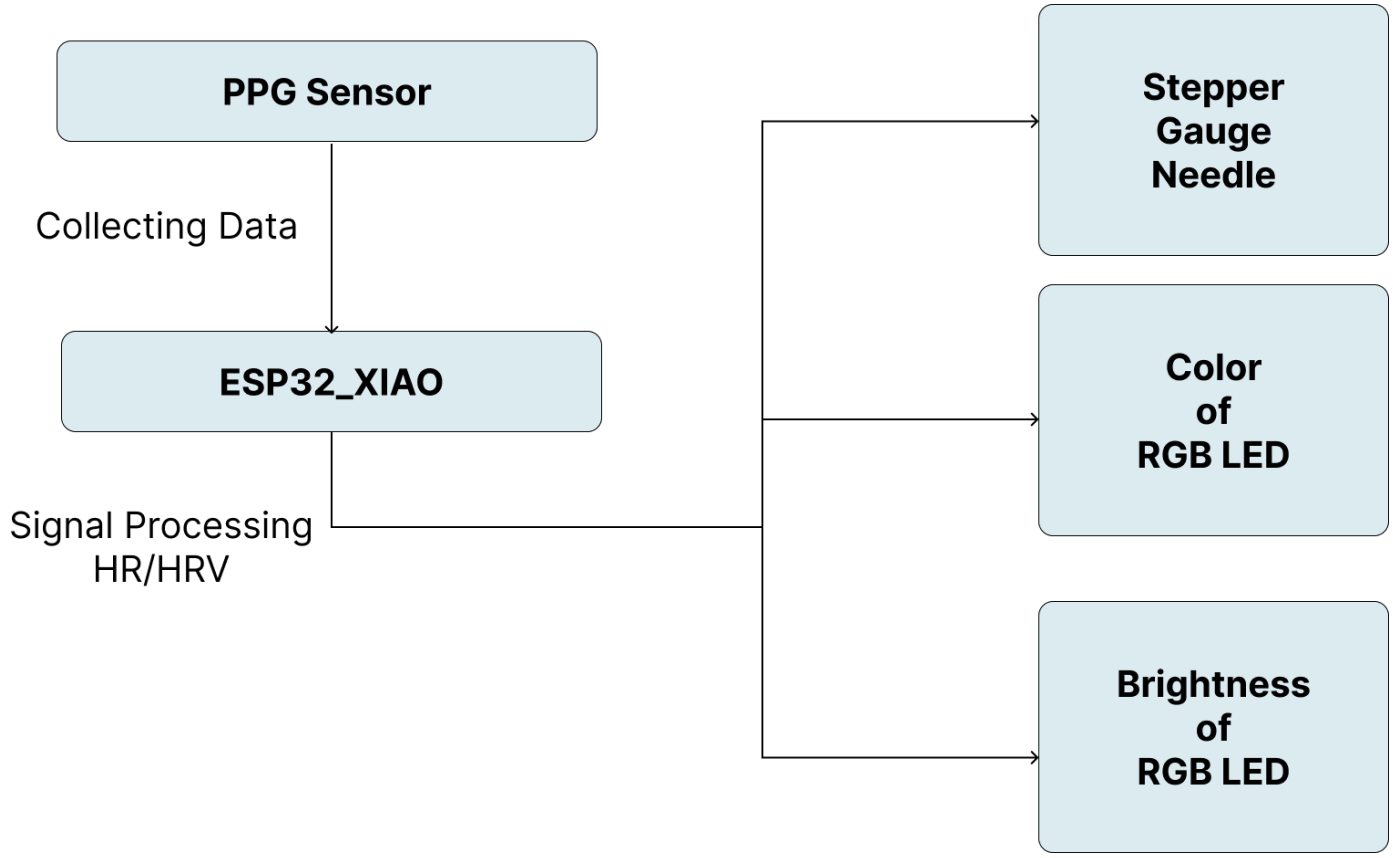
Display

- **RGB LED Strip**
  This color of the RGB LED display the user's anxiety level from green to red. The brightness of the light changes along with the suggested breathing tempo.
- **Stepper Gauge Needle**
  This needle display users' anxiety percentage according to the calculated **HRV**.



Diagram

- How it will work



- Systems Architecture Diagram