

# Sri Lanka Institute of Information Technology



IT1040 - Fundamentals of Computing

Year 1, Semester 1- 2024

**BodySQL - Real-Time Health Monitoring System with**

**Daily Insights and Alerts**

Progress Report

Group ID – P22

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BodySQL is a distance health care management tool we are building for this assignment, and it helps individuals in rural areas by providing them with insights into their body temperature and heart rate.

## Project Breakdown and Task Assignment

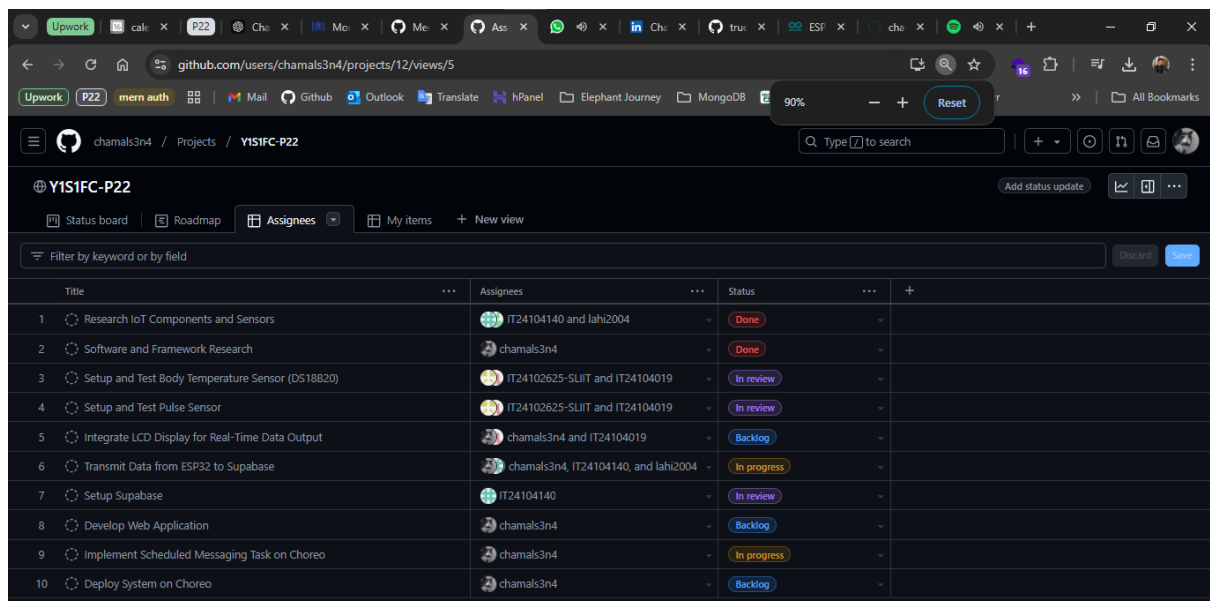
After proposing the project, the first thing we did was divide this project into smaller, manageable subparts. Then we assigned each task to our team member(s) based on their expertise and interest.

To make seamless collaboration and progress tracking, we:

1. Create a GitHub Repo to host the project
2. Setup a GitHub Project Board using Kanban Method to organize task into columns such as **Todo**, **In Progress**, **In Review** and **Completed**
3. Create issue templates for each subtask, documenting clear instructions and goals.
4. Assigned team members to each issue, linking their GitHub accounts.

As an open-source initiative 90% of the technologies used in BodySQL are open source, and the project is fully accessible on GitHub for public review and contribution. (YES, ITS OPEN SOURCE)

<https://github.com/chamals3n4/Y1S1FC-P22>



The screenshot shows a GitHub Project Board for the repository Y1S1FC-P22. The board is organized into columns for task status: Done, In review, In progress, and Backlog. There are 10 tasks listed, each with a title, assignees, and a status label.

Title	Assignees	Status
1. Research IoT Components and Sensors	IT24104140 and lahi2004	Done
2. Software and Framework Research	chamals3n4	Done
3. Setup and Test Body Temperature Sensor (DS18B20)	IT24102625-SLIIT and IT24104019	In review
4. Setup and Test Pulse Sensor	IT24102625-SLIIT and IT24104019	In review
5. Integrate LCD Display for Real-Time Data Output	chamals3n4 and IT24104019	Backlog
6. Transmit Data from ESP32 to Supabase	chamals3n4, IT24104140, and lahi2004	In progress
7. Setup Supabase	IT24104140	In review
8. Develop Web Application	chamals3n4	Backlog
9. Implement Scheduled Messaging Task on Choreo	chamals3n4	In progress
10. Deploy System on Choreo	chamals3n4	Backlog

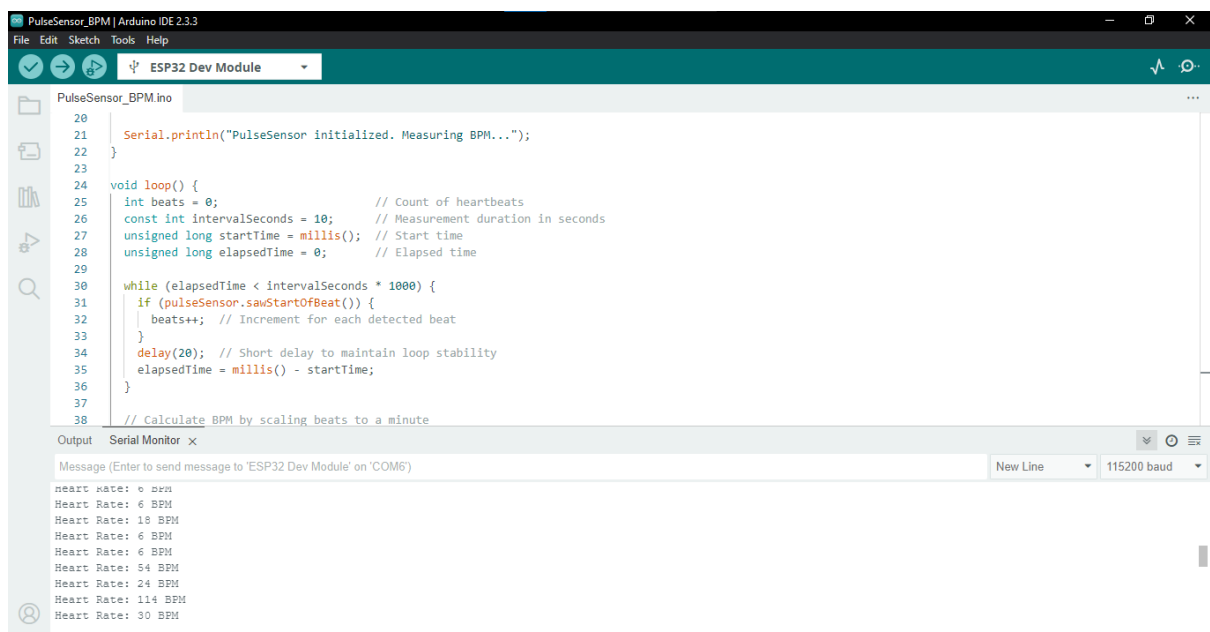
# Project Progress

## 1. Hardware Research

The first step was researching suitable hardware components for the project. We conduct research on the internet and using tools and forums like Perplexity and Arduino Forum to identify the most recommended and accurate sensors for body temperature and pulse rate measurements. Based on our findings we selected the DS18B20 and Pulse Sensor for each measurement.

## 2. Sensor Setup and Testing

We Connected both sensors individually and tested it accuracy under different conditions and, they provided stable reading to the serial monitor

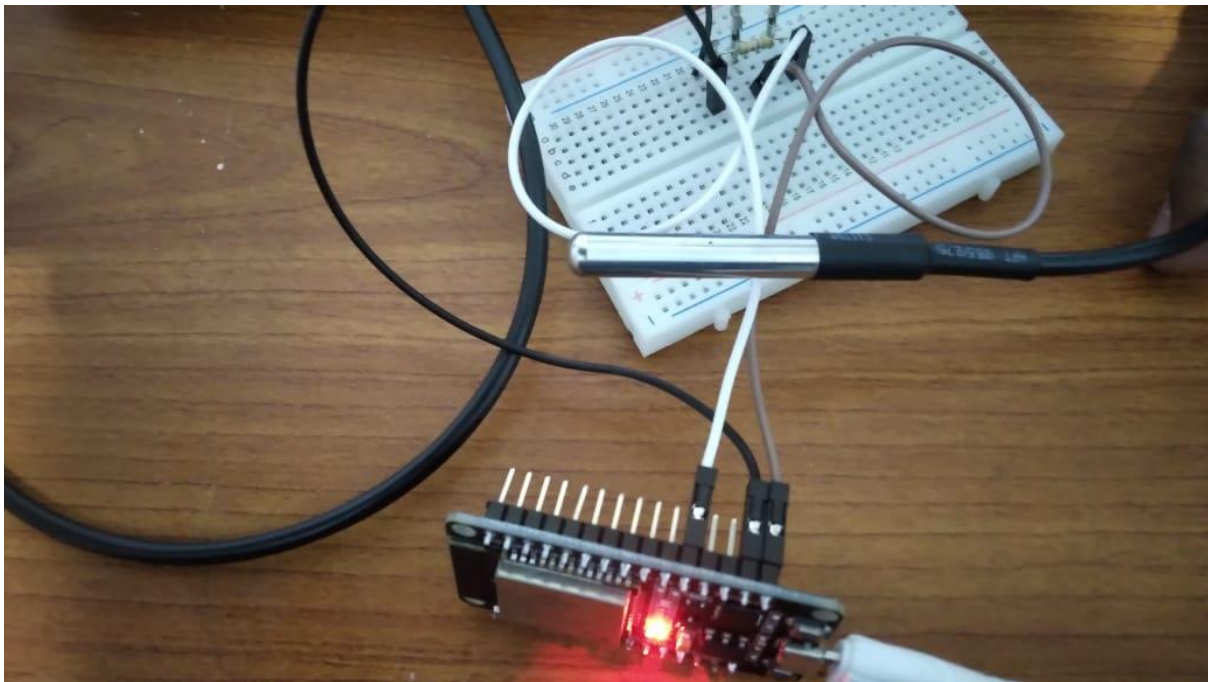
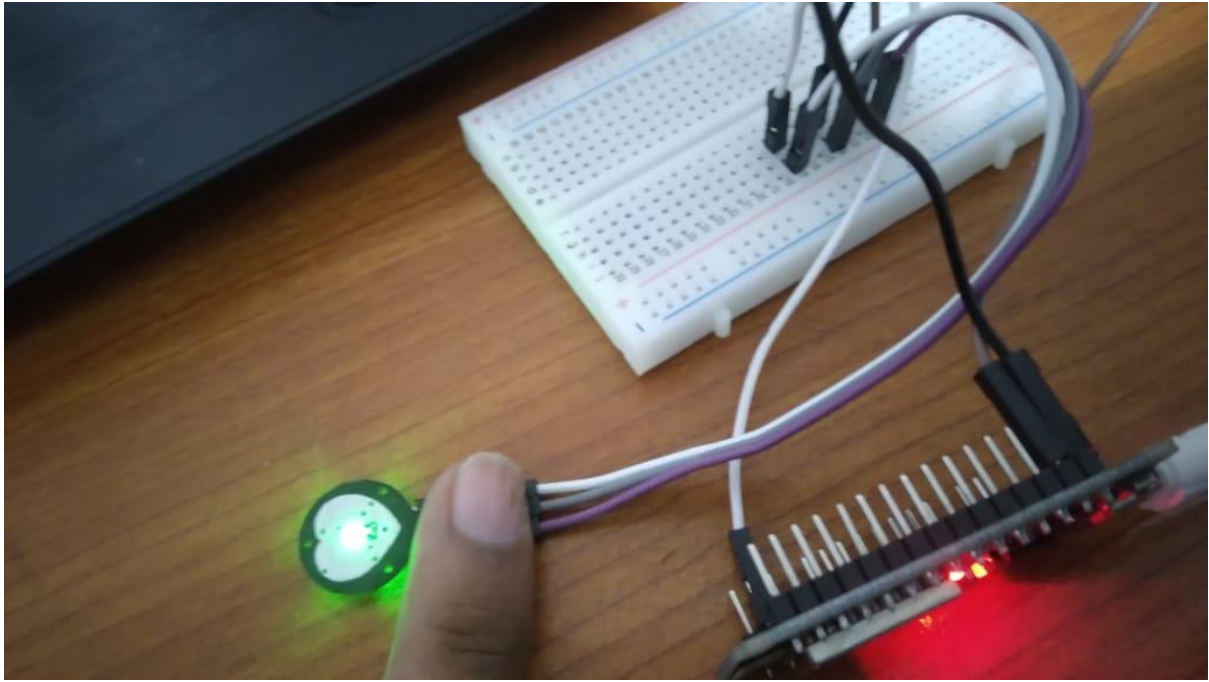


The screenshot displays the Arduino IDE interface. The top menu bar includes File, Edit, Sketch, Tools, and Help. The toolbar shows icons for opening files, saving, compiling, and uploading. The main editor window displays the code for 'PulseSensor\_BPM.ino'. The code includes a setup function that initializes the serial port and a loop function that measures heart rate using a pulse sensor. The Serial Monitor at the bottom shows the output of the program, displaying heart rate readings in BPM.

```
20
21   Serial.println("PulseSensor initialized. Measuring BPM...");
22 }
23
24 void loop() {
25   int beats = 0; // Count of heartbeats
26   const int intervalSeconds = 10; // Measurement duration in seconds
27   unsigned long startTime = millis(); // Start time
28   unsigned long elapsedTime = 0; // Elapsed time
29
30   while (elapsedTime < intervalSeconds * 1000) {
31     if (pulseSensor.sawStartOfBeat()) {
32       beats++; // Increment for each detected beat
33     }
34     delay(20); // Short delay to maintain loop stability
35     elapsedTime = millis() - startTime;
36   }
37
38   // Calculate BPM by scaling beats to a minute
```

Serial Monitor Output:

```
Heart Rate: 0 BPM
Heart Rate: 6 BPM
Heart Rate: 18 BPM
Heart Rate: 6 BPM
Heart Rate: 6 BPM
Heart Rate: 54 BPM
Heart Rate: 24 BPM
Heart Rate: 114 BPM
Heart Rate: 30 BPM
```



### 3. Data Transmission to Supabase

As mentioned earlier, we successfully tested the body temperature and pulse sensors **individually** to verify their functionality. However, we have not yet integrated both sensors with the **ESP32** for real-time data transmission to Supabase.

To ensure the data transmission flow works, we add some mock data to Arduino IDE and then those data was transmitted to the Supabase database using the **ESPSupabase** Library through a REST API. After doing this test we verified that the data transmission works well.

```
// Import WiFi and ESPSupabase Library
#include <WiFi.h>
#include <ESPSupabase.h>

// Add you Wi-Fi credentials
const char* ssid = "YOUR SSID";
const char* password = "YOUR PASSWORD";

// Supabase credentials
const char* supabaseUrl = "YOUR SUPABASE URL";
const char* supabaseKey = "SUPABASE ANON KEY";

Supabase supabase;

void setup() {
    Serial.begin(115200);

    // Connect to Wi-Fi
    WiFi.begin(ssid, password);
    while (WiFi.status() != WL_CONNECTED) {
        delay(1000);
        Serial.println("Connecting to Wi-Fi...");
    }
    Serial.println("Wi-Fi connected!");

    // Init Supabase
    supabase.begin(supabaseUrl, supabaseKey);

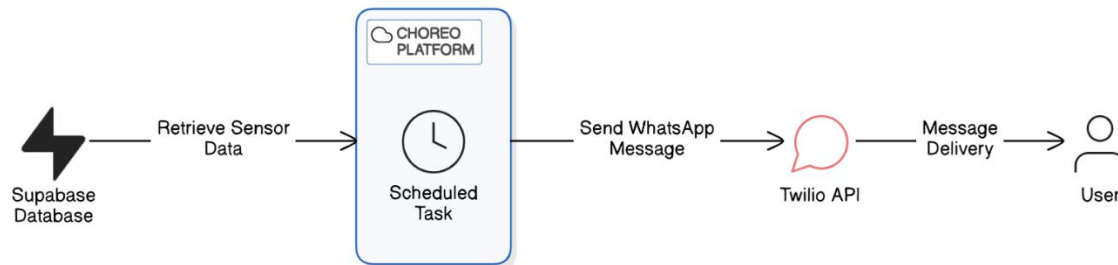
    // Add the table name here
    String tableName = "healthdata";
    // change the correct columns names you create in your table
    String jsonData = "{\"heartrate\": \"70\", \"bodytemp\": \"37\"}";

    // sending data to supabase
    int response = supabase.insert(tableName, jsonData, false);
    if (response == 200) {
        Serial.println("Data inserted successfully!");
    } else {
        Serial.print("Failed to insert data. HTTP response: ");
        Serial.println(response);
    }
}

void loop() {
}
```

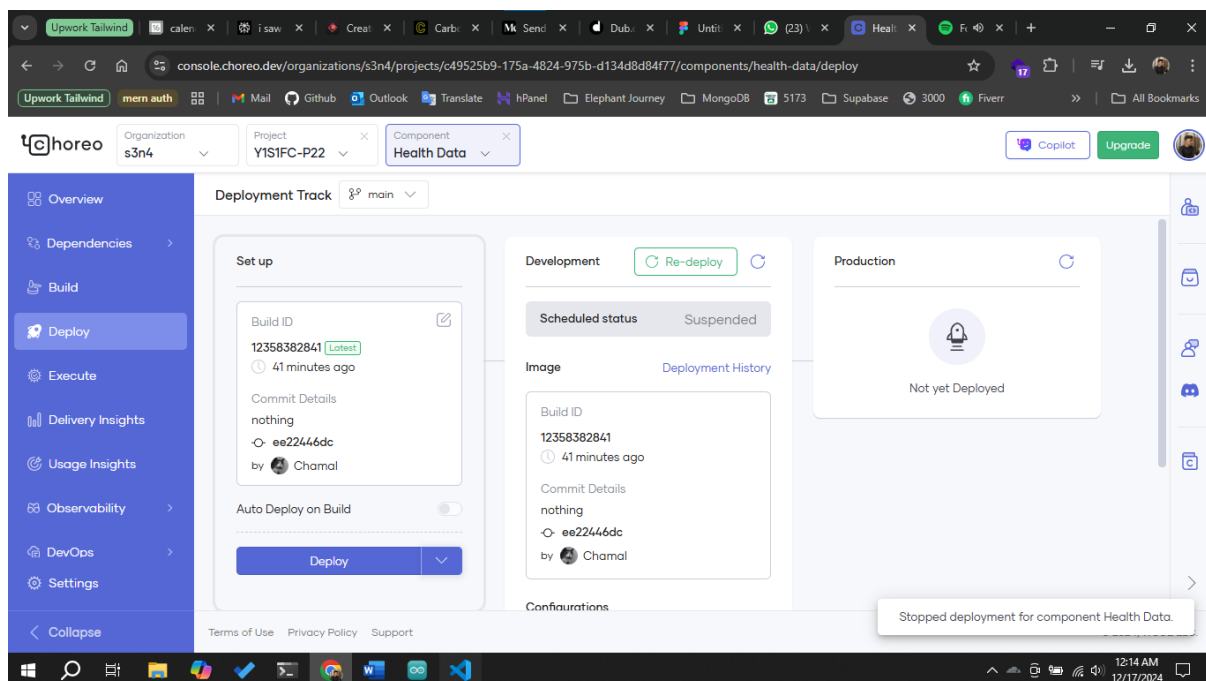
## Scheduled Task and WhatsApp Messaging

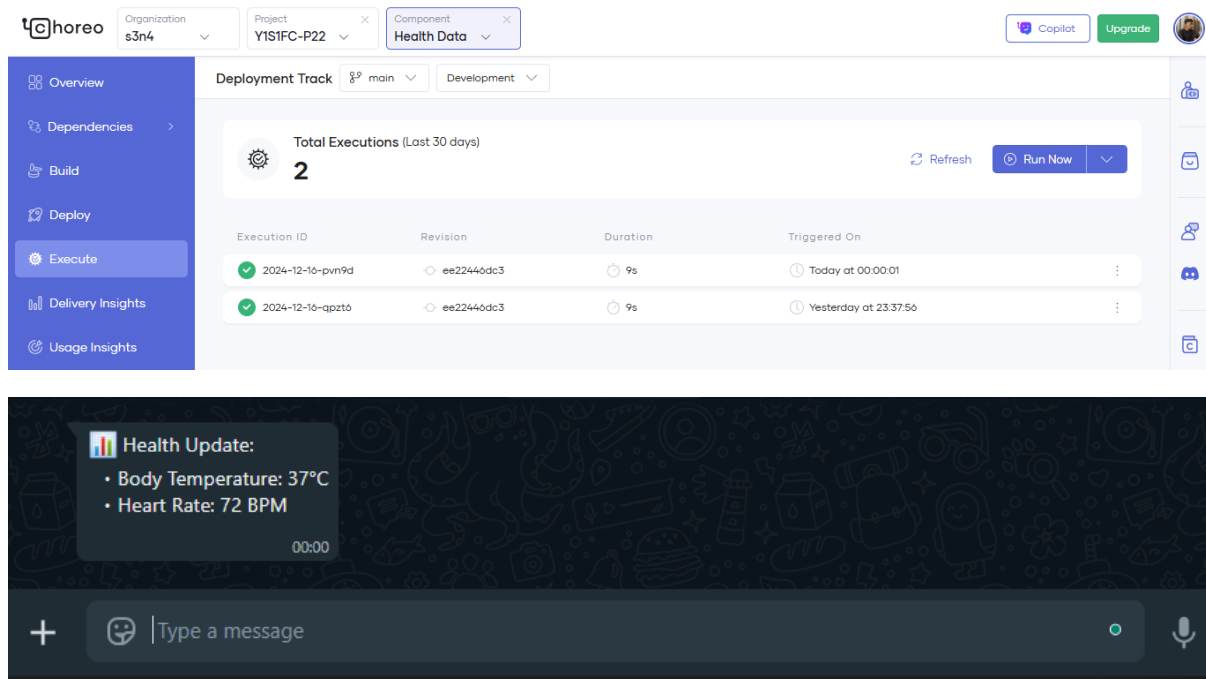
Another feature we tested out and confirmed was Schedule Messaging. In this user can get the data he tested out using sensor through a WhatsApp message.



*\*In the proposal we said that we are going to send this data through an email service, but after doing some UX stuff, we decided to go with WhatsApp because most people don't check emails regularly.*

For the also we used a similar approach we did in the above task, that is we fetch the mockup data, that we stored on our database, and using that data, we try to send WhatsApp messages with Twilio Message API. After that we deployed this into WSO2 Choreo as a Schedule Task Component, and it Successfully Send the data to Whatsapp.





These are the stuff we completed until this stage, and now here are the things we need complete to go for the FINAL STAGE

- Connecting 16x2 LCD Display to ESP32 Microcontroller and Show Real Time Health Data.
- Connecting Both the sensors to the Microcontroller and transmit the actual data and send schedule messages.
- Building the Web Application (We completed the designing of the UI for this).
- Integrating LLM /w Schedule Message. For this we are going to use either Grok (Elon's OPEN-SOURCE MODEL) or GPT (Sam's CLOSED MODEL)

Here are some articles, and code lines wrote along with this project by our member (S3n4)

- How to Send Data from ESP32 to Supabase – <https://chamalsena.medium.com/send-data-from-esp32-to-supabase-bb296bdb8e68>
- Implementing Choreo Schedule Task - <https://github.com/chamals3n4/choreo-scheduled-whatsapp>