Sri Lanka Institute of Information Technology

IT1040 - Fundamentals of Computing

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BodySQL
Real-Time Health Monitoring System with
Daily Insights and Alerts

Proposal Document

Group ID – P22

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1. Background

BodySQL will help people who are in rural areas to check their health risk quickly and easily. Many people who are in those areas hard to visit doctors regularly because hospitals are too far away. By using Internet of Things (IoT) and Cloud technology, our product provides simple way for peoples to track their important health data. Quick updates about health data can help individuals make informed decisions about their care, even when they are far from hospitals. We think that this approach can benefit those who are in remote areas.

2. Problem and Motivation

- Problem - Getting good healthcare is hard for people who are living in rural areas. These areas don't have enough doctors or hospitals nearby, and people need to go long distances just for basic health checks. Research by the North Carolina Rural Health Program shows that many rural areas are marked as Health Professional Shortage Areas (HPSAs) [1] . Regular health checks are difficult to get in these areas. Many people don't know about their health problems until they become serious, making treatment more difficult and expensive.

- Motivation – Our Goal is to make healthcare easier for people living in rural areas. Many of these individuals have difficulty getting quick medical help because there are often not enough doctors nearby. This can lead to delays in receiving essential care. By providing a system that allows for real-time health monitoring, we can help people keep track of important health signs, such as body temperature and heart rate, from their homes.

3. Aim and Objectives

- **Aim** – Building a health monitoring system that use sensors to collect health data such as body temperature and heart rate, and display those reading on LCD display, we need to make this more user friendly with an LCD display for real-time readings and a web app for to visualize health information's.

- **Objectives**

  1. Implement IoT sensors to monitor health info such a body temperature and heart rate and store these data securely in a cloud database.
  2. Send scheduled daily alerts via Email/WhatsApp, shares health details from the previous day.

3. Integrate LCD display that shows real-time reading f body temperature and heart rate directly
4. Develop a user-friendly web application that allows users to visualize their health data and track changes over time.

4. System Diagram
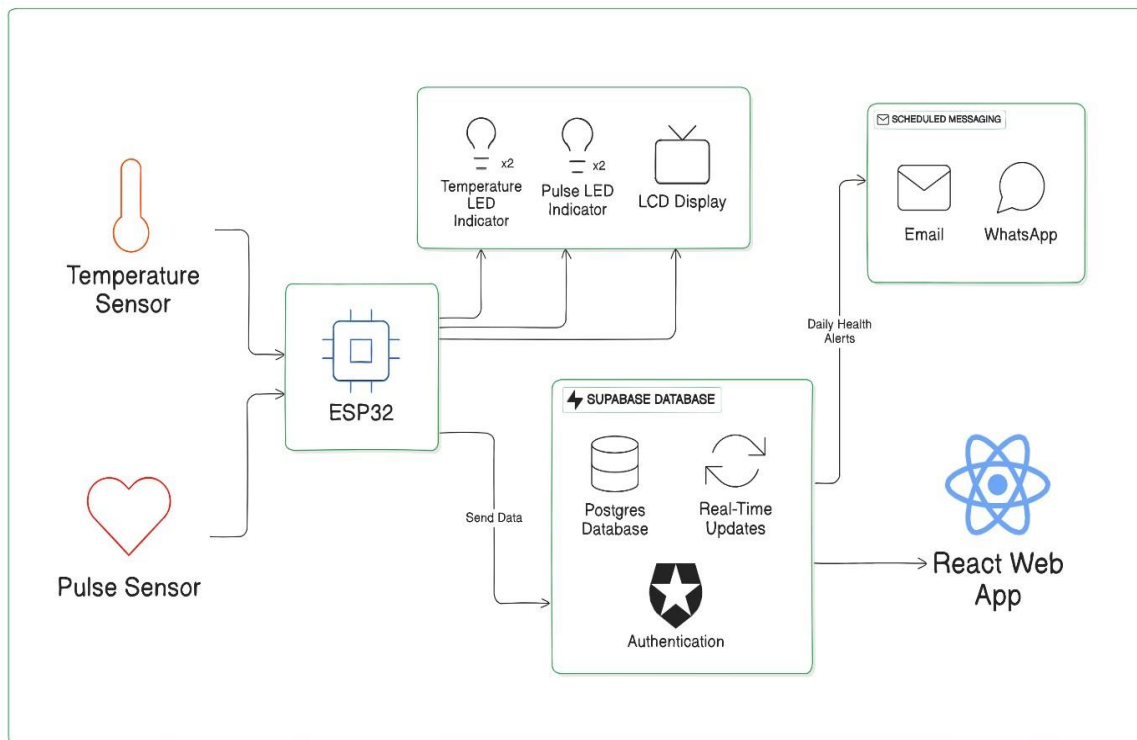
This system uses sensors to collect body temperature and heart rate from the users, then the data collected from these sensors will transmitted to the ESP32 microcontroller, then the LCD display will display the reading we got from these sensors, along with that, we have two separate LED indicators for each of these sensors to indicate whether it's a normal or abnormal result, in the Software Section we fetch the data from ESP32 and store it on the cloud database, using that data we are going to create a web application to visualize these data, also we are planned to send daily insights to the users through WhatsApp or Email this will include the previous day checkups with a LLM based medical advice according to that readings.

5. Methodology

Hardware Components

- Sensors: We will use two main sensors. The DS18B20 Temperature Sensor will measure body temperature, and the Pulse Sensor will check heart rate.

- Microcontroller: We use ESP32 to collects the data from the sensors and then sends it to our cloud DB. The main reason we choose ESP32 is it's available built-in Wi-Fi availability which is easier for us.
- LCD Display: 16x2 LCD display will show real-time temp and heart rate readings.
- LED Indicators: There are two separate LEDs for each sensos. If a reading goes above normal level, the related LED lights (RED) up to warn the user.

Software Components
- **Supabase**: Supabase will be our cloud database. It's built on Postgres, which is a highly reliable database system, so it can handle large amounts of data safely. real-time data capabilities easier for to implement this. [2]
    - Database: It stores all health data securely so users can access their information whenever they need it.
    - Authentication: Only authorized users can see the data, which is essential for privacy. Supabase has built-in authentication (RLS), so users need to log in to access the data.
- **React**: We will build our web application using React, it is a popular JavaScript library for creating user-friendly web applications [3]. React helps organize health data so users can easily view and understand it. The dashboard is designed to show clear, easy-to-read charts and summaries of health data, allowing users to monitor their health over time.

- **WSO2 Choreo** – We will use WSO2 Choreo to deploy out web application to the internet, Choreo empowers to seamlessly design, develop, deploy, and govern your cloud native applications, unlocking innovation while reducing time-to-market. [4]

6. Evaluation

To make sure everything works well, we will first check if our sensors give the same readings as normal medical devices. We will also make sure the temperature and heart rate shown on the LCD screen match what users see on web app.

Since internet can be slow in some areas, we will test our system with poor internet connections to make sure it still works. Also, we will ask different people, from young to old, to try using both our device and webapp. Their feedback will help us make the system easier for everyone to use.

With all these careful tests and improvements, we believe our health monitoring system will help many people get better healthcare, potentially saving lives by catching health problems early.

References

[1] T. University, "publichealth.tulane.edu," 17 January 2023. [Online]. Available: https://publichealth.tulane.edu/blog/how-to-improve-health-care-in-rural-areas/.

[2] Supabase, "Supabase | Open Source SQL Database," 2019. [Online]. Available: https://supabase.com/database.

[3] Meta Open Source, "React," 29 May 2013. [Online]. Available: https://react.dev/.

[4] WSO2 LLC, "What is Choreo?," 2024. [Online]. Available: https://wso2.com/choreo/docs/what-is-choreo/.