

CS 578 WIRELESS NETWORKS PROTOTYPE PROJECT

PiBLE
REMINDER SYSTEM

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TOPIC MOTIVATION

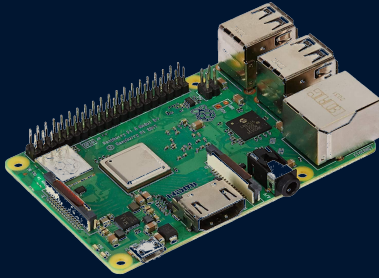
In today's world, society live their lives with a busy schedule. Many of us work and are students. We live our lives trying to accomplish tasks throughout the day and often times tend to forget.

Potential Target Audience(s)

1. Students who need reminders before leaving home
2. Those with cognitive disabilities who live alone
3. Elderly who live alone
4. Everyday busy professionals who forget to complete tasks

HARDWARE COMPONENTS

Raspberry Pi 3 Model B+



- Offers integrated WiFi (2.4GHz/5GHz) and Bluetooth capabilities.
- Offers ability to host a local web server for a mock GUI.

ROADOM 7" Touch Screen



- Offered visuals for desktop mode to multitask.
- Connected using:
 - 3 pin GPIO cable
 - MicroUSB to USB-A

SOFTWARE COMPONENTS



Operating System

Debian Linux 12 (Bookworm)



Remote Software

VNC Viewer by RealVNC



Text Editor(s)

Geany and Visual Studio Code



Notification Software

If This Then That (IFTTT)



Libraries/Frameworks

Flask and Bleak

The Process

Web Server Initialization

- **Start Web Server:**
 - `run python app.py`
 - Launches Flask web server which serves the GUI.
 - `app.py` connects to `reminders.json` to fetch or save reminder data.
- **Access GUI (via Pi):**
 - **URL:** `localhost:5000`
 - **Purpose:** Provides a user interface to view and set reminders.

Bluetooth Device Monitoring

- `python ble.py`
- **Function:** Monitors the receive signal strength indicator (RSSI) to determine the proximity of the connected Bluetooth device.
- No need for continuous connection; tracking is done via MAC address.

IFTTT Notification Setup

- **Trigger Setup:**
 - **Condition:** Webhook request made triggered by device disconnect ie. RSSI threshold
 - IFTTT sends a notification to IFTTT app.
- **Customization:**
 - **Fallback:** Sends a generic alert if no specific reminders are found in `reminders.json`.

RESULTS

Our goals of **Notification Timeliness** and **Proximity Detection Accuracy** were met.

- **Notification Timeliness** - IFTTT sends notifications via webhook.
 - A HTTP POST request to the IFTTT Webhook URL through the **send_ifttt_notification** function in the ble python script.
- **Proximity Detection Accuracy** - Bleak's BleakScanner is able to use BLE advertisements to track device's RSSI.
 - Threshold can be configured in **monitor_ble_device** function in ble python script.

OBSTACLES/IMPROVEMENTS

- **School Network**

Ideally this will be on a personal network where the device can be accessed through port forwarding.

Work primarily completed through remote access with the help of VNC viewer to test network limitations and real-world situations.

- **Mobile App Creation**

Cost and time constraints to publicly publish an app to interface with script.

- **Sending Notifications**

Choosing between FCM, SMS via email, IFTTT.