Smart Alarming IoT-Based System Using Raspberry Pi 4

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1. Introduction

This project focuses on **message transmission** using **Blynk**, **Twilio**, and an **SPI TFT display** integrated with a **Raspberry Pi 4**. The system allows a user to send a message via the Blynk app, which is received by the Raspberry Pi, displayed on the **1.8" SPI TFT LCD**, and forwarded as an SMS using **Twilio API**. Challenges included setting up SPI communication, ensuring reliable message transmission, and handling delays in network communication. The implementation also required GPIO handling for LED notification upon message reception.

2. Components Used

- **Raspberry Pi 4**
- **1.8" SPI TFT LCD (ST7735)**
- **Internet Connectivity (WiFi)**
- **Twilio Account for SMS transmission**
- **Blynk IoT Platform**
- **LED Indicator**
- **Power Supply (5V, 2.5A)**

3. System Architecture

- **User inputs message** via the **Blynk mobile app**.
- **Raspberry Pi receives** the message and **displays it** on the **TFT screen**.
- The same message is **forwarded via Twilio** as an SMS to a designated phone number.
- An **LED blinks** to indicate message reception.
- The system ensures **real-time message transmission** using the **SPI protocol** for display and **Twilio API** for SMS.

4. Software and Tools Required

- **Raspberry Pi OS (Debian-based)**
- **Python 3.9**
- **Blynk Python Library**
- **Twilio API**
- **Pillow (PIL) for Display Handling**
- **ST7735 Python Library for SPI TFT**
- **RPi.GPIO for GPIO Handling**