Wireless Emergency Pager System using ESP8266

1. Introduction

In restricted environments such as hospitals, laboratories, and industrial facilities, mobile phone usage is often prohibited. This project presents a Wireless Emergency Pager System using ESP8266 microcontrollers and ESP-NOW communication protocol to enable emergency alerts without internet or mobile networks.

2. Objectives

• Design a wireless alert system without internet
• Enable emergency communication in restricted areas
• Ensure low latency and reliable data transfer
• Build a low-cost and portable solution

3. System Architecture

Keypad → ESP8266 (Sender) → ESP-NOW → ESP8266 (Receiver) → OLED Display + Buzzer

4. Communication Protocol

ESP-NOW is a peer-to-peer wireless communication protocol developed by Espressif. It operates at 2.4 GHz and does not require a router or internet connection. It provides low latency, low power consumption, and supports broadcast communication.

5. Hardware Components

Sender Unit:
• ESP8266 (NodeMCU)
• 4×3 Matrix Keypad
• OLED Display (SSD1306)

Receiver Unit:
• ESP8266 (NodeMCU)
• OLED Display (SSD1306)
• Passive Buzzer

6. Connection Details

OLED Connections (Sender & Receiver):
VCC → 3.3V
GND → GND
SDA → D2
SCL → D1

Keypad Connections (Sender):
R1 → D1
R2 → D2
R3 → D3
R4 → D4
C1 → D5

C2 → D6
C3 → D7

Buzzer Connections (Receiver):
Signal → D5
GND → GND

7. Working Principle

The user inputs a message using the keypad. The ESP8266 sender transmits the message character-by-character using ESP-NOW. The receiver buffers the message, displays it on the OLED, and activates the buzzer for alert.

8. Communication Range

Open Area: 100–150 meters
Indoor: 50–60 meters

9. Applications

• Hospitals
• Laboratories
• Industrial plants
• Exam halls
• Emergency alert systems

10. Conclusion

The Wireless Emergency Pager System provides a reliable emergency communication solution for restricted environments. ESP-NOW ensures fast and infrastructure-free wireless communication.

11. Team Members

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