STTHK 3133

SENSOR-BASED SYSTEMS

GROUP A

FINAL PROJECT ASSIGNMENT

SEMESTER A242

TITLE:

SMART CLASSROOM SAFETY MONITOR USING FLAME AND PIR SENSORS

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1. Project Title

Smart Classroom Safety Monitor Using Flame and PIR Sensors

2. Project Description

Problem Statement

Rooms, especially in homes, dorms, or offices, can become hazardous when fire breaks out unnoticed or unauthorized motion occurs in restricted areas. Many safety systems are either costly, complex, or not integrated for small smart rooms. There is a need for a compact, low-cost, real-time system to detect fire hazards and human motion, display environmental data, and trigger alerts.

Objective

To design and implement a smart classroom safety monitoring system that:

- Detects flame/fire inside a room
- Senses motion or presence of people
- Displays safety warnings and environmental data like temperature and humidity on an OLED screen
- Activates an alarm using a relay module when danger is detected
- Sends real-time alerts to a web interface for remote monitoring

How the Selected Sensors Solve the Problem

- **Flame Sensor**
  Detects infrared light emitted by fire or flame sources. Triggers immediate warning and activates the relay for emergency response.
- **PIR Sensor**
  Detects humans based on motion. Alerts if someone is present in a potentially fire area or enters when they should not.

3. System Architecture

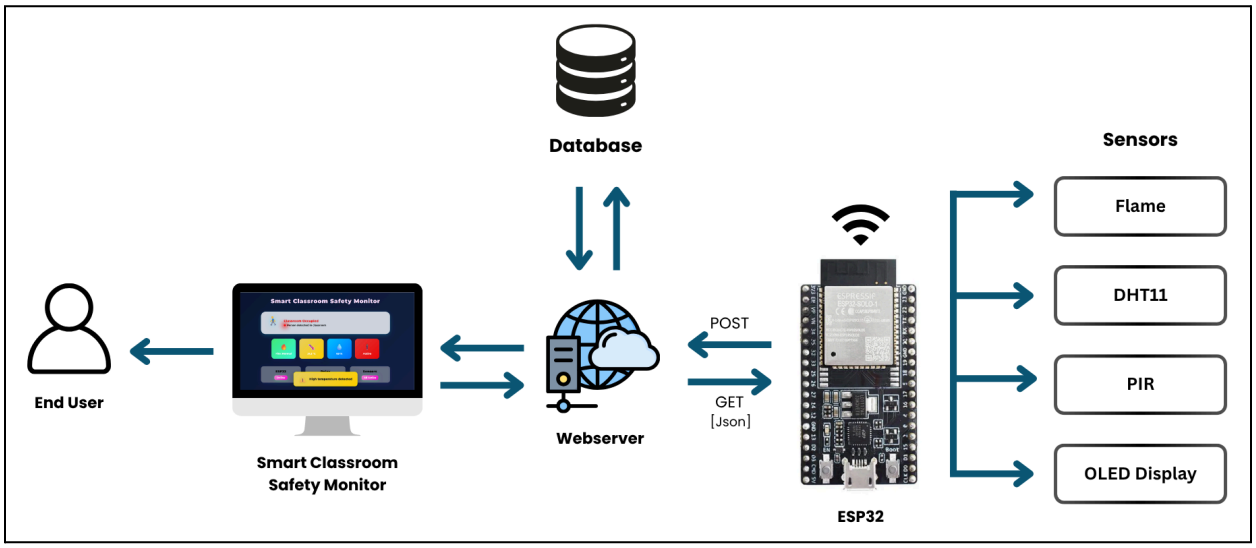

Figure 1. Smart Classroom Safety Monitoring System Architecture

4. Schematic

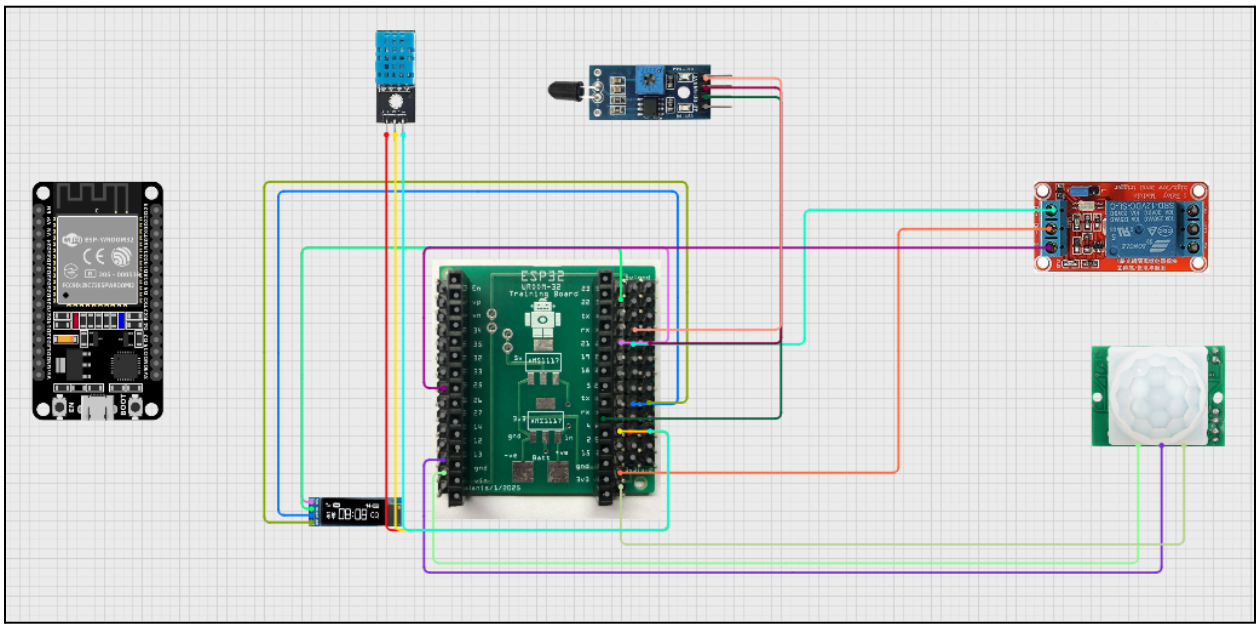

Figure 2. Smart Classroom Safety Monitoring Circuit Diagram

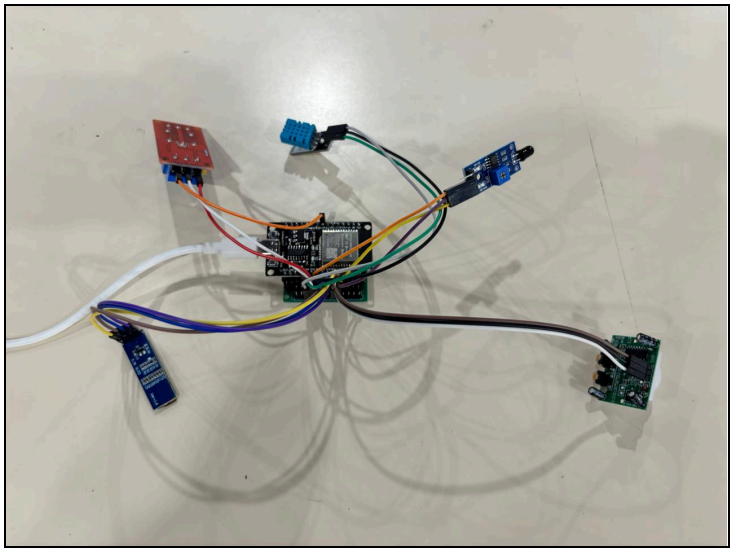

Figure 3. Smart Classroom Safety Monitoring Circuit Diagram

5. Arduino Code

Link to my SensorProject.zip

6. Web App Interface

Figure 4. Interface When Fire Detected

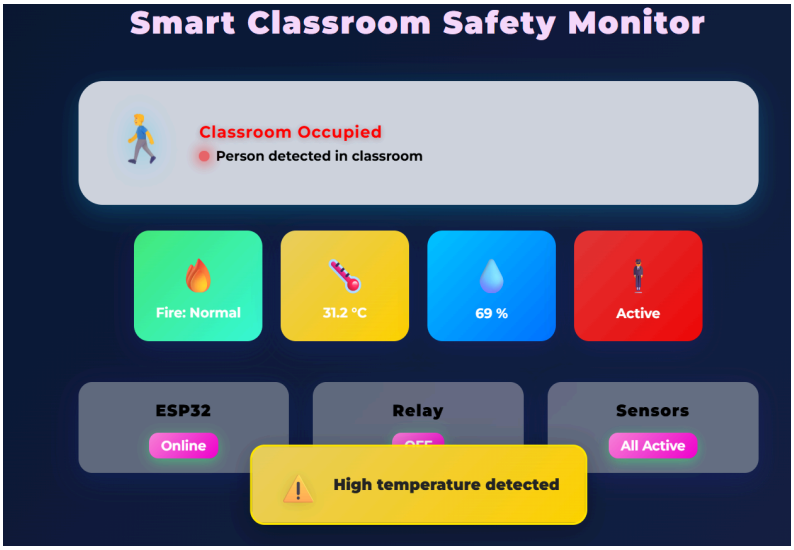

Figure 5. Interface When High Temperature is Detected

Figure 6. Interface When Classroom Is Safe

Figure 7. Manual Relay Control

Web App (HTML + JS)

- Hosted on ESP32 or local network
- Real-time sensor status and manual relay button

Web App for Remote Alerting

To allow users to remotely monitor the room's safety, a simple web will be developed. The interface will display live sensor readings and send alerts in case of fire and when there is motion detected. Also detects if there is a person in the room or not.

Feature	Description
Fire Status	Shows whether flame is detected
Motion Detection	Displays if human movement detected
Temperature & Humidity	Real-time DHT11 sensor data display
Remote Alert	Visual warning when danger is detected
Relay Control	Manual control of alarm remotely

7. YouTube Video

Link to my YouTube Demo is in the comment section at the submission.

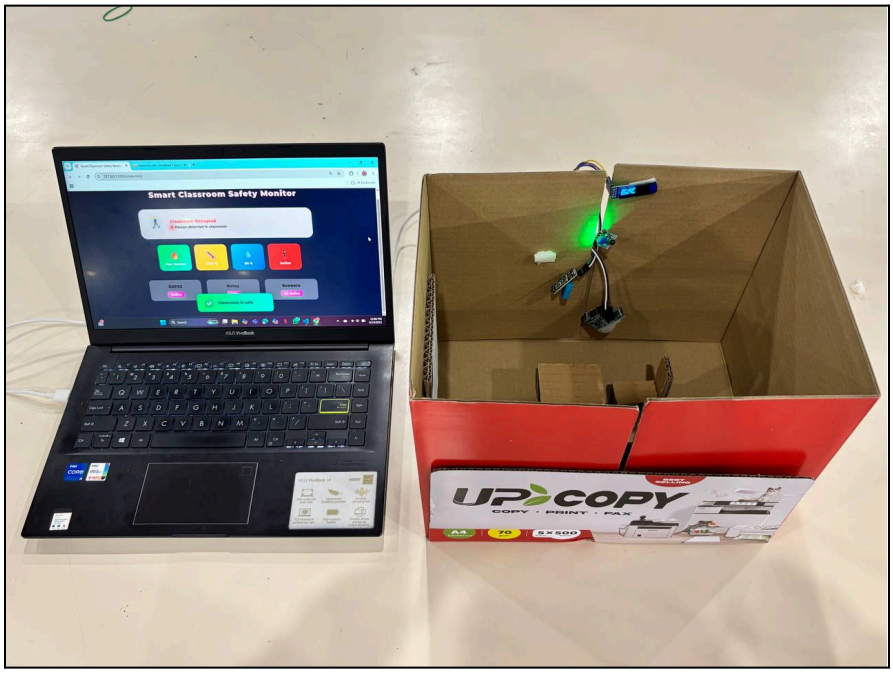

Figure 8. Recording Setup

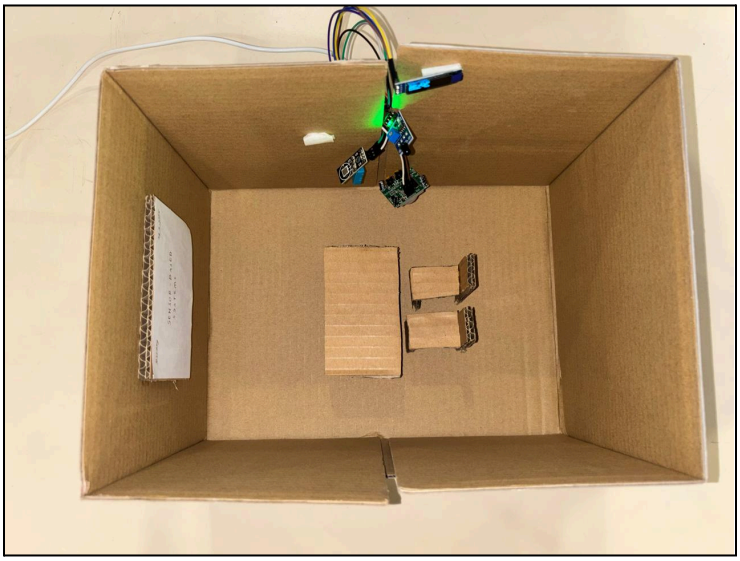

Figure 9. Classroom

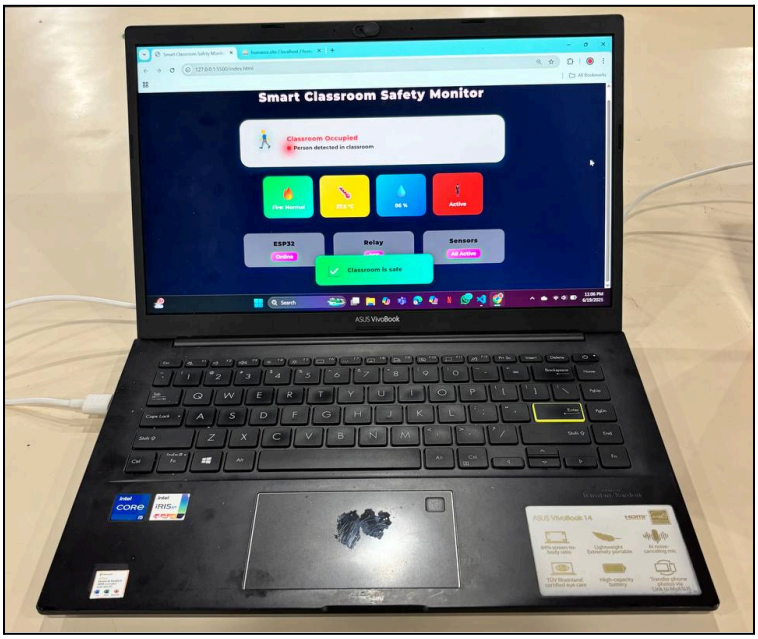

Figure 10. Website From Desktop View