

ESP32-BASED FIRE ALERT SYSTEM

**REAL-TIME FIRE MONITORING AND ALERTING WITH GOOGLE SHEETS &
BLYNK INTEGRATION**

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■ AGENDA OVERVIEW

01 INTRODUCTION

02 PROBLEM STATEMENT

03 PROJECT OBJECTIVES

04 HARDWARE & SOFTWARE
REQUIREMENTS

05 SYSTEM ARCHITECTURE

06 CIRCUIT DIAGRAM

07 WORKFLOW OVERVIEW

08 IMPLEMENTATION &
RESULTS

09 CONCLUSION & Q&A



INTRODUCTION

Fire is one of the most dangerous hazards, especially in homes, hostels, small offices, and remote areas where early detection systems are not always available or affordable. Traditional fire alarm systems can be expensive and often lack real-time remote alerts or logging capability.

This project aims to create a low-cost, IoT-based Fire Alert System using the ESP32 microcontroller and an IR flame sensor. The system detects fire and instantly notifies users through the Blynk mobile application and also logs the incident data in Google Sheets using a webhook. This ensures that fire events are both tracked and responded to in real time – even when the user is not physically present.

Key Features:

- Real-time fire detection using an IR sensor
- Mobile notification via Blynk app
- Data logging to Google Sheets using cloud scripts
- Affordable, easy to set up, and scalable for future enhancements



PROBLEM STATEMENT

Fire-related accidents can occur unexpectedly and often result in significant damage, especially in locations like homes, hostels, and small offices where safety infrastructure may be limited. Traditional fire alarm systems are usually expensive, lack smart connectivity, and cannot notify users remotely. Furthermore, these systems typically do not maintain any logs of incidents for future reference or analysis. This highlights the need for an affordable, automated fire alert solution that not only detects fire promptly but also sends real-time notifications to users and records the event data for tracking and safety audits. Our project addresses this problem by implementing an IoT-based fire alert system using the ESP32 microcontroller and IR flame sensor, integrated with the Blynk app and Google Sheets for smart monitoring and logging



PROJECT OBJECTIVES



- To develop a real-time fire detection system using ESP32 and an IR flame sensor
- To instantly notify users through the Blynk mobile application when fire is detected
- To automatically log fire detection events into Google Sheets using Webhooks and Google Apps Script
- To build a compact, low-cost, and easy-to-install safety solution
- To improve safety in environments like homes, hostels, and small offices where advanced fire systems are not available
- To demonstrate how IoT can be effectively used for smart fire monitoring and alert systems

HARDWARE & SOFTWARE REQUIREMENTS

01

HARDWARE REQUIREMENTS:

1. ESP32 Microcontroller
2. IR Flame Sensor
3. Breadboard
4. Jumper Wires
5. LED
6. Power Supply (5V)
7. Wi-Fi Module (Integrated with ESP32)

02

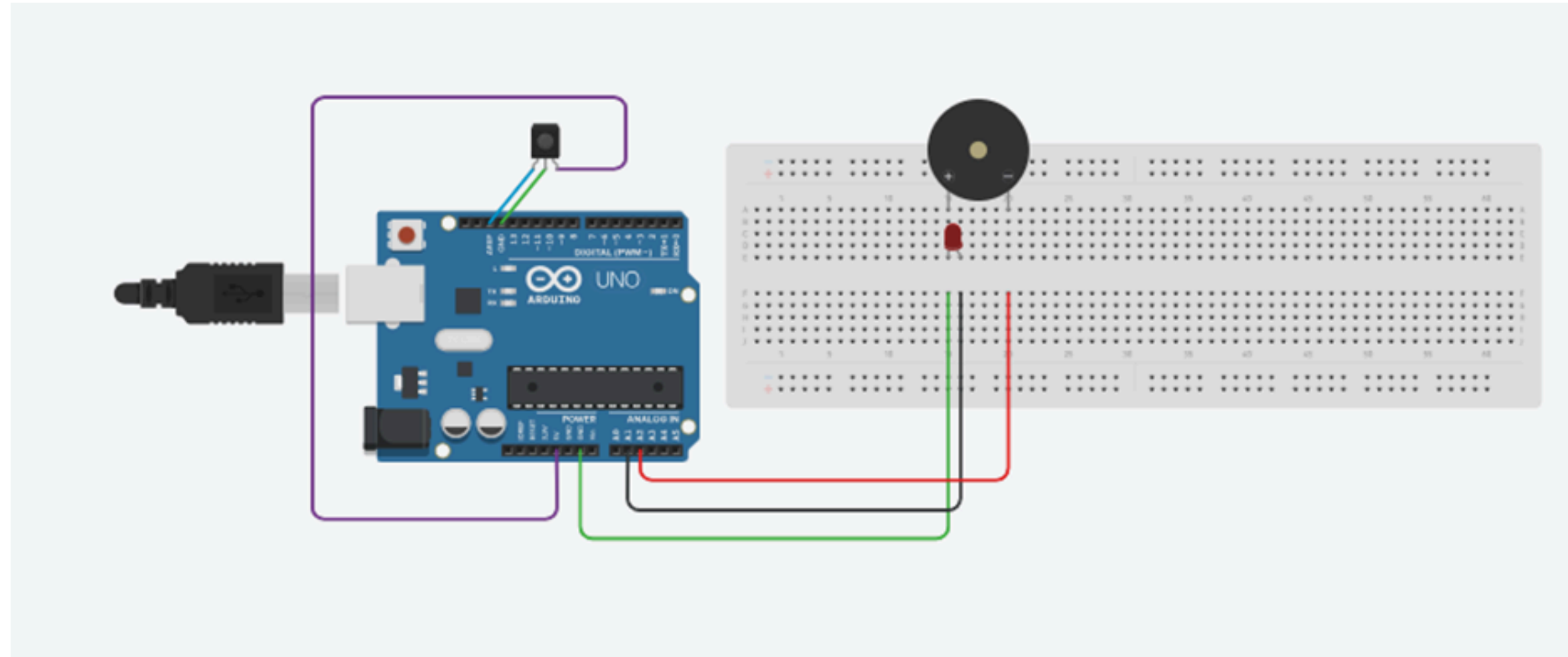
SOFTWARE REQUIREMENTS:

- Arduino IDE
- Blynk IoT Platform
- Google Sheets
- Google Apps Script
- Wi-Fi Network
- ESP32 Board Library for Arduino IDE
- Webhook Integration

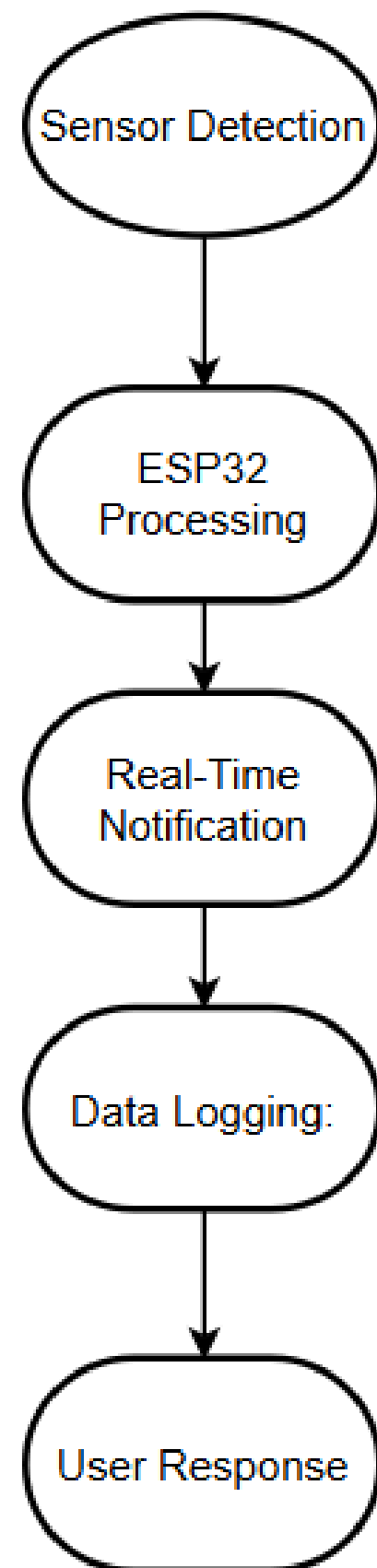
SYSTEM ARCHITECTURE

- **IR Flame Sensor:** Detects infrared radiation from fire and sends signals to ESP32.
- **ESP32 Microcontroller:** Processes the sensor data and determines whether a fire is detected.
- **Wi-Fi Module (ESP32):** Enables internet communication to send alerts and log data to Google Sheets.
- **Blynk Mobile App:** Receives real-time fire alerts from ESP32, notifying users of the incident.
- **Google Apps Script:** Handles the Webhook, pushing fire event data into Google Sheets for logging.
- **Google Sheets:** Stores the data from the fire events, including time and date, for later reference

CIRCUIT DIAGRAM



WORKFLOW OVERVIEW:





- The IR flame sensor detects the presence of fire by sensing infrared radiation.
- The ESP32 microcontroller reads the sensor data and checks for fire conditions.
- If fire is detected, the ESP32 sends a real-time alert to the user via the Blynk mobile app.
- Simultaneously, the ESP32 triggers a Webhook that logs the event details in Google Sheets.
- The user receives the alert and can immediately act, while the system continues monitoring.

IMPLEMENTATION & RESULTS:

- Built the circuit using ESP32 and IR flame sensor on a breadboard
- Programmed the ESP32 using Arduino IDE
- Integrated Blynk IoT platform for real-time fire alerts on mobile
- Connected Google Sheets via Webhook and Google Apps Script for data logging
- Tested with flame source; sensor successfully detected fire
- ESP32 triggered instant notification to Blynk app
- Fire events were correctly logged into Google Sheets with date and time
- System responded quickly and accurately in all test cases
- Proved to be a low-cost, reliable, and scalable fire alert system
- Ideal for use in homes, hostels, and small spaces lacking smart fire safety

CONCLUSION & Q&A:

- Successfully developed a low-cost IoT-based fire alert system
- Detected fire in real-time using an IR flame sensor and ESP32
- Instantly notified users via Blynk mobile app
- Logged fire events in Google Sheets using Webhook and Apps Script
- System proved efficient, reliable, and scalable for small environments
- Enhances fire safety in homes, hostels, and remote areas



THANK YOU