IoT Based Fire Detection and Alert System

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Abstract -An IoT Based Fire Detection and Alert System is designed to detect fire hazards at an early stage and send immediate alerts to users through the internet. The system uses sensors such as a temperature sensor and flame sensor connected to a Node MCU (ESP8266) microcontroller. These sensors continuously monitor environmental conditions and detect abnormal increases in temperature or the presence of flame. When a fire is detected, the system activates a buzzer and LED indicators for local warning and sends a real-time notification to the user's mobile device through the Blynk IoT platform via Wi-Fi. This helps in providing quick response and preventing major damage to property and life. The proposed system is low-cost, easy to implement, and suitable for homes, offices, and industrial environments. The integration of IoT technology enables remote monitoring and improves the efficiency and reliability of fire safety systems.

I. INTRODUCTION

Fire accidents are one of the major causes of damage to life and property in residential, commercial, and industrial areas. Many fire incidents occur due to electrical faults, gas leakage, overheating of equipment, or human negligence. In many cases, the damage becomes severe because the fire is not detected at an early stage. Therefore, an effective system for early fire detection and quick alert notification is very important to reduce the risk of fire disasters. Traditional fire detection systems mainly use smoke detectors or manual alarms. These systems can detect fire locally, but they do not provide remote monitoring or instant notifications to users when they are away from the location. With the advancement of Internet of Things (IoT) technology, it has become possible to monitor environmental conditions and control devices remotely through the internet. The IoT based Fire Detection and Alert System is designed to detect fire and abnormal temperature conditions using sensors and send alerts to users through a mobile application. In this system, a flame sensor and temperature sensor are used to detect fire or high temperature. These sensors are connected to an ESP8266 (NodeMCU) microcontroller, which processes the sensor data and sends it to the internet using a Wi-Fi network. When the system detects fire or a sudden rise in temperature, it activates a buzzer and LED indicator to alert nearby people. At the same time, the system sends a real-time notification to the user's smartphone through the Blynk IoT platform. An LCD display can also be used to show the current temperature and system status.The main objective of this project is to develop a low-cost, reliable, and easy-to-install fire detection system that provides early warning and remote monitoring. This system can be used in homes, offices, laboratories, and industries to improve safety and reduce the risk of fire accidents.

II. SYSTEM OVERVIEW

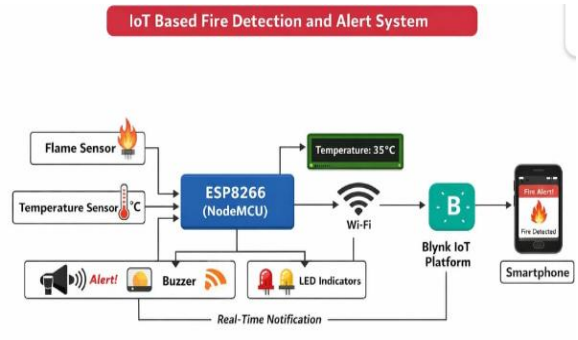
The **IoT Based Fire Detection and Alert System** is designed to detect fire and high temperature at an early stage and immediately notify the user through a mobile application. The system uses sensors, a microcontroller, and internet connectivity to monitor environmental conditions and provide real-time alerts. The main components of the system are **ESP8266 (NodeMCU), flame sensor, temperature sensor, LCD display, buzzer, LEDs, and a Wi-Fi network**. The **flame sensor** detects the presence of fire or flame, while the **temperature sensor** measures the surrounding temperature. These sensors continuously send data to the **ESP8266 microcontroller**. The **ESP8266 (NodeMCU)** processes the sensor data and checks whether the temperature exceeds a predefined threshold or if a flame is detected. If a fire condition is detected, the system immediately activates the **buzzer and LED indicators** to alert people nearby. At the same time, the microcontroller sends the data through Wi-Fi to the **Blynk IoT platform**, which delivers a **notification to the user's smartphone**. An **LCD display** is also connected to the system to show the

real-time temperature value and system status. This allows users to monitor the environmental condition directly at the location. The system provides **continuous monitoring, automatic fire detection, and instant mobile alerts**, which help in taking quick action to prevent fire accidents. The design is **low-cost, reliable, and easy to install**, making it suitable for **homes, offices, and industrial environments**.

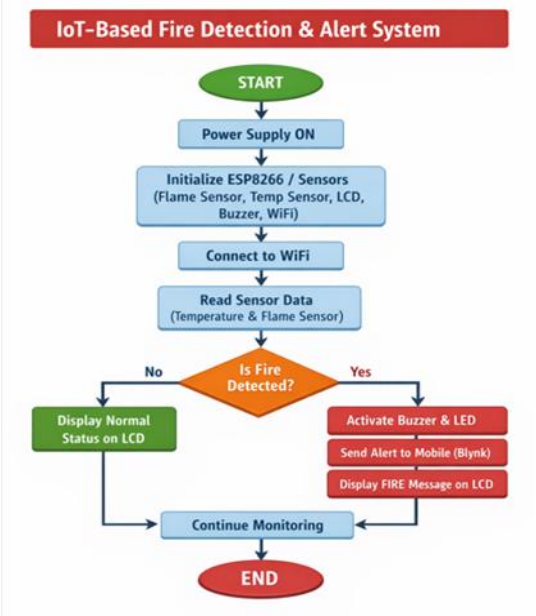
III. PROBLEM STATEMENT

Fire accidents are a major threat to human life and property in residential, commercial, and industrial areas. Many fire incidents occur due to electrical short circuits, gas leakage, overheating of equipment, or human negligence. In many situations, fire is detected very late, which leads to serious damage and sometimes loss of life. Traditional fire detection systems mainly rely on smoke detectors or manual alarms, which only provide local alerts. These systems do not provide remote monitoring or instant notifications to users when they are away from the location. As a result, quick action cannot always be taken to control the fire at an early stage. There is a need for a smart and automated fire detection system that can continuously monitor the environment, detect fire or abnormal temperature in real time, and immediately send alerts to users through the internet. Such a system should be low-cost, reliable, easy to install, and capable of remote monitoring. Therefore, the development of an IoT Based Fire Detection and Alert System is necessary to improve safety by providing early fire detection, automatic alerts, and real-time monitoring through a mobile application. This system helps in reducing fire-related risks and minimizing damage by enabling quick response to fire incidents.

IV. PROPOSED SYSTEM MODEL



V. FLOWCHART



VI. RESULT OF IMPLEMENTATION

VII. ADVANTAGES

1. Early fire detection
2. Instant mobile alert
3. Remote monitoring
4. Quick response
5. Low cost system
6. Automatic alarm
7. Improved safety
8. Real-time monitoring
9. Easy installation
10. Automatic operation

VIII. CONCLUSION

The IoT based Fire Detection and Alert System helps to detect fire quickly using sensors and sends an alert to the user through the internet. It improves safety, reduces damage, and allows fast action during fire accidents. This system is useful for homes, offices, and industries to provide better protection and monitoring. The IoT based Fire Detection and Alert System is a smart safety system that detects fire using sensors and sends an immediate alert to the user through the internet or mobile application. This helps people take quick action to prevent serious damage and protect lives and property. The system is simple, reliable, and cost-effective, making it suitable for homes, offices, and industries. Overall, it improves fire safety by providing early detection and real-time alerts

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