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IoT-Based Fire Alerting System

Aju Krishnan Ak¹, Akash J², Aswin Surendran³, Shyam J⁴, Veena R⁵, Rijul M⁶

UG Student, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri, Kerala,
India Orcid Id: 0009-0002-8009-9612

UG Student, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri, Kerala,
India Orcid Id: 0009-0006-9820-7529

UG Student, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri, Kerala,
India Orcid Id: 0009-0009-3834-9818

UG Student, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri, Kerala,
India Orcid Id: 0009-0000-8566-7338

Assistant Professor, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri,
Kerala, India Orcid Id: 0000-0001-5238-4972

Assistant Professor, Department of Safety and Fire Engineering, Eranad Knowledge City Technical Campus, Manjeri,
Kerala, India

ABSTRACT: A mistake at the place of work is an unexpected, unintentional activity that results in close-to-home cause damage due to the act or behavior of a substance, chemicals, an individual, or radiation. Fire has been the cause of certain accidents. In order to reduce the risk of casualties, fire identifiers are used to identify flames or smoke at their first appearance. Right A temperature and smoke sensor-based IoT alarm system is currently being established. It would use IoT for communicating relevant information to a portable device in addition to alerting users to the possibility of a fire at a particular location. Use of the temperature, smoke, and flame sensors, the Arduino collects the data from these sensors. When the temperature and the smoke approach a particular point, the Arduino initiates the buzzer.

KEYWORDS: IoT, Smoke sensor, alarm system

I. INTRODUCTION

The complexity of controlling fire risk levels and fire prevention is rising daily. Situations involving firefighting and monitoring are particularly critical right now.[1] Public safety continues to push for more technological advancements in monitoring and firefighting. They pay particular focus to advancing science and technology to better withstand fire disasters. They are worried about how new technologies like wireless sensor networks and the Internet of Things will be used in the monitoring and firefighting industries. IoT is ideal for firefighting since it has a broad application and works well with wireless sensor networks (WSN).[2] The Internet of Things (IoT) has a high level of intelligence that allows it to maintain a wide range of product categories, quantities, complex fire danger variables, and a wide range of equipment for fire monitoring and fighting.[1] IoT is ideal for firefighting since it has a broad application and works well with wireless sensor networks (WSN).[9] The Internet of Things (IoT) has a high level of intelligence that allows it to maintain a wide range of product categories, quantities, complex fire danger variables, and a wide range of equipment for fire monitoring and fighting. IoT can handle a variety of complicated business information due to its high scalability and resource-sharing features.[3] IoT in conjunction with WSN is crucial for fire alarm and fire control systems. For, hazard source monitoring, fire monitoring, fire-fighting rescue, fire early warning, prevention, and early disposal, IoT technology is merged with firefighting. Effectively used to improve emergency rescue and firefighting skills of the fire department.[4]

II. RELATED WORK

IoT-Based Fire Alarm System. [1] This study helps to understand the basic working principle of IoT-based alarm systems and better explain the construction and hardware of the system. It defines the various uses of IoT and the implementation of the IoT in various applications and use of it. An IoT-based Fire Alerting System: Design and Implementation. [2] In this study present the application of IoT-based systems is extended to real-time detection and warning system. This paper proposes a low-cost yet efficient IoT system called Fire Not for warning and alerting fire incidents. Internet of Things technology for the fire monitoring system. [3] Internet of Things technology fire-fighting, fire monitoring, and safety management system are important applications. Its cusses the IoT system framework for fire-fighting, planning, and monitoring. A smart fire detection system using IoT technology with an automatic water sprinkler. [4] This study aims to implement a smart fire detection system that would not only detect the fire using integrated sensors but also alert property owners, emergency services, and local police stations to protect lives and valuable assets simultaneously.

III. HARDWARE

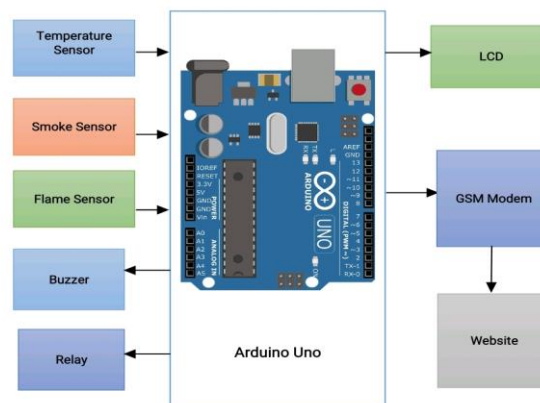


Fig.1 Block diagram

Block Diagram Description

1. Sensors

There are several sensors available for a variety of physical quantities, and their primary application is to transform physical quantities into electrical form.

Smoke Sensor

We have used MQ-2 gas sensor as a smoke sensor. This sensor has a high sensitivity to Carbon Monoxide. The sensor is low-cost and suitable for different applications. This sensor responds quickly and with excellent sensitivity. The sensor's output is an analog voltage.

Flame Sensor

A flame sensor definition is a type of detector that is used to detect as well as react to the occurrence of a fire or flame. A flame sensor frequently responds faster & more precisely as compared to a heat or smoke sensor because of the mechanisms it utilizes to notice the flame. Flame sensors are usually used to verify whether the furnaces are functioning correctly.

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2. Arduino

The Arduino is the component of the project that is most crucial. The task of locating and evaluating the condition of the peripherals falls to the Arduino. It must decide what to do with the linked devices. It is in charge of assigning each job a priority. It is a key component of the system that regulates every circuit activity, including LCD interface and Wi-Fi module communication. The messages that will be displayed on the LCD and their duration are also decided by it. The Arduino includes a single serial connection for data transmission and reception. The simultaneous happening of transmission and receiving is possible. The four communication modes offered by Arduino provide system designers and programmers the chance to create extremely complex data transmission networks. It is the heart of the system which controls all the inputs and the controlling action to be taken at the output. Arduino used here is the Arduino Uno.

3. LCD

We are going to use a 16x2 alphanumeric Liquid Crystal Display (LCD) which means it can display alphabets along with numbers on 2 lines each containing 16 characters. LCD shows various informative and warning messages about the project. Users can read these messages and can get the current status of the project.

4. Buzzer

The buzzer is activated by the microcontroller when any parameter reaches its level. In our project, we used a piezoelectric buzzer. It serves as an alarm signal. The buzzer is driven by a transistor. The buzzer will activate when the sensor value rises over the required value.

5. GSM Modem

GSM modem is the main feature provided for this system. A Global System for Mobile Communications (GSM) modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. A GSM modem accepts a Subscriber Identity Module (SIM) card. It is used as an important enhancement that sends alert SMS to the user. In this, the present readings taken through the sensors are given to the GSM modem so as to send SMS.

IV. INTERNET OF THING

The "Internet of Things" is the extension of Internet connection into physical objects and everyday stuff. These devices can communicate and interact with one another via the Internet and can be watched and controlled from a distance since they are embedded with electronics, Internet connectivity, and other types of technology.[7] An IoT system's sensors and devices "talk" to the cloud via connectivity.[12] Once the data is stored in the cloud, software analyses it to determine whether to do a certain action, such as notifying the user or modifying the sensors and machinery automatically.[8] However, if their involvement is needed or if they simply want to check on the system, a user interface allows them to do so. The user interface, the cloud, and finally back the sensors and devices receive any modifications or actions the user performs before being routed through the system in the opposite direction to effect the desired change.[10]

GSM modem used for IoT interfacing

Benefits of using GSM modem for IoT

1. Easy to develop and a popular choice among both hobbyists and product developers.
2. Extensive features including voice calls, SMS, and internet access.
3. Small size is ideal for portable products and wearable tech.
4. Very affordable module.

Pin connection

Insert the SIM card into the GSM module. Then, connect the GSM TX and RX to the Arduino RX and TX respectively. These are the serial UART connections that allow communication between the two modules.

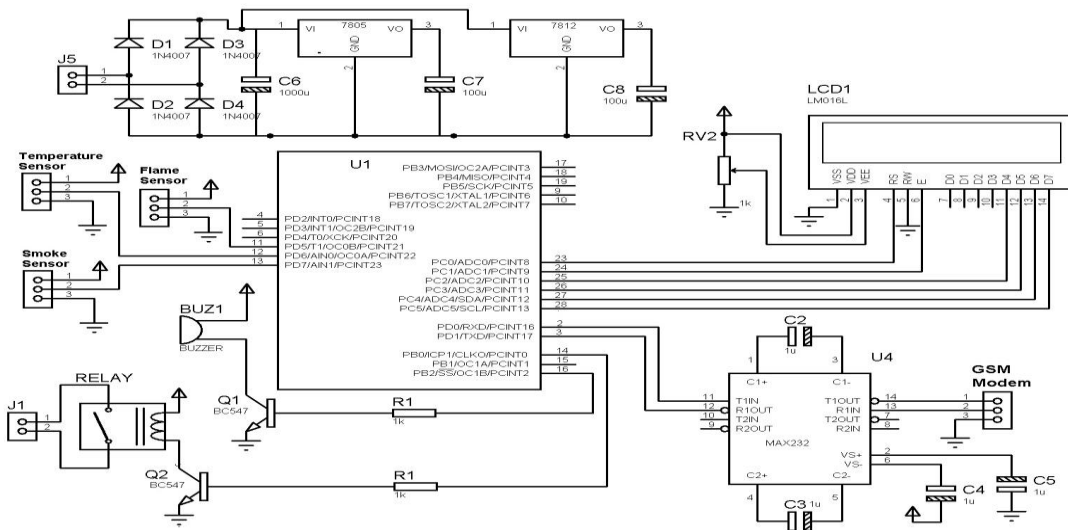


Fig.2 Circuit Diagram

Three sensors temperature, flame, and smoke are used by the fire alerting system. Arduino has an inbuilt ADC converter, which converts the analog signals received at the sensor end to digital. When a threshold value is reached for temperature, flame, or smoke, the Arduino is programmed to activate the buzzer. At the same time, Arduino sends the data to the GSM module. GSM modem is used for connecting microcontrollers to the internet. Microcontrollers are connected to the internet using GSM modems.[15] The following information will then be sent via GSM modem to the IOT website so authorized users can take the necessary action to extinguish the fire. The device ID is the unique ID given to the device, which would help the person get Information related to the location when the fire is detected.[13] The Prerequisite for this IoT-based fire alarming system is that the GSM module should be connected to a network. This project is also implemented without the IoT module. We have used SMS alerts in place of the IoT module, and in this project, an SMS is delivered whenever the buzzer is turned ON.[14]

V. CONCLUSION

IoT-based fire alerting systems have emerged as a promising solution for detecting fires in various settings and alerting authorities and individuals in a timely manner. With the integration of sensors, cloud computing, and wireless communication technologies, these systems can provide accurate and reliable fire detection, as well as real-time alerts and data analysis. One of the key benefits of IoT-based fire alerting systems is their ability to collect and analyze large amounts of data from various sources, such as smoke detectors, and temperature sensors. This data can be used to identify potential fire hazards, track the spread of fires, and optimize emergency response efforts. Overall, IoT-based fire alerting systems have the potential to significantly improve fire safety and emergency response, making them an important area of development for the future.

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