

Fire and smoke detection with auto alert for hostels and lab

Prof. Amol Halde¹, Prajval Patil², Tejas Patil³, Priti Fate⁴, Kunal Patil⁵, Rohan Mahajan⁶

¹ Professor, Department of Electrical Engineering, PADM .VB. KOLTE college of Engineering, Malkapur, Maharashtra, India

^{2,3,4,5,6} Student, Department of Electrical Engineering, PADM .VB. KOLTE college of Engineering, Malkapur, Maharashtra, India

DOI: 10.5281/zenodo.19290217

ABSTRACT

*Here makes a foundation of plywood in vertical direction as an indication of wall. Swing motor is use to rotate flexible pipe and fire sensor [LDR or IR receiver] in approximately 180 degrees. 12-volt 1 amp power supply is use to provide supply for the circuit. Here 12-volt water pump is use for pumping water on the fire. 12-volt supply is use for the energy of water pump. Here Arduino Uno is use to interface smoke sensor and fire sensor with 2*16 LCD and relay. Here buzzer is use to convert electrical signal in to vessel type sound for information in this system makes a foundation of device on the wall. Flexible pipe, fire and smoke detection sensor is continuously move left to right in near about 180 degrees to watch fire. Here if fire is created then buzzer produce sound for information as well as water is fall on the fire to stop the fire as well as stop the motion of sensor and flexible pipe.*

Keywords : - Arduino Uno, Sensor, Electrical Signal, Sound.

1. INTRODUCTION

We listen and read news about fire created due to heat. And due to short circuit. When fire is created then it is identified after few times, after this we call to the fire brigade to stop fire for these many times loss. At that time fire is spread and by this more material burns out. We know that if after created fire we immediately identified and try to stop the fire then it is possible to decrease loss and prevent human life by burning.

Here for this make a foundation of fire protection device on the wall. Here fire detection sensor and flexible pipe is circulating left and right continuously in 180 degrees. Here if fire is created then fire and soke detection sensor is detecting the fire and by electronic circuit motion of fire sensor and flexible pipe is stop and supply of water pump is automatically switch on, by this water is fall on the fire to stop the fire. And buzzer produce sound for information.

1.1 Related Work

We know that for the construction of buildings, industries, offices more time and money is required. But if fire is created then all burn out in a very few times. There are many systems are available in the market to stop the fire. Few of them are as follows 1) Fire extinguishers 2) Fire Alarm System 3) Smoke Detector 4) Heat Detector. Every system has few draw backs. To avoid here develop a system which is better than above.

In our system we have use programming language. we have used the sensor which will detect the smoke and fire and it will make sound which will alert the people at the same time pumping of water will be also start.

1.2 Objective

The objective of this project is to show all the steps followed to perform the design, research and development of an optimized Fire System to detect and protect the environment / system / building from the fire. The complete monitoring is based on Arduino and sensor based system.

2. WORKING METHODOLOGY

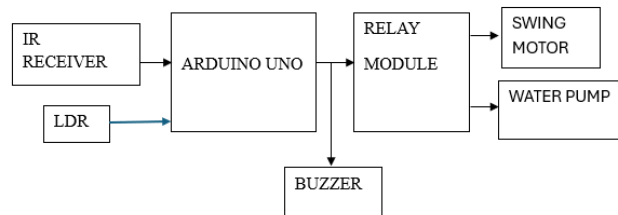


Fig -1: Block diagram of systems

The block description of system is given below- Mains supply is A.C 230-volt supply. When fire is created then light of fire is incident on infrared light receiver, by this resistance of IR receiver is decrease. Current obtain from Arduino Uno is not sufficient to drive relay and buzzer so for drive relay and buzzer, relay module is use

3. APPLICATION

- **Home Safety:** The system can be used in residential environments to detect gas leaks from cooking appliances, heaters, or other gas-powered devices, ensuring household safety by preventing fires or explosions.
- **Industrial Safety:** It can be employed in industries that use or produce gases, such as chemical plants, oil refineries, or manufacturing units, where early detection of gas leaks can prevent accidents.
- **Fire Detection:** In buildings and commercial spaces, the system can serve as an early warning for fires by detecting smoke and flammable gases, complementing fire alarm systems.
- **Automotive Applications:** This system could be used in vehicles, especially those running on natural gas or LPG, to detect gas leaks in the fuel system and prevent potential explosions.
- **Mining:** Gas sensors are critical in underground mining operations to detect the presence of combustible gases like methane, which can lead to explosions.
- **Laboratories:** Research labs handling volatile chemicals can use the system to monitor air quality and ensure the workspace is free from harmful or flammable gases.
- **Public Spaces:** The system can be installed in public areas such as parking garages, restaurants, or gas stations to monitor for gas leaks and ensure public safety.
- **Environmental Monitoring:** It can be used to monitor air quality in specific areas where pollution or emissions of combustible gases are a concern, aiding in regulatory compliance and environmental protection.
- **Boiler Rooms:** Gas detection in boiler rooms or other equipment rooms is essential for safety, as undetected gas buildup could lead to dangerous explosions.
- **Agriculture:** In farming environments, the system could help monitor for gases like methane produced by livestock, contributing to both safety and environmental monitoring.

3.1 Advantages and Disadvantages

Advantages-

- **Early Detection of Harmful Gases:** The sensor can detect gases and smoke, enabling early warning of potential hazards such as gas leaks or fires.
- **Audible Alerts:** The system uses a buzzer to notify users.
- **Cost-effective:** Using an Arduino and IR sensor and LDR makes the system relatively inexpensive while maintaining good functionality for small-scale applications, such as homes or small industries.
- **Customizable and Expandable:** As it is based on Arduino, the system can easily be customized or expanded with additional sensors, notifications, or wireless capabilities for more advanced monitoring.
- **Portable and Compact:** The components used are lightweight and compact, making it easy to install the system in different locations or integrate it into existing setups.

Disadvantages-

- There is necessary of present of water in the water tank.

4. CONCLUSIONS

Conclusion, the fire and smoke detection system based on an Arduino and an IR sensor provides an efficient and cost-effective solution for detecting harmful gases in various environments. With its ability to offer real-time monitoring and audible (buzzer) alerts, it enhances safety by providing early warnings of potential hazards. While the system is limited by factors such as detection range and potential accuracy issues, it remains highly useful for home, industrial, and public applications. Customization and expandability through the Arduino

platform make it adaptable for more advanced or specialized uses, further increasing its value in safety and environmental monitoring.

5. REFERENCES

- [1]. "Linear LSI Data and Applications Manual". Significs. 1985.
- [2]. Fuller, Brian (15 August 2012). "Hans Camenzind, 555 timer inventors, dies". EE Times. Retrieved 27 December 2016
- [3]. "Linear Vol1 Databook". Signetics. 1972. [4]. Official Arduino BT, website: <http://www.arduino.cc/en/Guide/ArduinoBT>
- [5]. May Zaw Tun, Htay Myint," Arduino based Fire Detection and Alarm System Using Smoke Sensor" EISSN: 2454-8006 Volume 6, Issue 4, April - 2020
- [6]. Shehab, J. N. (2018) Design and Implementation of Factory Security System. (PP. 162 - 171)