



## Radio Frequency Based Fire Alarm System

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### 1. Abstract

In today scenario due to industrialization and development activities on its peak with power supply so fire incident may occur anywhere due to short circuit or flammable material uses. So to take immediate and efficient alert on time is essential to avoid major casualties. Therefore, a RF fire alarm may play a greater role in this context.

A circuit which detect and observe fire and activates the siren sound with the Heat measuring instrument like thermistor, photodiode etc is known ideally to be "fire alarm sensor". The fire alarm which operate on radio frequency based detect fire On Right time and prevent us to damages of people or property. The proficiency of fire alarm circuit can be improved by Providing The Radio Frequency Such that Temperature Sensor and Fire alarm Can be Placed away from one another. Fire alarm circuit and Smoke Sensor Are part of security system which helps in finding out and preventing unnecessary damage Instantly alarm System and smoke sensor in Commercial Buildings Like offices, movie theatre, shopping complex and other public place is compulsory to avoid human Casualties there. Till now we have designed only five fire alarm circuit using thermistor LM358, LM341, Germanium diode and NE555. The circuit we have designed is very simple Radio frequency alarm circuit to provide for early warning of fire so that people can be evacuated and certain action can be taken to reduce fire effect and damages.

### 2. Introduction

According to a report published by TOI 82 died 700 Heart in 16,500 fire incident took place in Delhi in 2022 India Holds 5<sup>TH</sup> position in Highest risk of fire by a report published in FICCI. Major causes of fire in urban area are wood fuel, charcoal for Room Heating purposes and burning courtyard poor city infrastructure. Forest fire which is called as wild fire is uncontrollable trolled fire occurring in forest area causes huge devastation of flora and fauna in forest therefore to overcome such problems Radio frequency based fire Alarm arise as excellent type of fire alert type of system new technologies is replacing fire alarm telephone monitoring, In this system Each fire alarm Radio monitor Has a radio frequency transmitter. These sophisticated monitoring and communication system utilize cellular radio transmission which are Highly Reliable Choosing the right Fire alarm Monitoring system decreases the chances of operate losing everything. Fire alarm which is electronic Device are known as horns in UK And Canada can be either continuous or set to Different codes. Manually fire alarm warning devices are set at different volume levels they are initialize by means of physical interaction such as pulling or breaking glass to respond to physical change related with fire. The newest innovation can use Camera and Computer Algorithms to analyze visible effect of fire and movement in applications which is inappropriate from other detection measures.

### 3. Why is Radio Frequency Better Then infrared communication System?

- ❖ An RF module operates at radio frequency which range between 30 KHZ to 300 KHZ
- ❖ Modulation to be applies as a module of amplitude Shift keying.
- ❖ RF signal travel between large Distance can even pass through Obstacles but IR Follows line of Sight Communication.
- ❖ RF Signal is more Stronger Favourable as compared to IR transmission.
- ❖ RF communication use a specific frequency through other IR emitting source distract IR SIGNAL

#### 4. Comparison between Radio Frequency and Existing Fire Alarm Methods

- There are two types of Alarm System wired alarm wireless alarm System(Radio Freq)work on batteries on the other hand wire alarm system work on electricity which means radio frequency alarm system are effective during power cut.
- RF based fire alarm provide easy installation which is not possible in wired alarm due to complexities of one of wire on it.
- Wired alarm system are susceptible to not portable on the other hand RF alarm is easily portable and Fixed able
- A wireless alarm used sensor that communicate with central panel using radio frequency technically.
- RF alarm system provides early warning safety which is essential for effective fire safety because fire incident can occur any time anywhere

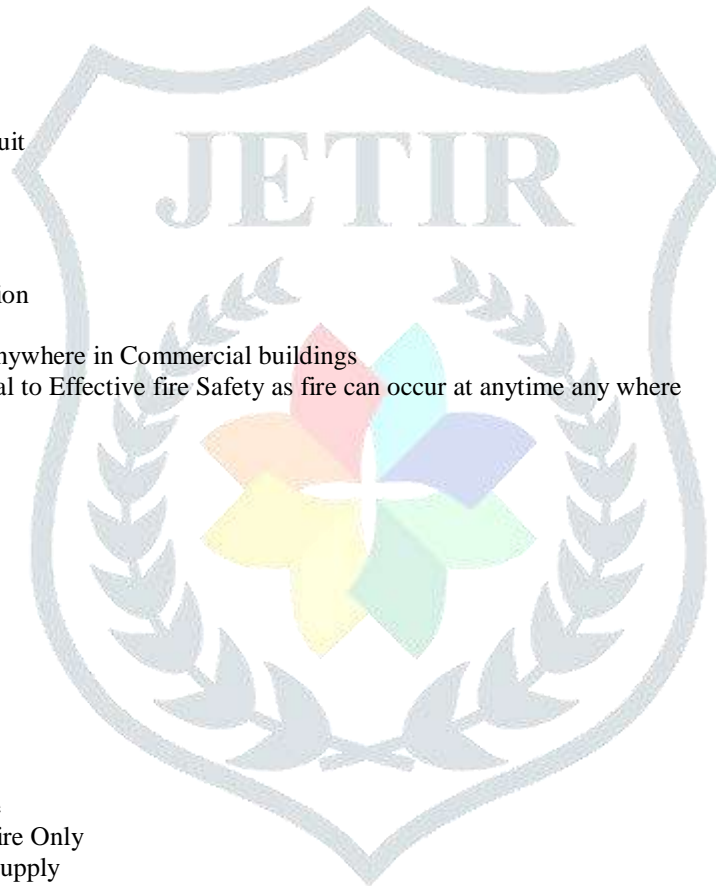
#### 5. Advantage and Disadvantage

##### Advantage

- ❖ Low cost
- ❖ Fast Response
- ❖ Easily constructible Circuit
- ❖ High level Security
- ❖ Easy to Design
- ❖ Immediate Response
- ❖ Easy to Modify
- ❖ Lower Power Consumption
- ❖ Early Warning Benefit
- ❖ Can be easily Installed anywhere in Commercial buildings
- ❖ Early Warning is essential to Effective fire Safety as fire can occur at anytime any where
- ❖ Detection Distance
- ❖ Speed of response
- ❖ Sensitivity
- ❖ Range of applications
- ❖ Portable

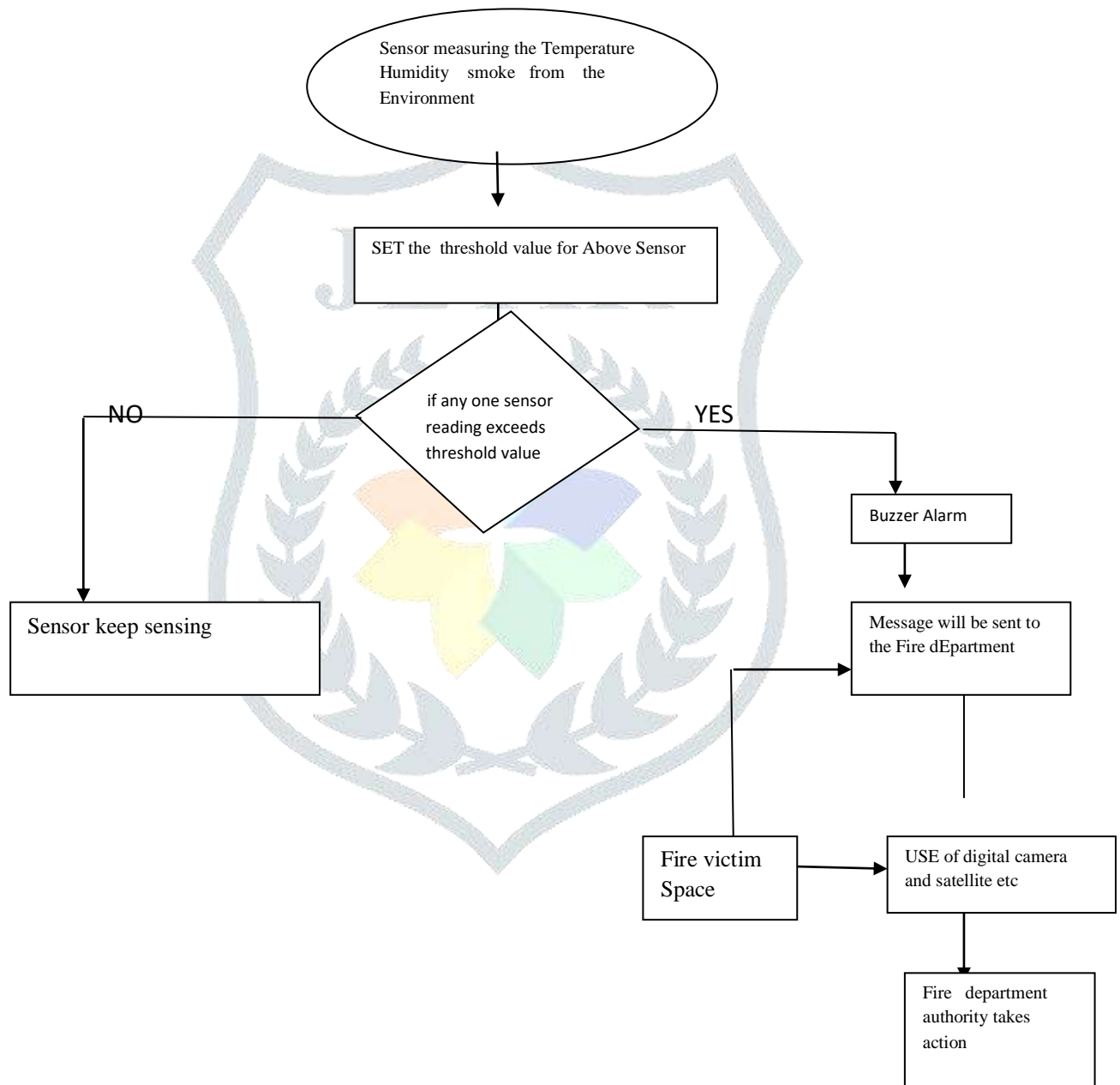
##### Disadvantages

- ❖ False alarm
- ❖ Blinded by Thick Smoke
- ❖ Sense near Range heat Fire Only
- ❖ Uses continuous power supply



## 6. Flowchart and Statistics

### 6. Flowchart

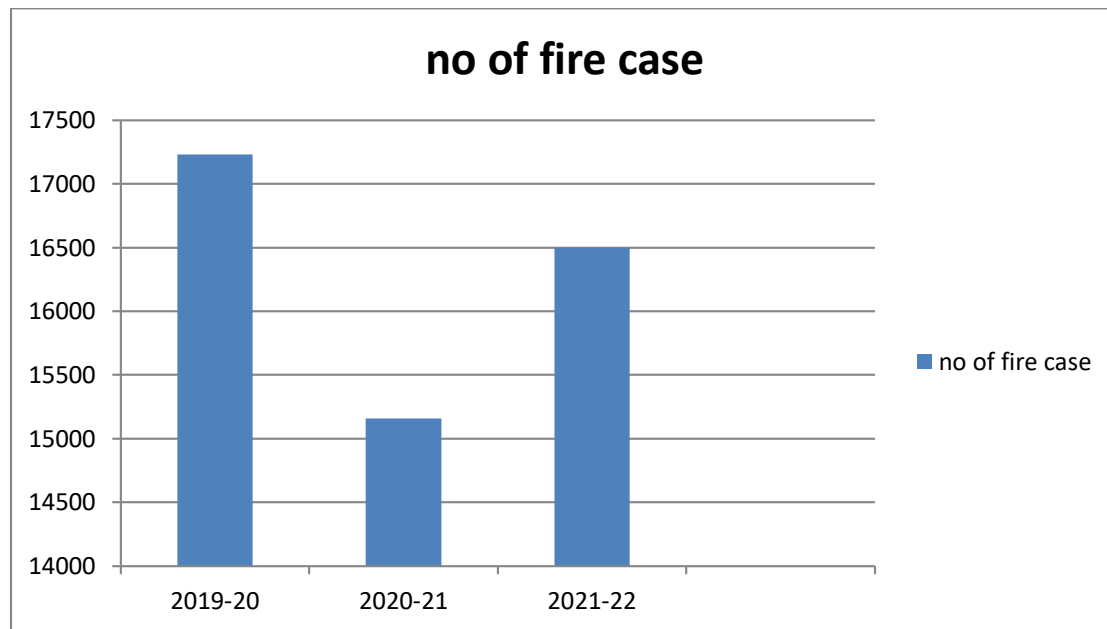


Operational flow chart

## 7.Statistics



Source-Linkedin

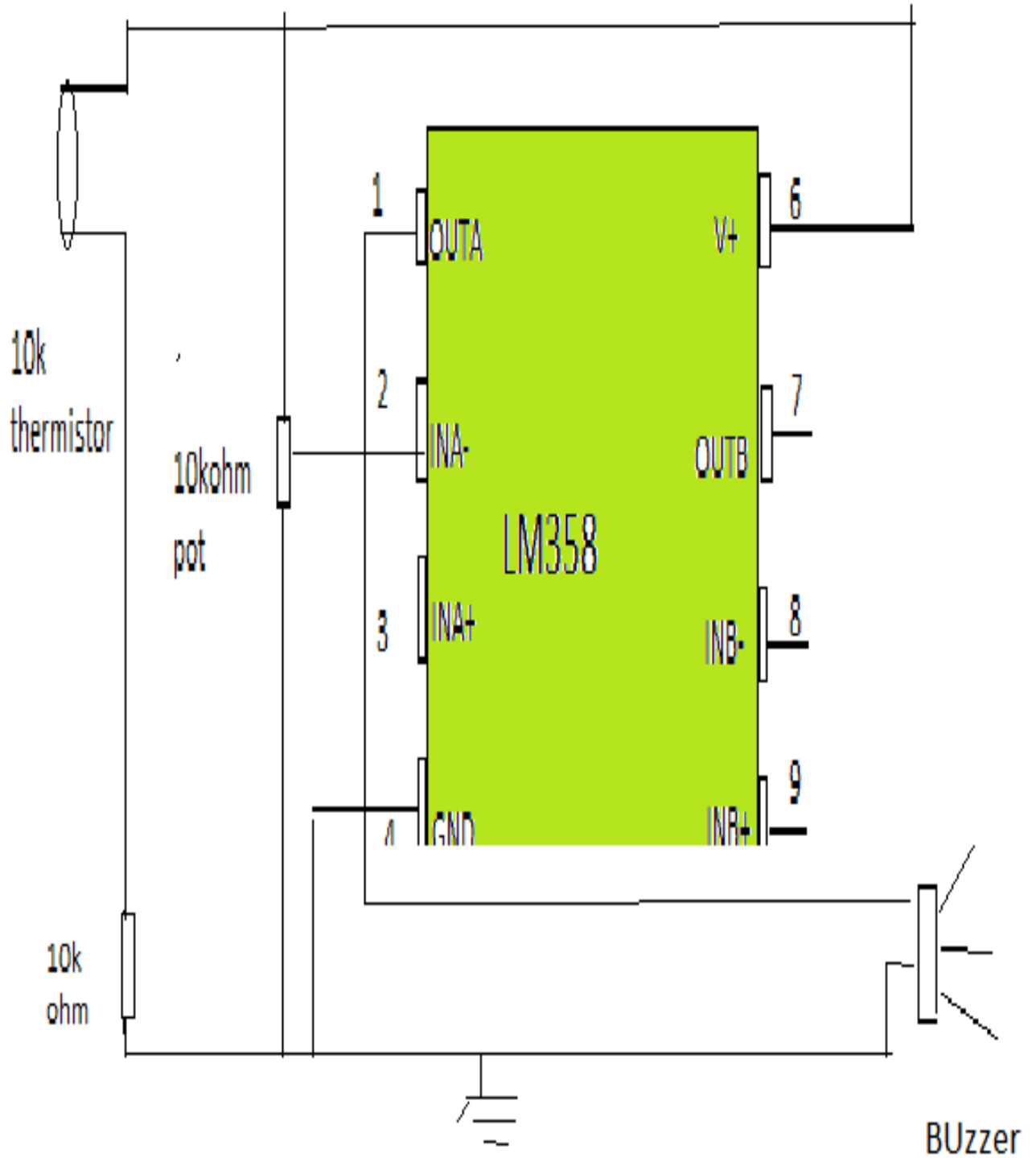


□ Source-Directorate general fire services

## 8.Component Required

- 1.10k ohm resistor
- 2.LM358 Operational Amplifier
3. 4.7k ohm resistor(1/4 watt)
- 4.10k ohm potentiometer
5. Small Buzzer (5v Buzzer )
- 6.Connecting wires
7. Mini Bread Board
- 8.5v power supply

## 9.Circuit Diagram



## 10.Working

We will now see the working of the simple Fire Alarm Circuit. First thing to know is that the main component in detecting the fire is the 10 K Thermistor. As we mentioned in the component description, the 10 K Thermistor used here is a NTC type Thermistor. If the temperature increases, the resistance of the Thermistor decreases.

In case of fire, the temperature increases. This increase in temperature will reduce the resistance of the 10 K Thermistor. As the resistance decreases, the output of the voltage divider will increase. Since the output of the voltage divider is given to the non – inverting input of the LM358 Op – Amp, its value will become more than that of the inverting input. As a result, the output of the Op – Amp becomes high and it activates the buzzer.

## 11.CONCLUSION

The gift of technology to mankind is to make life simpler .In this work a remote control for multiple home appliance is designed ,presented and implemented .The design is Durable ,robust and sturdy which is built with an available compact Ic's and RF module .From any place around the house any four appliances can be Control at will without the Requirement of line of sight .

The relay action which is connected to the load to be controlled is operated with radio frequency which transmits only when a switch is pressed .Multiple devices Can be Control using Different receiver with different addressing mode using single remote . The transmitter circuit is given power with 9v With circuit current of 9.6mA and power Consumption of 86.4mW

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