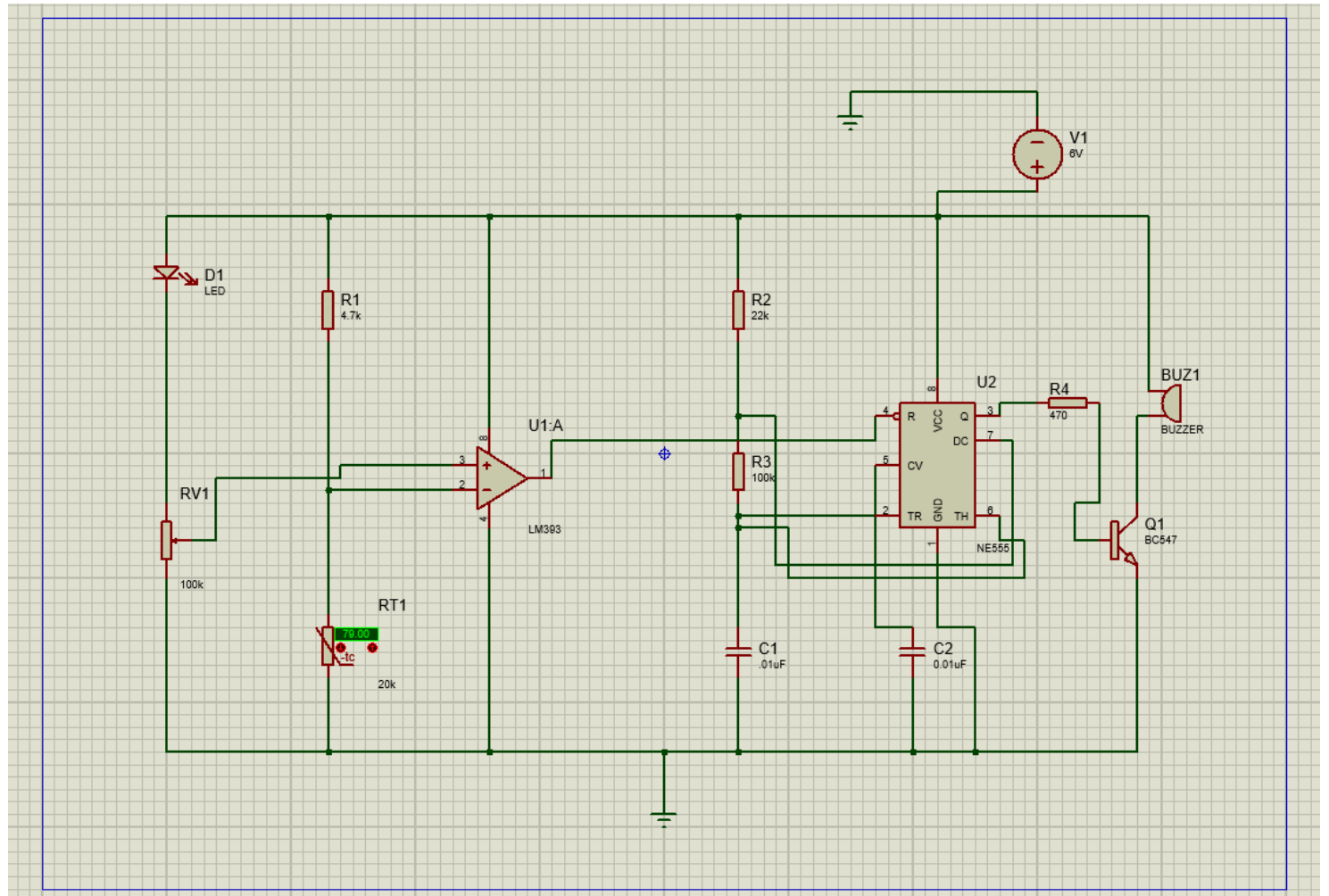
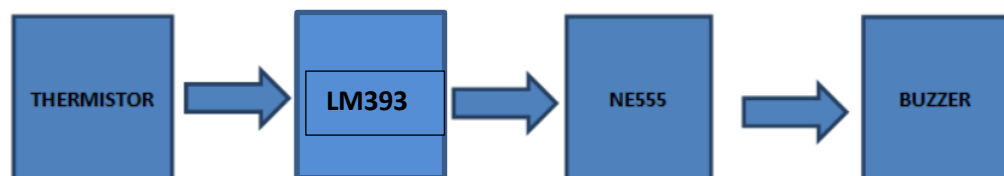


Anwar baker  
12113661

Circuit Picture :



Block Diagram of Fire Alarm Circuit Using LM741



Block Diagram of Firm Alarm Using LM341

## **Introduction :**

Fire Alarm Circuit is a simple circuit that detects the fire and activates the Siren Sound or Buzzer. Fire Alarm Circuits are very important devices to detect fire in the right time and prevent any damage to people or property. Fire Alarm Circuits and Smoke Sensors are a part of the security systems which help in detecting or preventing damage. Installing Fire Alarm Systems and Smoke Sensors in commercial buildings like offices, movie theatres, shopping malls and other public places is compulsory.

## **Component in the Circuit :**

- 1-NTC Thermistor
- 2-LM 393 "op-amp as a comparator"
- 3-NE 555 Timer
- 4-Buzzer
- 5-Resistors
- 6-Capacitors
- 7-LED

## **Thermistor :**

Thermistors are Temperature Dependent Resistors i.e. the resistance of a Thermistor varies according to the ambient temperature. There are two types of Thermistors: PTC Thermistor and NTC Thermistor. PTC stands for Positive Temperature Coefficient and NTC stands for Negative Temperature Coefficient. In PTC Thermistor, the resistance is directly proportional to the temperature and in NTC Thermistor, the resistance is inversely proportional to the temperature and we used NTC thermistor in this circuit.

The thermistor is the main component which detects the fire by sudden change in the room temperature because of the heat generated by the fire. The thermistor will detect the heat and give the information to the LM393 OP-AMP. The op-amp will make the NE555 to generate pulse which has been given to a buzzer to buzz.

## **LM393 OP-AMP :**

The LM393 series are dual independent precision voltage comparators capable of single or split supply operation. These devices are designed to permit a common mode range-to-ground level with single supply operation. Input offset voltage specifications as low as 2.0 mV make this device an excellent selection for many applications in consumer, automotive, and industrial electronics.

## Circuit working :

- Thermistor is used to sense the raise in temperature. But it rises only after a fixed temperature.
- Here op amp acts as non-inverting comparator i.e. Vout is positive only if Vin (voltage at pin 2) < VRef (voltage at pin3).
- When there is no any fire, voltage at pin 2 of the comparator is greater than the voltage at pin3.
- When there is no fire resistance of thermistor is 100k. So 100K and 4.7k forms voltage divider circuit.
- Voltage at pin2 is calculate using formula.  $V = (100 \times 5) / (100 + 4.7) = 4.7v$
- Voltage at pin 3 =  $50 \times 5 / 100 = 2.5v$  (Variable pin of the pot is at 50% of total resistance.)
- When there is any fire thermistor temperature raises and its resistance decreases. So voltage at pin2 starts decreasing. Thus Vout is goes to positive i.e. it is equal to Vcc.
- Here reference voltage selected is 2.5v. Fire alarm starts only if the input voltage is less than 2.5v. To increase the reference voltage decrease the resistance of pot.

## Applications:

- Fire Alarm Circuits are very useful in homes, offices, schools, labs, etc. to detect and prevent any disasters due to fire.
- Fire Alarm Systems can work as a stand – alone devices or be a part of a complex home security system with other security features like smoke detection, intruder alert, motion detection, etc.

## Conclusion:

A **fire alarm is an electronic sounder** or a bell. The sounder makes a loud high pitched sound to alert people that there is a fire in the building. Here the fire alarm devices sense the heat and activate the loud noise. There are many typical and complex fire alarm circuits available in the form of standalone devices. But this is a simple fire alarm circuit using LM393. This is a simple project which detects the fire and triggers the siren sound or a buzzer.