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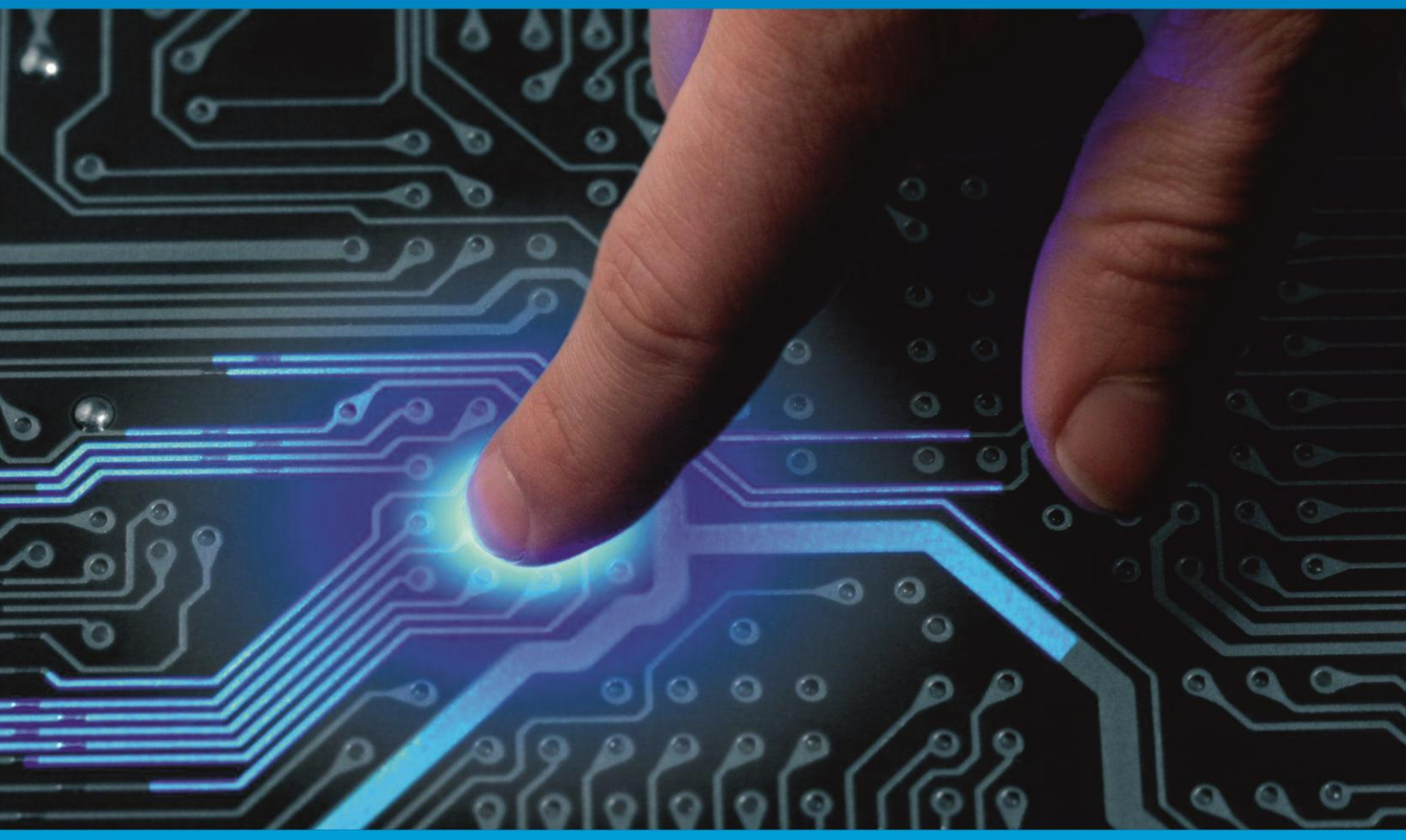

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IoE based Automatic Fire Detection System

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ABSTRACT: Fires continue to occur in modern architecture, the people's lives and property has brought huge losses. Your home/work space is full of objects and materials that can combust under the right conditions. Some of the common causes of house/work space fires are familiar to everyone, while others may surprise you. Identifying and lowering these risks help you lower your chance of house fire, keeping your family and property safer.In order to reduce the fire in the building automatic fire alarm equipment placed into a necessity.Thus we are creating a system that will be able to detect fire.This project discusses the automatic fire alarm system, the composition and working principle.

KEYWORDS: IoE, Fire, Fire Detection, Smoke, Detect, Temperature, Gas, Sensors, Arduino Uno

I. INTRODUCTION

Fire detection systems are designed to discover fires early in their development when time will still be available for the safe evacuation of occupants. Early detection also plays a significant role in protecting the safety of emergency response personnel. Property loss can be reduced and downtime for the operation minimized through early detection because control efforts are started while the fire is still small. Most alarm systems provide information to emergency responders on the location of the fire, speeding the process of fire control.

A. Arduino Uno Board

It is an IOT tool which is very much useful when interfacing with the electronic components and coding which would too hard it we would have to code the components individually by using the machine level code. Arduino provide the software tool which helps us to code the components using embedded c. The tool is the Arduino IDE and it is an open source software provided by the Arduino. It uses the ATmega328P microcontroller. It consists of the set of Digital and Analog pins. It can be operated in two voltages i.e the 3.3v and 5v as some of the components doesn't require high voltage as it can damage the components. So the components required to build the Fingerprint scanner lock have been studied and now we proceed toward combining the system.

Fig.1 Arduino Uno Board

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B. LCD Screen

The Hitachi-compatible LCDs can be controlled in two modes: 4-bit or 8-bit. The 4-bit mode requires seven I/O pins from the Arduino, while the 8-bit mode requires 11 pins. For displaying text on the screen, you can do most everything in 4-bit mode, so example shows how to control a 16x2 LCD in 4-bit mode.

fig.2 LCD Screen

C. LM-35 Temperature Sensor

LM35 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. The sensitivity of LM35 is 10 mV/degree Celsius.

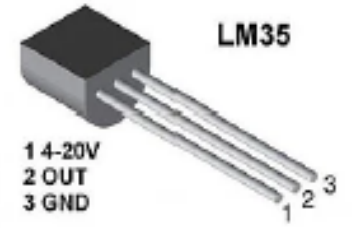

fig.3 LM35 Temperature Sensor

D. Gas sensor

A gas sensor is a device which detects the presence or concentration of gases in the atmosphere. Based on the concentration of the gas the sensor produces a corresponding potential difference by changing the resistance of the material inside the sensor, which can be measured as output voltage.

Fig.4 Gas Sensor

E. Resistors

A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses.

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Fig.5 Resistor

F. Breadboard

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

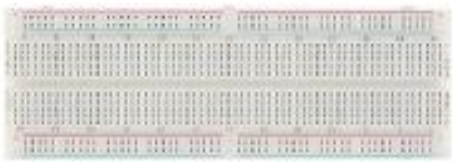

Fig.6 Breadboard

G. Piezo Buzzer

Piezo buzzers are constructed by placing electrical contacts on the two faces of a disk of piezoelectric material and then supporting the disk at the edges in an enclosure. When a voltage is applied across the two electrodes, the piezoelectric material mechanically deforms due to the applied voltage.

Fig.7 Piezo Buzzer

H. Wires

These are Jumper wire male to female, used in connecting female header pin of any development board (like Arduino) to other development board having male connector. We have also used some male to male connectors.

Fig.8 Wires

I. LED

In electronics, an LED circuit or LED driver is an electrical circuit used to power a light-emitting diode (LED). The circuit must provide sufficient current to light the LED at the required brightness, but must limit the current to prevent damaging the LED.

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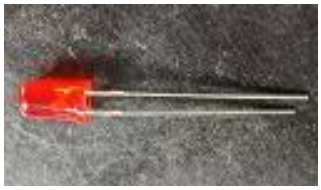

Fig.9 LED

J. Tinkercad

Tinkercad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use.[1] Since it became available in 2011 it has become a popular platform for creating models for 3D printing as well as an entry-level introduction to constructive solid geometry.

II. PROPOSED SYSTEM

Automatic fire detection and alarm systems are a fairly recent addition to the range of equipment available to combat the threat of fire in buildings, creating an effective and reliable means of detecting fires and signalling an alarm to the occupants. By providing an early warning to the building management team, action can be taken to deal with the fire before it takes hold. Automatic fire detection and alarm systems have a good record of performance and have demonstrated they can be effective in reducing the risk to life and property damage from fire.

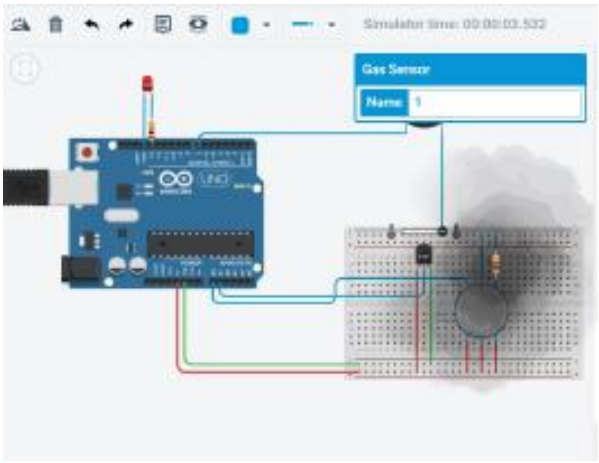

Fig.10 Testing Smoke On Circuit

The circuit diagram involves a temperature sensor(LM35), a gas sensor(mq2) , arduino uno board , a piezo buzzer, an LED component along with a LCD display.Firstly, we need to connect one line of the breadboard to the ground and the other to the power supply. This is done by connecting the 5V pin of the Arduino Board to one line of connection pins on the breadboard for grounding. The other line of the breadboard is connected to the ground terminal of the Arduino Board. These lines will be connected to other devices. The Temperature sensor has three pins. Ground, Vout, and Vs (Supply). The Vs pin that has a range of 4-20V is connected to the power supply line of the breadboard. The Ground terminal of the sensor is connected to the ground line of the breadboard. The Vout terminal of the temperature sensor is connected to one of the Analog pins of the Arduino Board, A1.

Similarly for the Gas Sensor, there are 6 pins. 3 pins of the gas sensor are directly connected to the power supply line of the breadboard. Amongst the other 3 pins of the sensor, one pin is connected to one of the Analog pins of the Arduino Board, A0. The pin in the middle is connected to the ground line of the breadboard. The third pin of the sensor is connected to a resistor and then connected to the ground line. The piezo buzzer is externally connected to the circuit. The ground pin of the #buzzer is connected to the ground line of the breadboard. Another pin of the buzzer is connected to the digital pin, PIN 7 of the Arduino Board.

Lastly, the LED is connected to the Arduino directly. The cathode of the LED is connected to the GND pin of Arduino and the anode of the LED is connected through a resistor to the digital pin 13 of the Arduino.

Finally the LCD connection ,LCD RS pin to digital pin 12,LCD Enable pin to digital pin 11,LCD D4 pin to digital pin 5, D5 pin to digital pin 4, LCD D6 pin to digital pin 3, LCD D7 pin to digital pin 2, LCD R/W pin to GND, LCD VSS

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pin to GND,LCD VCC pin to 5V & LCD LED+ to 5V through a 220 ohm resistor also, LCD LED- to GND respectively.

III. RESULT & SIMULATION

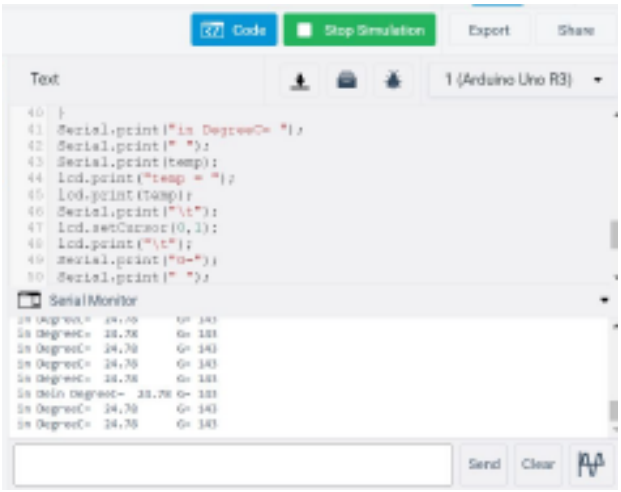
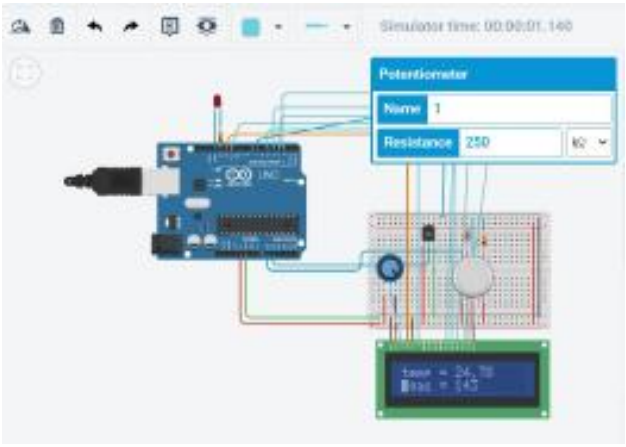


Fig.11 Output Values On Console



Fig,12 Output Values On LCD

As shown in the fig when temperature >= 80deg C then piezo buzzer will be activated an it will start ringing. If Gas Sensor >= 1000 ppm, then led will start detecting.

IV. FUTURE SCOPE

More sensors and technologies such as image and video processing can be used for more efficiency.Further updates can be done to improve its performance and efficiency of the system. We can convert this system into a smart detective robot with the help of some modifications and additions.

V. CONCLUSION

The proposed system is made to ensure that system warns the user by sending an alert when detects fire. This system used low cost, reliable instruments that were suitable to develop a fire detector and affordable.So, that every person around system can reach safe location as soon as possible.It reduces human lose as well due to fire.

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