

DESIGN AND IMPLEMENTATION OF AUTOMATIC QUICK FIRE EXTINGUISHING BY USING ELIDE BALL

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Abstract: Automation and security is major concern in our day to day life. In this system proposal to home and industrial automation and security system design is almost balanced nowadays. In this system also provide some basic emergency action to the small fire area. In this paper, we have tried to increase this standard by combining new skill and developed a minimum cost home and industrial automated security systems. Everyone wants to be as much as secure as possible. The design of simple hardware circuit enables every user to use this sensor, MQ2 sensor, 12V dc motor and GSM at home and industries.

Keywords: Temperature sensor, Smoke sensor, Elide ball, GSM and 12V DC motor.

1. INTRODUCTION

A fire extinguisher is an active protection device which is used to extinguish or control small fires often in emergency situation. Fire Alert Systems are very necessity for security purpose. Every field we choose for our appraisal we can get a clear view of fire accidents in a system. Fire Alarm and protection system is a combination of Electrical and Electronics Instruments. Now by using power L293D we have increase the efficiency. For this, we have to have a clear view tmp35 which is used for our resistances. Along with this project we will be able to know about fire, fire system protection and precaution.

2. ARCHITECTURE OF THE SYSTEM:

It can be implemented to any levels of the security system. The architecture mainly consists of four components which are Arduino Uno, GSM Modem, Elide ball and the sensor device which is the main detectors. The main function of the GSM MODEM is the remote communication between the user and the controller through the RS 232 serial communication standard. The function of the controller is to continuously check the inputs coming from the sensor device and send message through the GSM network in case of emergency. The microcontroller is connected with different device like temperature sensor, smoke sensor etc. The GSM modem is connected to the user, police station and fire brigade through the mobile cellular network. An interference circuit has been designed which includes sensor as input device. Then the programmed of microcontroller device has been connected to the interface circuit and the GSM modem through the serial port of the GSM MODEM.

3. SOFTWARE USED:

An integrated development environment (**IDE**) is a software application that provides comprehensive facilities to computer programmers for software development. An **IDE** normally consists

of a source code editor, build automation tools, and a debugger. Most of the modern IDEs have intelligent code completion. The programming language is Embedded C/C++.

Hardware Used: This paper consists of following hardware:

Arduino Uno

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc.^[2] ^[3] the board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.^[1] The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable.^[4] It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.^[1] The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform.^[3] The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.^[3] It



Figure 1 front side of Arduino Uno

Communicates using the original STK500 protocol.^[1] The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.^[7]

Smoke sensor

The **MQ-2** is a flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm. The MQ-2 gas sensor is sensitive to LPG, i-butane, propane, methane, alcohol, Hydrogen and smoke. They are used in gas leakage detecting equipments in family and industry and in portable gas detector.

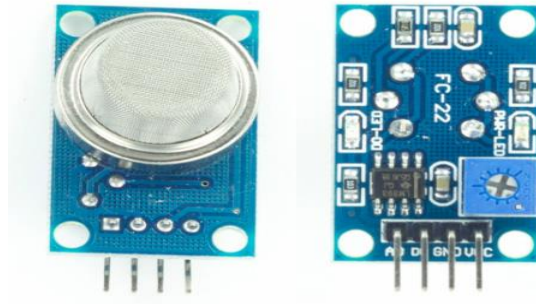


Figure 2 smoke sensor

- Supply Voltage:5V
- Sensitive to H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane
- Analog and Digital Output
- Digital Out is high or Low based on an adjustable preset threshold.

Temperature sensor

These sensors use a solid-state technique to determine the temperature. That is to say, they don't use mercury (like old thermometers), bimetallic strips (like in some home thermometers or stoves), nor do they use thermistors (temperature sensitive resistors). Instead, they use the fact as temperature increases, the voltage across a diode increases at a known rate. (Technically, this is actually the voltage drop between the base and emitter - the V_{be} - of a transistor.) By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature.

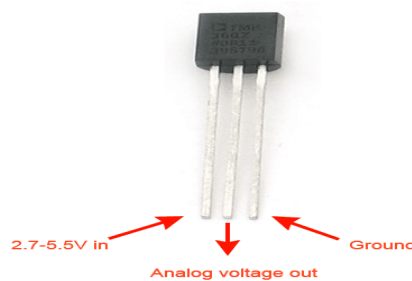


Figure 3 temperature sensor

GSM Module

GSM (global system for mobile communication) is a cellular network. GSM network operate in four different frequency ranges. SIM800 is a quad-band GSM/GPRS module designed for the global market. It works on frequencies GSM 850MHz; EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. SIM800

features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. With a tiny configuration of 24*24*3mm, SIM800 can meet almost all the space requirements in users' applications, such as M2M, smart phone, PDA and other mobile devices. SIM800 has 68 SMT pads, and provides all hardware interfaces between the module and customers' boards. SIM800 is designed with power saving technique so that the current consumption is as low as 1.2mA in sleep mode. SIM800 integrates TCP/IP protocol and extended TCP/IP AT commands which are very useful for data transfer applications.

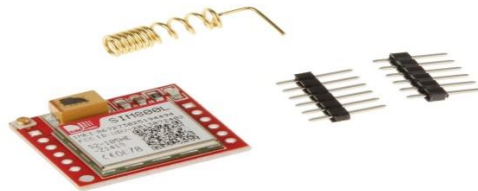


Figure 4 GSM Module

Elide Ball

Elide ball filled with high pressure mono ammonium phosphate. Combustion may occur when there is a combination of three element fuel, oxygen, and heat. Whenever the ball outer area faced flame means the ball is blast. The outward driving force of the blast pushes the oxygen out of the fire area. It works on heat sensitivity principle. It can extinguish almost all types of fire within 10 to 20 seconds. It also used automatic or manual. It can be easily installed at a fire prone area or rolled into live fire. Self actuating mechanism. Emits a loud noise during activation which acts as also fire alarm.



Figure 5 Elide ball

Ammonium dihydrogen phosphate commonly called as mono ammonium phosphate is a chemical compound with formula $\text{NH}_4\text{H}_2\text{PO}_4$. It is a white crystalline solid consist of ammonium cations $[\text{NH}_4]^+$ and dihydrogen phosphate anions $[\text{H}_2\text{PO}_4]^-$ in equal proportions.

Motor Driver

L293D is a typical **Motor driver** or **Motor Driver IC** which allows **DC motor** to drive on either direction. **L293D** is a 16-pin IC which can control a set of two **DC motors** simultaneously in any direction. It means that you can control two **DC motor** with a single **L293D IC**. Dual H-bridge **Motor Driver** integrated circuit (IC).

MAIN CIRCUIT DIAGRAM OF FIRE SENSOR ALARM

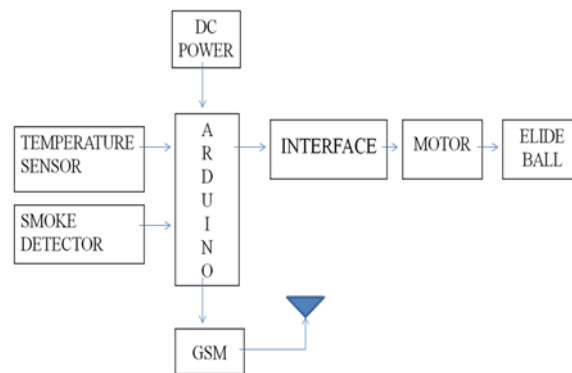


Figure 6 block diagram

Working of the System:

The system is fully controlled by the microcontroller and the microcontrollers will continuously monitors the sensor, detector and GSM modem. If the voltage level of sensor input pins goes to zero then it will send the 'AT+ CMGS='USER MOBILE NUMBER'' to GSM modem through serial port. The GSM modem will response with the character '>'. After receiving '>' microcontroller again send the type of security problem SMS+CTRL Z to GSM modem. Then GSM modem will send this type of problem to the user. Also provide the some kind of emergency process. It means arduino give some signal to the drive circuit (L293D). Then the motor driver drives the motor. Finally elide ball drop down and face the fire .based on fire level the ball blast and extinguish the fire. The tmp36 is the main temperature sensor. It connected to the Arduino UNO. The Arduino can sense the temperature. The GSM Module is also connected with this ARDUINO UNO. When any problem arises or temperature is increase the after sensing this problem Arduino sends this problem to the GSM module.

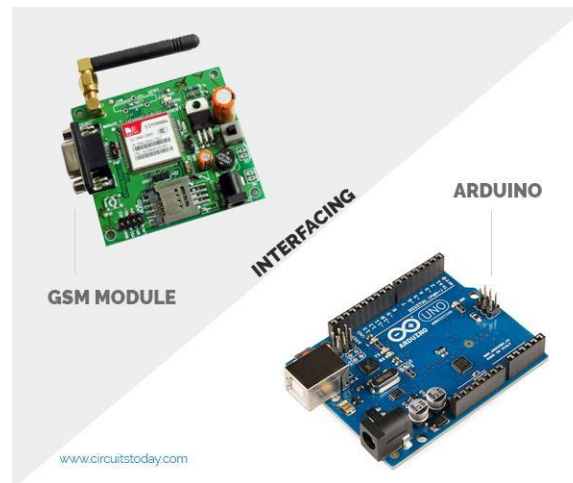


Figure 7 interface GSM & Arduino

CONCLUSION:

This paper presents the design of low cost, robust and secure fire protection system for buildings. It fulfills the user requirements like real time monitoring and control strategy. The system can be easily implemented with maximum reliability and the high security. In future special enhancement from the existing systems for home security based on Iot.

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