AUTOMATIC FIRE EXTINGUISHER SYSTEM

ABSTRACT

This paper demonstrates the requirements, specifications, design problems and solutions for the fire extinguishing system project fulfilling the requirements. Fire fighting is an important and hazardous job. A fire fighter can be able to extinguish fire quickly, averting the damages and reduce losses. Technology has joined the gap between firefighting and machines using some effective method. The purpose of this thesis is to establish a system that can detect

fire and extinguish it in the shortest time subject to a few effective factors. In this case, the system aims to put out the fire before it spreads increasing the security of home, laboratory, office, factory and building that is important to human life.

INTRODUCTION

In our country fire accident is a very common phenomenon. Many wealth and lives are fallen in danger. As a developing country we have no modern technology to solve this problem. The main sector of fire brigade has limitation to overcome it.

Sometimes police, military come to the firing spot to help them. But this is not enough. If an automatic fire extinguishing system available,

offers greater flexibility.In conventional automatic fire-extinguishing systems utilizing a fire-extinguishing gas, a bomb containing a fire-extinguishing gas, such as halon gas, under pressure is provided at a location. Several gas jetting nozzles are arranged at desired locations within a region when a fire occurs therein. The gas jetting nozzles are connected through a valve and a pipe to the bomb. Fire sensors are arranged at desired locations within the region. In response to a fire signal from the fire sensors, the valve is opened to cause fire-extinguishing gas to jet from the gas jetting nozzles into the region so that automatic extinguishing can be effected therein.However, since such conventional automatic fire-extinguishing systems require a complicated system of gas pipes from

a gas bomb to the gas jetting nozzles, the cost and installation of the pipes is expensive. Moreover, since the gas pipes are fixedly arranged in the walls, ceiling etc., of a room defining a region, it is not easy to remove the gas pipes and to change the arrangement of the gas jetting nozzles. Furthermore, the gas bomb to be used must have a capacity comparable with the space of the region and therefore, gas bombs having different capacities must be prepared for different regions. This is very uneconomical. The main object of this paper is to provide an automatic fire- extinguishing system which eliminates the above described disadvantages of the prior arts, and to enable easy installation or removal of the system in or from a region wherein automatic fire-extinguishing should be effected and to allow a flexible arrangement of

gas jetting nozzles according to the size and shape of the region.

Importance of fire extinguishing system

This system can play a vital role in life safety. Automated Fire Extinguishing systems are the most effective means of fire controlling. When properly installed this system can be highly effective safe-guard against loss of life and property.

According to a recent article on Hotel Interactive.com, a leading web portal for hotel professionals, an estimated 3,900 fires occur each year in hotels and motels. Annually, these fires result in $76 million in property loss. According to a recent report by the U.S. Fire Administration, 46 percent of hotel and motel fires are caused by

cooking, with electrical malfunctions and heating each causing an additional 7 percent of fires. These fires occur primarily in the evening, between 6 p.m. and 9 p.m. While 73 percent of fires are confined to the object of origin, 18 percent are confined to the room of fire origin and the remaining 9 percent of fires extend beyond the room of origin. With 73 % of these fires confined to the object of origin, it is easy to see the absolutely critical role that fire extinguishers play in keeping the guests in hotels safe. Extrapolating the prominent studies, thisindicated more than 20 fires everyday are put out by fire extinguishers in hotels. There is lots of extinguisher that works for our life safety and also save our property. Water fire extinguishers are good for putting out flames on carpets and soft furnishings, but are

dangerous when used on flammable liquids or cooking fats. This is a good device to have in the bedroom and living room, especially if you are a smoker, but not useful for the kitchen. 4 Foam extinguishers are effective on woods and flammable liquids, petrol and spirits but not for kitchen or electrical fires, making this a handy device to keep in the garage. Carbon-di-oxide (CO2) is effective on flammable liquids and electrical fires, but not suitable for cooking fats or soft furnishings. Dry powder can be used on the widest range of fires in the home. It is safe to use on textiles, wood, flammable liquids/gases and electrical fires. However it cannot be used on kitchen fires involving cooking fats and oils. It’s a good device for garages and living areas, but you will still need a separate device for the kitchen. Wet chemical

is safe to use on soft furnishings and cooking fat fires, yet hazardous when brought into contact with electrical or flammable gases and liquids. It is good for the living room and kitchen but unsuitable for the garage.

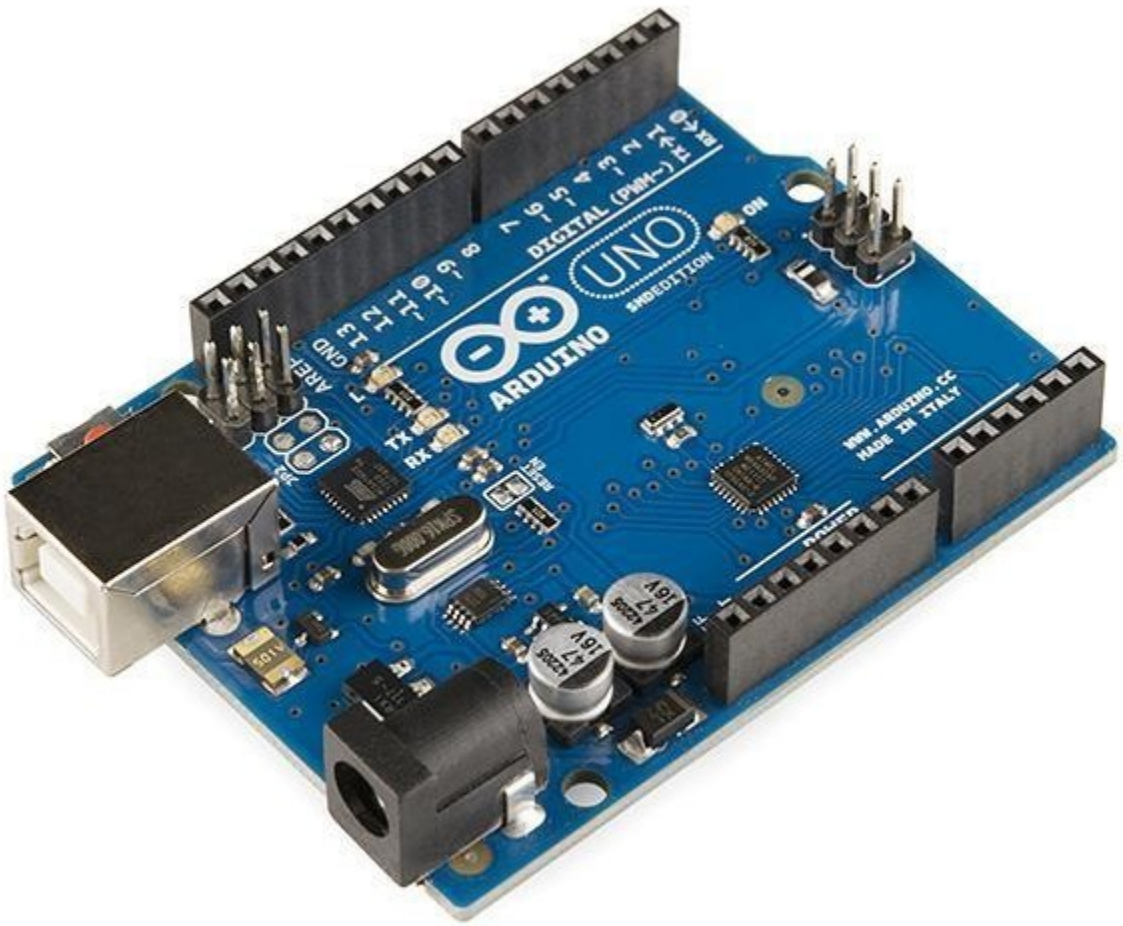
The best thing to do is to make an assessment of the places in your home where you see the greatest potential risks of fires occurring and keep the appropriate devices in an easily accessible place nearby. A fire blanket and wet chemical extinguisher in the kitchen and dry powder device in the garage could prove invaluable tools in saving your home and your life in case of a house fire.

Components Used:

Arduino Uno:

Arduino Uno was used in this system.

Arduino Uno The hardware consists of an open-source hardware board designed around an 8- bit Atmel AVR microcontroller. Arduino Uno has a clock speed of 16 MHz [13]. It was chosen for its available digital and analog pins, PWM generation ability, serial communication and low power consumption. Such attributes make Arduino Uno perfect for the given system.



Temperature Sensor - lm35:

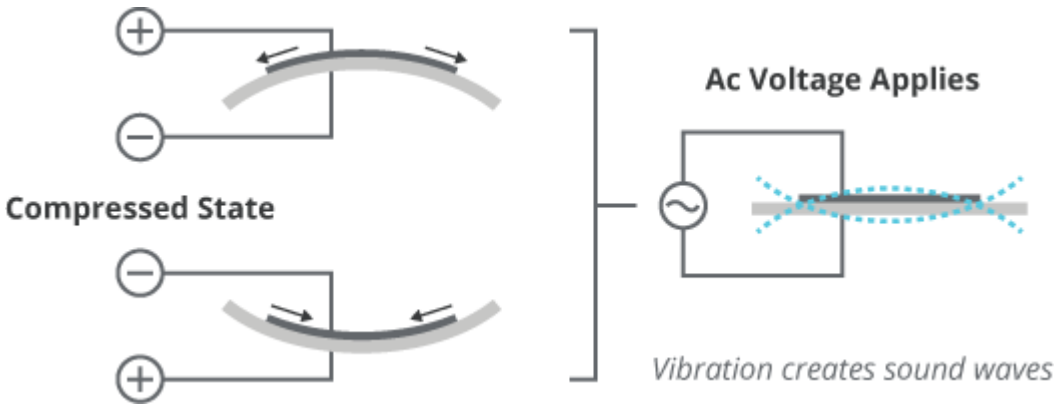
- LM35 is a temperature measuring device having an analog output voltage proportional to the temperature.
- It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry.
- The sensitivity of LM35 is 10 mV/degree Celsius. As temperature increases, output voltage also increases.
  E.g. 250 mV means 25°C.
- It is a 3-terminal sensor used to measure surrounding temperature ranging from -55 °C to 150 °C.
- LM35 gives temperature output which is more precise than thermistor output.

PIEZO BUZZER:

The piezoelectric element is composed of a piezoelectric ceramic and a metal plate held together with adhesive. Both sides of the piezoelectric ceramic plate contain an electrodefor electrical

conduction. Piezo materials exhibit a specific phenomenon known as the piezoelectric effect and the reverse piezoelectric effect. Exposure to mechanical strain will cause the material to develop an electric field, and vice versa.

When an alternating voltage is applied to the piezoceramic element, the element extends and shrinks diametrically. This characteristic of piezoelectric material is utilized to make the ceramic plate vibrate rapidly to generate sound waves.



MINI WATER PUMP:

CODE:

```
int val;
int tempPin = 1;

void setup()
{
  Serial.begin(9600);
  pinMode(13, OUTPUT);
  }
void loop()
{
  val = analogRead(tempPin);
  float mv = ( val/1024.0)*5000;
  float cel = mv/10;
  float farh = (cel*9)/5 + 32;
  Serial.print("TEMPRATURE = ");
  Serial.print(cel);
  Serial.print("*C");
  if(cel>34)
  {
digitalWrite(13, HIGH);
Serial.println("Fan on");

  }
  else {
```

```
digitalWrite(13, LOW);
Serial.print("Fan off");
}
 Serial.println();
 delay(1000);

}
```

WORKING:

Temperature sensor will sense the temperature all time, When fire catches, Temperature sensor will sense the temperature and if temperature cuts the threshold limit,The Buzzer begins to ring and Water will pump out through the Mini water Pump.

CONCLUSION:

In our daily life, whether it's an industry or domestic, the most common and fatal accidents occurred are due

to fire. This results in both human loss and property loss. Fires claim the lives of innocent people around the world every single day. A small amount of fire is able to damage a huge part of a society. Although smoke detectors and fire alarms alert people of danger, they often have few choices other than escaping from a building and calling the fire department. Although waiting for fire fighters to rescue people may not always be the best choice. The modern day home and business should be equipped with at least one fire extinguisher. Using modern fire extinguisher is not so easy and only

a professional user can use it. Fire fighting is a highly technical profession which needs a lot of training and education to become a professional. So using a fire extinguisher is not at all suitable for people's residence. For those purpose automated fire fighting system will be the best choice.

REFERENCES:

[1] M. J. A. Khan, M. R. Imam, J. Uddin, and M. Sarkar, "Automated fire fighting system with smoke and temperature detection," in 2012 7th International Conference on Electrical & Computer

Engineering (ICECE), 2012, pp. 232-235.

[2] K. Li, R. Huo, J. Ji, and B. Ren, "Experimental investigation on drag effect of sprinkler spray to adjacent horizontal natural smoke venting," Journal of hazardous materials, vol. 174, pp. 512-521, 2010.

[3] T. Chen, H. Yuan, G. Su, and W. Fan, "An automatic fire searching and suppression system for large spaces," Fire safety journal, vol. 39, pp. 297-307, 2004.

[4] F. Yuan, "An integrated fire detection and suppression system based on widely available video

surveillance," Machine Vision and Applications, vol. 21, pp. 941-948, 2010.

[5] K. C. Lee and H.-H. Lee, "Network-based fire- detection system via controller area network for smart home automation," IEEE Transactions on Consumer Electronics, vol. 50, pp. 1093-1100, 2004.

[6] Z. Liu, A. K. Kim, and D. Carpenter, "A study of portable water mist fire extinguishers used for extinguishment of multiple fire types," Fire safety journal, vol. 42, pp. 25-42, 2007.

[7] W. Chow, "Proposed fire safety ranking system EB- FSRS for existing high-rise nonresidential buildings in Hong Kong," Journal of architectural engineering, vol. 8, pp. 116-124, 2002.
[8] M. Balaskó and E. Sváb, "Dynamic neutron radiography instrumentation and applications in Central Europe," Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, vol. 377, pp. 140- 143, 1996.
[9] K. L. Su, "Automatic fire detection system using adaptive fusion algorithm for fire fighting robot," in IEEE International

Conference on Systems, Man and Cybernetics, 2006. SMC'06. pp. 966-971.

[10] N. Vaughan and J. Gamble, "The modeling and simulation of a proportional solenoid valve," Journal of dynamic systems, measurement, and control, vol. 118, pp. 120-125, 1996.

[11] S. K. Salman and I. M. Rida, "Investigating the impact of embedded generation on relay settings of utilities electrical feeders," IEEE Transactions on Power Delivery, vol. 16, pp. 246-251, 2001.

[12] R. Richey, "Measure tilt using PIC16F84A & ADXL202,"

Microchip Technology Inc,
1999.

[13] T.-H. Chen, C.-L. Kao, and S.-M. Chang, "An intelligent real-time fire-detection method based on video processing," in Proceedings. IEEE 37th Annual 2003 International Carnahan Conference on, 2003Security Technology, 2003., pp. 104-111.