

DESIGN AND DEVELOPMENT OF AUTOMATIC FIRE DETECTION USING SMS AND VOICE ALERT SYSTEM

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Abstract: In this work a review of existing fire-detector types has been carried out along with the development of a low cost, portable, and reliable PIC microcontroller based automated fire voice alerting system for remotely alerting any fire incidents in industrial premises. During fire emergency response operations, establishment and utilization of situational awareness are of essential importance, enabling first responders, especially incident commanders, to better assess changing on-scene situations and make informed decisions. To keep in mind of the above mentioned situations, our proposed system is designed to alert the distant property-owner efficiently and quickly by sending short message (SMS) via GSM network and voice alerting system. This system guides the usage of Fire extinguisher during the fire accidents. A Linear integrated LM35 sensor detects Fire beyond preset value. The sensor units are connected via common data line to PIC microcontroller. A GSM kit based network module, capable of operating in standard GSM bands, has been used to send alert messages. Therefore the system is called eco-friendly system since the system automated in such a way to replace the conventional practices during fire accidents. The proposed system describes the nature of occurrence of fire and the system used to control them in the source.

Keywords: fire detector, PIC16F77A, GSM Module, Voice Recorder and Fire Extinguisher.

1. INTRODUCTION

With the advancement of human civilization, fire-safety has been a prime concern. Fire hazards can be fatal and denigrating for industrial and household security, also minatory for human life. The best way to reduce these losses is to respond to the emergency situation as quick as possible. So, there comes the necessity of standalone autonomous fire detection systems. These systems render the works of quick detection, alarm notification, and sometimes initiation of fire extinguishing. The systems, equipped with smoke, temperature, pyro-electric sensors can detect unfavorable accidental situations, as it happens, and with the help of a processing unit can alert instantly for undertaking cautious measures. In these fatal situations, early detection and faster alert will yield lesser losses of property and life.

A fire or smoke alarm system can be monitored locally in the premises, or remotely at a distant place as per requirement. Remote alarm system provides the owner of the premise with the advantage of monitoring from distant location and

taking immediate actions when an emergency message is received, unlike a manual system. Remote monitoring systems can be designed in various ways- using wireless sensor networks, Ethernet, image processing and other digital communication technologies [1]-[3]. Although the systems are reliable and have a wide range of pros, they are accompanied by concerns about being complex, uncompact, non-standalone, expensive and having redundant appurtenances. Therefore, there is necessity for a system which would be reliable and swift responsive as well as simple, easy implementable and cost effective.

Fire hazards cause woebegone incidents throughout the world, especially in the developing countries where the fire-safety measures are precarious and often inadequate. Bangladesh, being the cynosure of industrial and household fire accidents in recent years [4] [5], particularly in Ready Made Garments section, is in dire need of tenable, reliable, and easily affordable fire security system which would be cost effective as well. Although a number of advanced systems are used in practical

scenarios, a reliable, easy implementable and cost-effective automated fire-alarm system is not available in developing countries. Therefore in this work, a review of existing fire-detectors is done, and then using one of those detectors a low cost and quick-responsive fire/smoke detection and alarm system has been designed and implemented. The system is capable of sending alert messages via GSM network and activating siren at the premises.

II LITERATURE SURVEY

Kwon, O.H., Cho, S.M. and Hwang, S.M [1] "Design and Implementation of Fire Detection System", In this work a review of existing fire-detector types has been carried out along with the development of a low cost, portable, and reliable microcontroller based automated fire alarm system for remotely alerting any fire incidents in household or industrial premises. The aim of the system designed is to alert the distant property-owner efficiently and quickly by sending short message (SMS) via GSM network. A Linear integrated temperature sensor detects temperature beyond preset value whereas semiconductor type sensor detects presence of smoke or gas from fire hazards. The sensor units are connected via common data line to ATmega8L AVR microcontroller. A SIM300CZ GSM kit based network module, capable of operating in standard GSM bands, has been used to send alert messages. The system is implemented on printed circuit board (PCB) and tested under different experimental conditions to evaluate its performances

Oh-Hyun Kwon , Sung-Min Cho ,Sun-Myung Hwang [2]" Design and Implementation of Fire Detection System", Most of the fire detection are performed by sensor-based systems which have perceived the temperature and smoke by themselves and utilized in various type of industry after combining with the fuzzy theory. Generally this kind of methodology is useful for many spots of fire occurrences. However, it could not satisfy the requirement of accuracy and reliability on some environment. For example, large spaced factories, common area of electric power facility, communication facility are vulnerable to the sensing accuracy and too expensive to cover the entire place. Thus, fire might spread widely over the spots and hard to extinguish even though those sensors detect the fire. For the more it could be worse in the area that causes high temperature, humidity, dust, vibrations. In this study, we tried to improve the problems by using camera image processing instead of sensors. We designed the prototype system and

implemented it after suggesting some type of fire detection algorithm.

Omar Asif , Md. Belayat Hossain, Mamun Hasan, Mir Toufikur Rahman, Muhammad E. H. Chowdhury [3]" Fire-Detectors Review and Design of an Automated, Quick Responsive Fire-Alarm System Based on SMS ", In this work a review of existing fire-detector types has been carried out along with the development of a low cost, portable, and reliable microcontroller based automated fire alarm system for remotely alerting any fire incidents in household or industrial premises. The aim of the system designed is to alert the distant property-owner efficiently and quickly by sending short message (SMS) via GSM network. A Linear integrated temperature sensor detects temperature beyond preset value whereas semiconductor type sensor detects presence of smoke or gas from fire hazards. The sensor units are connected via common data line to ATmega8L AVR microcontroller. A SIM300CZ GSM kit based network module, capable of operating in standard GSM bands, has been used to send alert messages. The system is implemented on printed circuit board (PCB) and tested under different experimental conditions to evaluate its performances.

Lei Zhang¹, and Gaofeng Wang²[4]" Design and Implementation of Automatic Fire Alarm System based on Wireless Sensor Networks" ,Fire disaster is a great threat to lives and property. Automatic fire alarm system provides real-time surveillance, monitoring and automatic alarm. It sends early alarm when the fire occurs and helps to reduce the fire damage. Wireless sensor network has become the most important technology in environmental monitoring and home or factory automation in recent years. In this paper, an automatic fire alarm system based on wireless sensor networks is developed, which is designed for high-rise buildings. In order to provide early extinguishing of a fire disaster, large numbers of detectors which periodically measure smoke concentration or temperature are deployed in buildings. Those scattered detectors report their monitoring information to the surveillance center via the self-organizing hierarchical wireless sensor networks. Test results from the prototype system show that the automatic fire alarm system achieves the design requirements.

Kausik Sen, Jeet Sarkar, Sutapa Saha, Anukrishna Roy, Dipsetu Dey [5]"Automated Fire Detection and Controlling System" ,In this paper basically a low cost fire detection and control system based on smoke and heat detection is proposed. It is comprised of a combination of electrical/electronic devices/equipment's working together to detect the presence of fire and alert people through audio or

visual medium after detection. These alarms may be activated from smoke detectors or heat detectors which, when detects fire. Then, it automatically operates a relay which can be used to send Short Message Service (SMS) to the registered mobile numbers and switch on a water sprayer or a Solenoid Pump to spray water or fire ceasing foam.

III. PROPOSED SYSTEM

5.1 BLOCK DIAGRAM

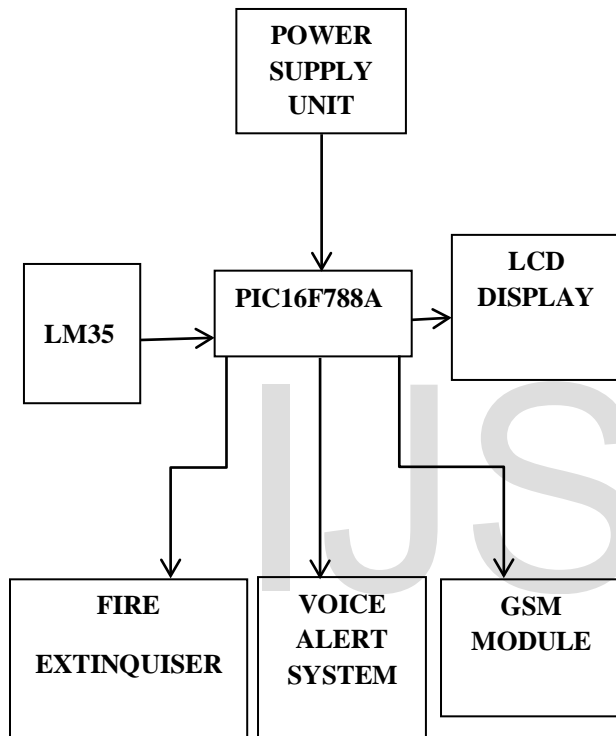
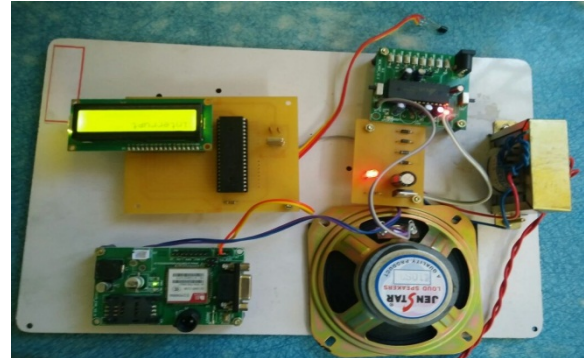


Fig.4 Block diagram of the proposed system

Fig 1 depicts the entire process of the proposed system, in this system the fire is detected with the help of LM35 FIRE DETECTION sensor. Sensor sends a signal to microcontroller. In the next step microcontroller sends an active signal to other externally connected devices. The efficiency and memory of the microcontroller can be increased if microcontroller is used in place of 16f877a. multiple SMS can be send by changing programming GSM module and VOICE alert . To change the SIM card we have to make changes in program. With the help of the fire sensor unit input is given to the pic microcontroller .once the input is given to the microcontroller it under goes the various safety actions for that pic microcontroller is programmed in such a way to undergo process. once the input is given the microcontroller unit gives the output to the

GSM module. GSM module sends the information to the mobile phone in the form of sms to the customer and mean while alerts the entire industry through voice recorder. Voice recorders guide the employees in the correct direction and give instructions for the operation of fire extinguisher.

Working Methodology



In these fire detector is a device that senses fire, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, Arduino software to developing the code for sending an SMS to safety officer or concerned authority person. SMS based Fire Alarm system are very useful in remote locations where human interaction is limited. Voice Alert system combines fire alert system. In this system digital voice technology is used today. Transmitters and a remote Receiver/Speaker Base Unit. When a zone is breached, a signal is sent up to 50 feet to the remote Base Unit. It can be continuously 60s with voice recorder sound.

IV CONCLUSION

In this paper, from our above work, we can conclude that this proposed system can provide a safe, secure and efficient way for avoiding accidents. The proposed system, which is installed at the industry, consists of LM35 fire sensor, GSM module, PIC microcontroller unit, Voice recorder and Fire extinguisher. This component performs four different operations and the input is given to the PIC microcontroller under critical condition and it automatically undergoes the prevention actions and our proposed idea can give benefit to the industries by saving their life during accidents using the automatic voice recorder instructions to operate the fire extinguisher. GSM is placed inside the system in order to send the up to date information about the status of surrounding area to the company IP address. By implementing this modern fire safety system in actual practice, due to more safety, industries can not only gain more benefits, but also, we can bring our safety system towards global standards.

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