



Implementation of GSM Based Fire Fighting Robot

Anjitha Krishnan¹, Athira Paul², Fathima Shermin³, Merlin Jose⁴, Merin Skariah⁵

B.Tech Student, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India^{1,2,3,4}

Asst. Prof, Dept. of ECE, HKCET, Pampakuda, Ernakulam, Kerala, India⁵

ABSTRACT: Our project 'Implementation of GSM Based Fire Fighting Robot' develops a multiple sensor based robot. This system detects the fire using four temperature sensors attached to the fire fighting robot that continuously monitors the temperature. If the value of temperature increases above the predetermined value, then the buzzer sounds to notify the contingency of fire mishap and at the same time a warning message will be sent to the corresponding industry with the help of a GSM module provided to it. In case, if robot comes across any obstacles that are sensed by ultrasonic sensors, then it deviates the path of robot by avoiding the obstacle, thereafter robot moves to the direction to which the temperature is recorded to be the relatively very high among the four sensors and extinguishes the fire with water pump provided to it.

KEYWORDS: Fire detection, Obstacle detection, Control station, Fire extinguish.

I. INTRODUCTION

Fire fighters nowadays come across with dangerous situations when they extinguish fires and it is an unavoidable part of being a fire fighter. This paper consists of four main sections. This includes obstacle avoidance, fire detection, pumping water as well as passing the message to the control room. All these sections are a mixture of hardware and software. Here, robot can operate by itself if power supply is kept on. Also, robot decrement the necessity for fire men to get into dangerous situations.

This robot concentrates on the following concepts: sensing of environment, motor control, alert message to control room. This robot processes information from its different sensors and main hardware elements through microcontroller. It uses ultrasonic sensor in which obstacles in the way are found out and avoid them and simultaneously track the fire using temperature sensors which are fixed in four directions in the system and are equally spaced. Once the temperature is detected that is above the threshold value, the robot sounds the alarm with the help of buzzer provided to it. In addition to this, information is given to control station via GSM. When it reaches near the fire, the DC water pump works and the water from the container is made to pour over the fire thereby extinguishing it.

II. RELATED WORK

The system [1] by Tawfiqur Rakib and M. A. Rashid Sarkar is based on simple algorithm of arduino used for detection of fire and also for calculation of distance from fire attack area while the robot is on its way to extinguish fire. Whenever there is fire detected and when robot reach near to fire, a centrifugal pump is used to put out the fire. Here, a water spreader is used for extinguishing. In this system [1] sensors used were LM35 and Flame Sensors in order to detect the fire and distances towards the fire. Another system [2] is Intelligent Fire Extinguisher System introduced by Poonam Sonsale which was one method of fire fighting. In this multiple sensors like smoke sensor, flame sensor and temperature sensors are used to detect fire accident. This system is proposed to detect the hazardous situations. System will notify by sending a warning about the fire accident. According to sensor based method robot is programmed. Fire is detected and water is poured using sprinkler. System [3] states that fire extinguishing robot based on multiple sensors in which it is constructed using aluminium frame. This robot consists of six systems which includes obstacle avoidance

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 3, March 2017

system, driver system, software part, fire detection system with the help of two flame sensors. In this, fire detection and fire fighting procedure were programmed using various sensors.

III. PROPOSED METHODOLOGY

For cost effectiveness and reducing threat to human life, proposed system is introduced. This system will replace manual effort by detecting and extinguishing fire itself. This will reduce human effort and safeguard the life of man.

3.1 Block Diagram

This project contains mainly four sections: obstacle avoidance, fire detection, pumping water and alert message to the control room. The heart of our robot is Arduino microcontroller which processes various information and put into action according to the input it gets.

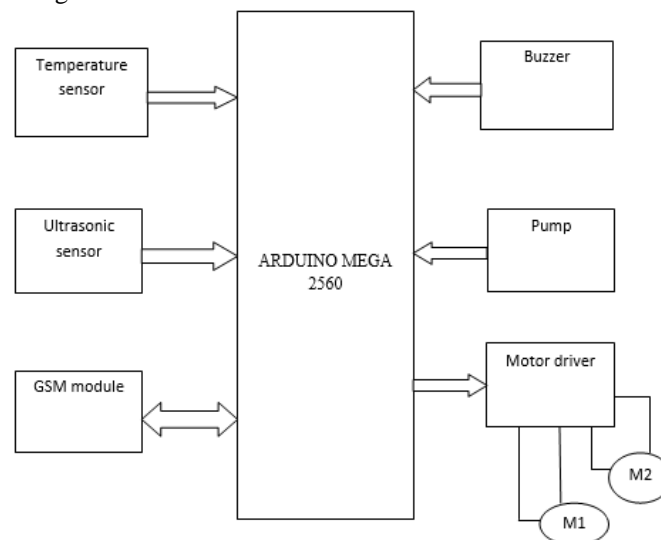


Figure 1. Block Diagram

In this, robot which could run automatically, avoid obstacles simultaneously find and track fire and extinguish it. Robot senses the fire using temperature sensor (LM35). Furthermore, information (GSM) is given to control station. Here the fire is detected using temperature sensors which are fixed in four directions in the system (equally spaced). Using Ultrasonic (PING) sensor, obstacles in the way are found out and the robot is moved avoiding the obstacles. When it reaches near the fire, robot stops suddenly then water pump sucks the water from container and is poured over the fire thereby extinguishing it.

IV. HARDWARE IMPLEMENTATION

Arduino based Atmega 2560 controller is used to implement this hardware. All the temperatures sensors are connected to the analog pins of microcontroller. Ultrasonic sensor pins are connected to corresponding pins. Motor driver L293D receive 12V from power supply. Each DC motor is connected to the IN1,IN2 and IN3,IN4 of the driver IC. Water Pump is connected to digital pin. LCD 16*2 is used to display temperature value of four sensors and distance of ultrasonic sensor. GSM SIM300 is used and its receiver pin is connected to transmitter pin of microcontroller. This is connected to send alert information to control station.

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 3, March 2017

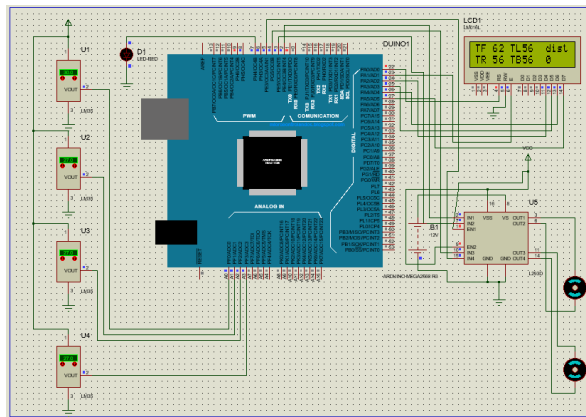


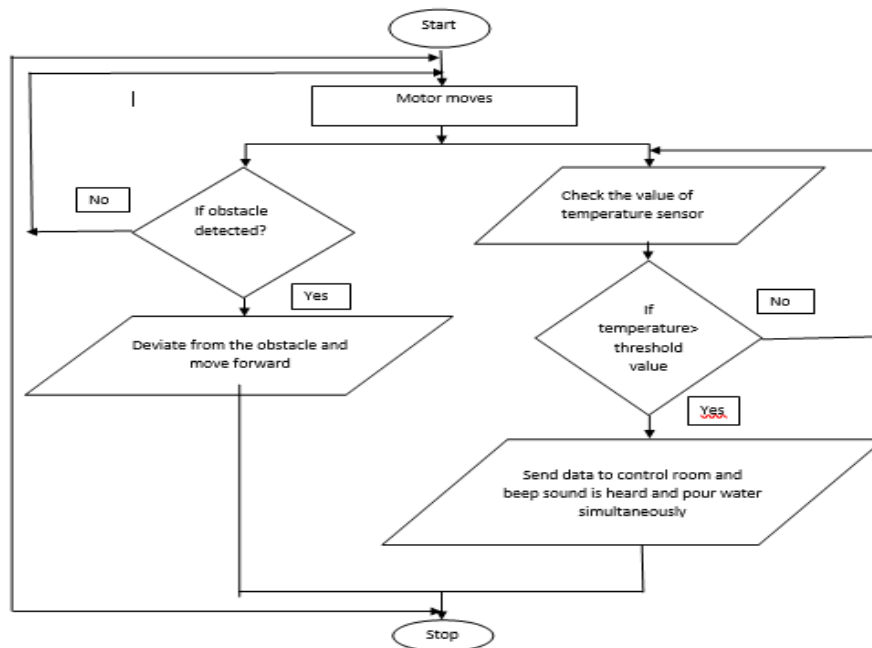
Figure 2.Circuit Diagram

4.1 Software

4.1.1 Language Used

To program Arduino, C programming language is used. It is a basically structured programming language as well as an object oriented programming language. C program along with arduino library files are used for the software part of this project. There are 2 main functions for the basic structure this program. The set of program codes that are to be executed only once are included in void setup() function. Moreover, those program codes that are required to execute repeatedly are written in void loop() function. Both these functions are inbuilt functions in the program itself. This programming language is easier to code.

4.1.2 Flowchart



International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirccce.com

Vol. 5, Issue 3, March 2017

V.RESULTS AND DISCUSSION

Finally, all the values of various temperature sensors and distance from obstacle was viewed using an LCD. The whole setup is mounted on wooden case and also the case was extended to accommodate water tank. Appropriate voltage is given to each sections using regulator. Ultrasonic sensor is attached at the front side of the robot to detect the obstacle in its forward motion and all the four sensors are placed on front, left, right and back side of the robot. Water storage facility is maintained at the centre of top platform which enables to pump water to extinguish fire.

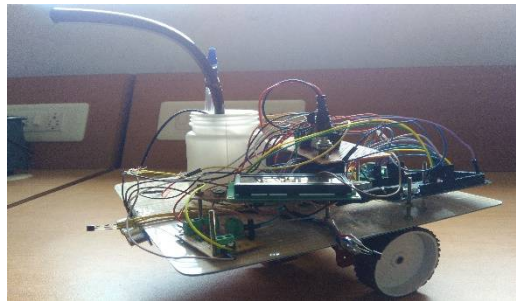


Figure 3. Prototype

VI.CONCLUSION

This prototype is introduced to help fire men to avoid the risk situations. It deals with obstacle detection, temperature sensing and fire extinguishing. Also, robot can easily pump water to the fire destination according to the temperature sensor values. By introducing this system in industries and other factories, fire accident rates can be decreased.

REFERENCES

1. Tawfiqur Rakib, M. A. Rashid Sarkar, "Design and Fabrication of an Autonomous Fire Fighting Robot with Multisensor Fire Detection Using PID Controller", *IEEE 5th International Conference on Informatics, Electronics and Vision (ICIEV)*, PP. 909-914, 2016.
2. Poonam Sonsale, Rutika Gawas, Siddhi Pise, Anuj Kaldate, "Intelligent Fire Extinguisher System", *IOSR Journal of Computer Engineering (IOSR-JCE) e-ISSN: 2278-0661, p- ISSN: 2278-8727 Volume 16, Issue 1, Ver. VIII, PP 59-61, Feb 2014.*
3. Ting L. Chien, Jr H. Guo, Kuo L. Su', Sheng V. Shiau, "Develop a Multiple Interface Based Fire Fighting Robot", *Proceedings of International Conference on Mechatronics Kumamoto Japan, 8-10, PP 1-6, May 2007.*
4. Saravanan P, "Design and Development of Integrated Semi - Autonomous Fire Fighting Mobile Robot", *International Journal of Engineering Science and Innovative Technology (IJESIT) Volume 4, Issue 2, PP. 146-151, March 2015.*