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Fire Fighting Robot for Automatic Fire Detection and Alert System

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ABSTRACT:
In todays modern era, by doing industrial survey it is observed that, now a days if any fire incident happens in building, power plant, etc, the time consumption of human power is high. So there may be a possibility of heavy damage to human beings. A fire fighters work entails detecting and extinguishing fire. In this rapidly involving technological era, the word is gradually moving toward automated systems. Fire fighters on other hand, are often in danger of losing their lives. The majority of the death were caused by toxic gases found in the fire fighting environment. As a result, in order to resolve these issues, our system was developed. The elimination of fire before it spreads aways will avoid catastrophic effect.

Keywords: Arduino UNO, IoT, Arduino IDE, etc.

I. INTRODUCTION

The flame fire sensor module project is based on arduino microcontroller. This system is used to detect the flame using fire sensors. We are going use three fire sensors for different part of robot body. First sensor is going to place on right front side of robot body, second sensor is going to place middle front side of robot body and lastly third sensor is going to place on left side of robot body. Also we are going to use L298 motor driver IC for controlling the robot movement and MQ2 LPG gas sensor to detect the smoke. All the components going to attached on robot. When all data collects from sensors then it will sends to user for that purpose we are using GMS system. The data will send to SIM 900L GSM Model which going to send message to user for alert purpose. The main advantage of flame fire sensor module system is that the robot will automatically change the direction of fire and move accordingly towards fire. When robot detect the fire place then it will take action, using relay through it will start water motor and stop the fire. The servo motor use for connecting water movement. All the process of system going to show on LCD with the help of i2c converter.

II. OBJECTIVE

- Design and development of low cost fire fighting robot.
- Run Automatically fire fighting robot.
- Extinguish the small scale as well as large scale fire.
- To alert the user about upcoming fire.

III. LITERATURE SURVEY

IOT Based Fire Detection Robot - Satya Ranjan Das, Santosh Kumar Behera, Mihir Narayan Mohanty:

The GSM modem transmits the data collected using sensors mounted on the robot. The robot is semi-autonomous, so responds to the data with some specific actions for which it is programmed. For example, fan starts when data indicates that there is fire or gas leakage. The Attention commands are transferred to the electronic devices. In reverse, the electronic device transfers the stored messages from the wireless module. The micro controller checks the IoT command and after validating the command it performs further certain task on the robot or device. The micro controller used here in this project is ATMEGA 328 incorporated in an Arduino UNO board. The whole device will actuate when the user need information or data in a form of messages like work like" Harmful threat detected" through the

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SIM card which is inserted in the mobile phones or smart phones.

Design and Implementation of an IoT Based Firefighting and Affected Area Monitoring Robot - Hossain, Md Anowar & Sarowar, Md & Hossain, Md. Azad & Khondakar, Md. Fazlul Karim & Roy, Himaddri:

In the indoor of an industrial organization, the robot is placed at the place where fire accidents can happen. A microcontroller and sensors are used to operate this robot. If there exist any fire signal, the sensors will send the information to the central co-ordinator unit. The co-ordinator unit is the brain of the robot. It makes decisions based upon the sensor signals. The whole system includes a camera, sensors, a Microcontroller unit, and motors.

IOT based fire fighting robot - Kanwar, M., & Agilandeeswari, L.:

The objective of this system is to design an IOT based Fire Fighting Robot which can replace the traditional Fire Protection Robot. This robot will send a fire alert to the cloud

Fire Extinguishing Robot using IoT - Shilpa Kappalguddi, Sangharsha Madvanna, Sujata Tupale, Rakshanda Patil:

The design consists of array of sensors and two Node MCU. The firefighting robot is connected with Node MCU through wireless medium. If a node detects fire, it will notify that to the central Node MCU. Central Node MCU will sends information to fire safety officers and initiate robot to perform Firefighting actions and start the pump to extinguish the fire

IV. PROBLEM STATEMENT

Fire is usually get caught in such a place where it is tremendously tough to reach due to which fireman has to face problems along with fire poisonous gas come out which cause suffocation to death. Thus, the robot is suitable to deal with challenging problem. A robot is a habitually directed machine which able to do tasks on its own. This project, which is our attempt to design a fire robot. This has capability to detect fire and extinguish it. This robot procedure information from its several sensor and key hardware elements through microcontroller.

V. GOAL

In this Project we aim to reduce the effect of fires accidents which usually start from small flame , therefore people life and money would be saved.

VI. PROPOSED SYSTEM

The Arduino UNO development board issued to control this firefighting robotic system. A gas sensor (MQ2) for sensing hazardous smoke, and a fire flame sensor (IR) for detecting and sensing the approaching fire are all mounted on a servo-motor for obstacle detection and free path navigation, by using L293 motor Driver. In addition, for extinguishing the flames, it also makes use of a water tank and a spray gun mechanism. With the aid of a 5 V pump, water is pumped from the main water tank to the water nozzle. Along with the GSM module (SIM 800L) connected to the Arduino Uno to alert the user ,by sending a message.

Advantages of Proposed System:

- It will help to detect the small as well as large fire and Gas.
- It will Eliminate the fire.
- 24*7 operation
- Low cost solution to make the surrounding safe
- Easily portable

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VII. SYSTEM ARCHITECTURE

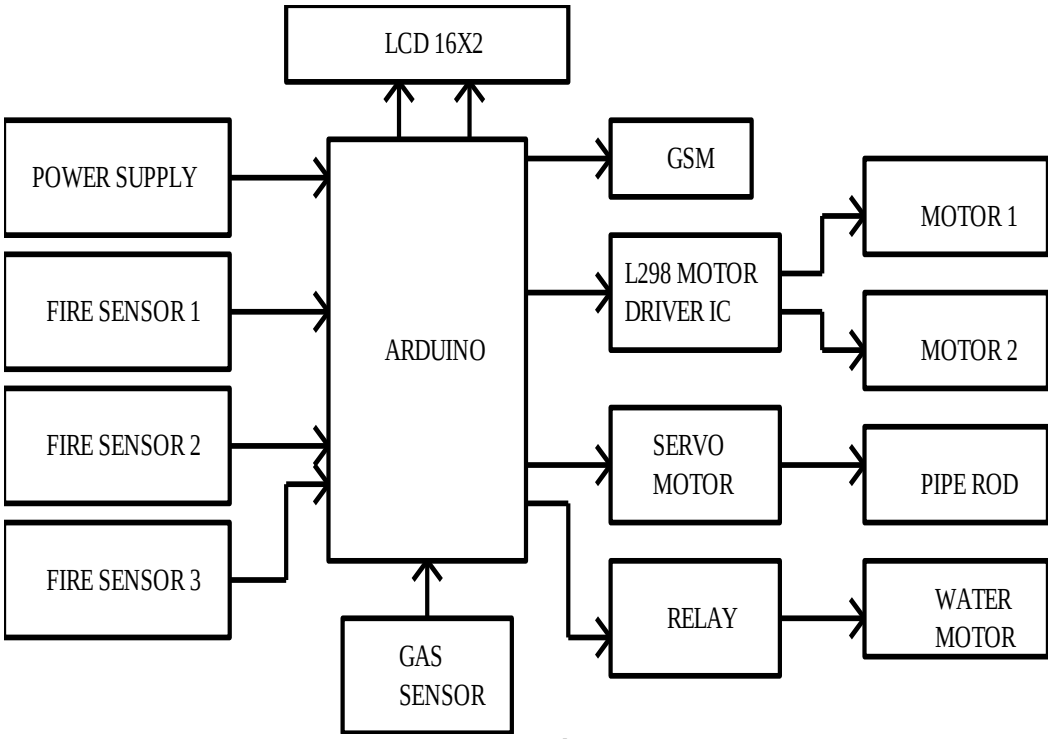

Fig.System Architecture

VIII. METHODOLOGY :

In flame fire sensor module project is based on arduino microcontroller. This system is used to detect the flame using fire sensors. We are going use three fire sensors for different part of robot body.

First sensor is going to place on right front side of robot body, second sensor is going to place middle front side of robot body and lastly third sensor is going to place on left side of robot body. Also we are going to use L298 motor driver IC for controlling the robot movement and MQ6 LPG gas sensor to detect the smoke.

All the components going to attached on robot. When all data collects from sensors then it will sends to user for that purpose we are using GMS system. The data will send to SIM 900 GSM Model which going to send message to user for alert purpose.

The main advantage of flame fire sensor module system is that the robot will automatically change the direction of fire and move accordingly towards fire. When robot detect the fire place then it will take action, using relay through it will start water motor and stop the fire.

Applications:

- This type of technology can be used in industry to detect and eliminate the fire easily without any manual operation.
- This technology can be used in domestic as well as government building, offices.
- We can use this in public places like school, cinema, theatre, shopping malls, Bus stops, etc.

Disadvantages:

- Sometimes when GSM module is out of range then it will be difficult send message to user.

CONCLUSION

IN THIS PROJECT BY CONSIDERING ALL THE SITUATIONS AND POSSIBILITY, WE DECIDED THE SPECIFICATION FOR PROJECT AND CHOSEN COMPONENTS AND SENSORS WHICH ARE HELPING TO ACHIEVE THE DESIRE TARGET. Whereas due to the use of Arduino development tools, reduce difficulties during programming & troubleshooting was reduced. We believe that after installation of this project, the robot can successfully find fire and

reach it without running into obstacle. Also it will alert us about the fire or gas on our mobile phones.

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