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FIRE FIGHTING ROBOT

Shiv Nath Dwivedi [1],Smriti Shukla [2], Supriya Tiwari [3]

Mr. Prabha Kant Dwivedi (Assistant Professor) [4]

Department of Electronics and Communication Engineering [1,2,3]

Department of Electronics and Communication Engineering [4]

Buddha Institute Of Technology ,Gida ,Gorakhpur U.P.,273209

Dr. A.P.J. Abdul Kalam Technical University Lucknow U.P., 226031

Email: bit18ecl07@bit.ac.in smritishukla251@gmail.com , itssupriyahear@gmail.com

Abstract

This paper presents the development and implementation of mode firefighting robot. The proposed fire extinguishing robot works in either automatic or manual mode. The operation of robot is monitored and controlled by Arduino UNO microcontroller. Fire Fighter is a robot designed to use in such extreme conditions. It can be operated and controlled by remote user and has the ability to extinguish fire after locating the source of fire. It is equipped with a monitoring system and operates through a wireless communication system. Complete robot model is simulated using Proteus. The hardware of proposed fire extinguishing robot is implemented and tested. A surveillance camera is mounted on the robot to monitor the movement of robot under manual mode. Real time surveillance can also be obtained from the camera in automatic mode. In automated mode, robot will detect the fire and move to the fire location and water will be pumped to extinguish the fire. In manual mode, user is able to control the whole movement and the pumping action of robot. Location of fire can be detected with the help of camera of robot. After the water is pumped, fire is extinguished to ground level.

Keywords—Robot; Arduino; Proteus; Flame sensor ,motor driver

I. INTRODUCTION

This advanced firefighting robotic system independently detects and extinguishes fire. In the age of technology, the world is turning rapidly towards the automated system and self-travelling vehicles, Human as a fire fighters are constantly at a risk of losing their life. Fire spreads rapidly if it is not controlled. In case of a gas leakage there even may be an explosion. So, in order to overcome this issue, safe guard live of our hero, our system comes to the rescue. This firefighting robotic system is powered by Arduino Uno development board it consists of the ultra-sonic sensor mounted on a servo motor for obstacles detection and free path navigation, it is also equipped with the fire flame sensor for detecting and approaching fire it also makes use of water tank and spray mechanism for extinguishing the fire. Water spraying nozzle is mounted on servo motor to cover maximum area. Water is pumped from the main water tank to the water nozzle with the help of water pump.

II. FIRE FIGHTING ROBOT IN FIRE EXHAUSTING

Fire fighting robot used in time of an emergency like fire catches objects and objects going to burned. In this situation an automated fire fighter robot needed where fire can be exhaust without human fire fighter life keeps in dangerous.Our electronics field able to invent more powerful and accurately to sense Fire and exhaust immediately.it can be established in Server room, Library, Shopping mall, etc. some picture of incident of fire catching given below.

1. (a) Server Room

1. (b) Library

1. (c) Garment shop

III. LITERATURE SURVEY

we see that many times Humans as a fire fighter job have their life in dangerous during exhausting fire, so we decided to make an automated robot who capable for exhaust fire without human life in dangerous so In this research paper we have developed a fire an open source microcontroller Arduino UNO Atmega328 based electronic device who capable to automatic detect fire with the help of flame sensor connected with the Arduino Uno and it can be exhaust using gas or water.[1] We read various research paper as their references mentioned in this paper. We got that flame sensor can be used as a fire detector and water pump can be used to exhaust the fire.[2]

with the help of relative component we achieved our target.

We have decided to connect our project with IOT for real time status. It could be possible through GSM module. We upgrade our device in future. [3]

IV. PROBLEM FORMULATON

At the time of making this device we have faced some issues like flame sensor automatically work on sunlight, water pump started automatically in sunlight so this device can be used where sunlight cannot be scatter. it can be used only in Large hall room like data center, book shop, garment shop etc

We feel that real status fire catching to fire exhausting operation should be received in nearest emergency help line like 112 and 108 and it could be monitored from there.

The status of fire catching and exhausting should be send the nearest hospital in the case human life in dangerous due to Fire.

V. METHODOLOGY

An automatic firefighting robot has been designed and proposed in this study. This robot used 3 flame sensors to

detect the fire.

Each sensor on the robot is controlled by the Arduino. Apart from the sensors, the robot is also equipped with the water tank that provides water once the fire is detected. The robot will move randomly in the room when the power is on. When the flame sensors detected the fire, the robot will move to the fire source and send a warning message to the user. Once the robot reached the burning area, it will stop at a certain distance and extinguish the fire by using water.

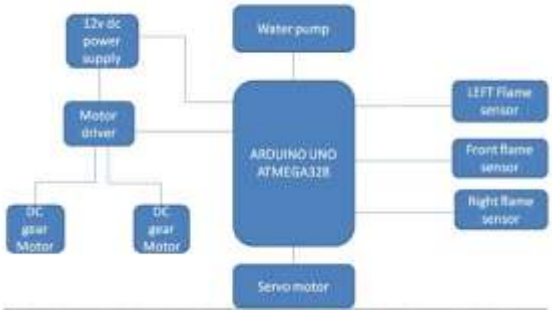

Fig: V(a) Purposed block diagram of Fire Fighting Robot.

VI. CIRCUIT DIAGRAM

Circuit diagram for fire fighting robot shown in fig VI(a). in which we debug all the component like Flame sensor LM293 motor driver servo motor and pins.

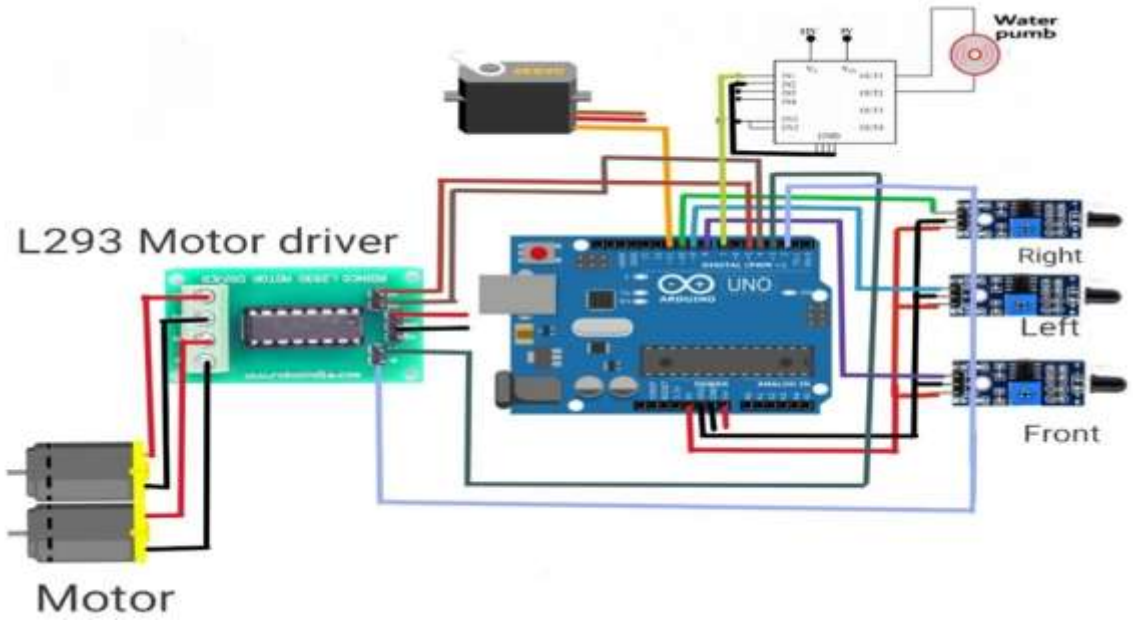

Fig: V (a) circuit diagram for fire fighting Robot

VII. ADVANTAGES AND SOCIAL BENEFIT

- To detect the exact direction of the fire source.
- Capability of sensing accuratiy with increased flexibility.
- Reduce human effort.
- Not sensitive to weather conditions.

Reliable and economical.

VIII. RESULT AND OUTCOMES

The final configuration of an Automatic Fire Fighting Robot with notification. The control circuit is located at the top of the robot body. The size of the robot is (26 x 16 x 18) cm. The robot will operate in the auto mode after switch on, it will move randomly in house, office or any place that required early fire extinguisher. During the auto mode, if there is no fire detected, it will keep on moving and scanning. Meanwhile, if fire detected, it will move toward the fire source and activate the water pump to pump the water to extinguish the fire. If the left flame sensor detecting fire, the left sensor will send the data to Arduino telling that the fire is at the left-hand side, the Arduino will send the command to the motor driver to turn the robot to left direction. The robot will remain turning to left direction until the front flame sensor detecting fire. When the front sensor detecting fire, the sensor will send the data to Arduino to tell the Arduino that there is a fire in front of it. Then the Arduino will send data to the motor driver shield and motor driver will activate the motors to move the robot backward the fire if the fire is too close to the robot. Otherwise, if the fire is too far from the robot, the motor driver will activate the motors to move the robot forward to the fire. This process will be the same if the right flame sensor detecting fire.

Fig: VIII(a) back View

Fig VIII (b Front View

Fig VIII (c) Top View

Fig:VIII(d) internal view

IX. CONCLUSION

We have presented a design for a fire extinguishing robot, mathematical modelling for the robot. We used SolidWorks to design the bed, the modelling of the system was verified by MATLAB. The prototype of Fire Fighting Robot can frequently be modeled, designed and developed in the way as explained above. It can run and avoid obstacles in the direction provided by the controller. This can extinguish the fire within its range defined by its indoor arena. It is concluded that desired results and verified model may be used for the control, design and development of a fire extinguishing robot. A control design will produce precision and accuracy.

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