

FIRE FIGHTING ROBOT

*Dr. N. RAJASHEKAR VARMA¹, DURGAM SAI², V. DIVYA SREE³, G. SAI CHARAN⁴, CH. ANJIAH⁵
Professor¹, B.Tech students^{2,3,4,5}
Dept of EEE, TEEGALA KRISHNA REDDY ENGINEERING COLLEGE.*

ABSTRACT

According to National Crime Records Bureau (NCRB), it is estimated that more than 1.2 lakh deaths have been caused because of fire accidents in India from 2010-2014. Even though there are a lot of precautions taken for Fire accidents, these natural/man-made disasters do occur now and then. In the event of a fire breakout, to rescue people and to put out the fire we are forced to use human resources which are not safe. With the advancement of technology especially in Robotics it is very much possible to replace humans with robots for fighting the fire. This would improve the efficiency of firefighters and would also prevent them from risking human lives. Today we are going to build a Fire Fighting Robot using Arduino, which will automatically sense the fire and start the water pump. A fire outbreak is a hazardous act that leads to numerous consequences. Detecting a fire at an early stage and extinguishing it can aid in prevention of various accidents. Till now we rely on human resource. This often leads to risking the life of that person. Therefore, fire security becomes an important aspect to save human lives. In this paper a fire extinguishing robot has been proposed and designed which detects the fire location and extinguish fire by using sprinklers on triggering the pump. This robot uses three flame sensors for accurate fire detection. This proposed model of Fire Extinguishing Robot using Arduino used to detect presence of fire and extinguishing it automatically without any human interference. It contains gear motors and motor driver to control the movement of robot when it detects any presence of fire and will automatically start the water pump to extinguish that fire breakout. This model robot has a water ejector which is capable of ejecting water at the fire breakout place. The water ejector pipe can be move towards the required direction using servo motor. The whole operation is controlled by an Arduino UNO micro-controller.

INTRODUCTION

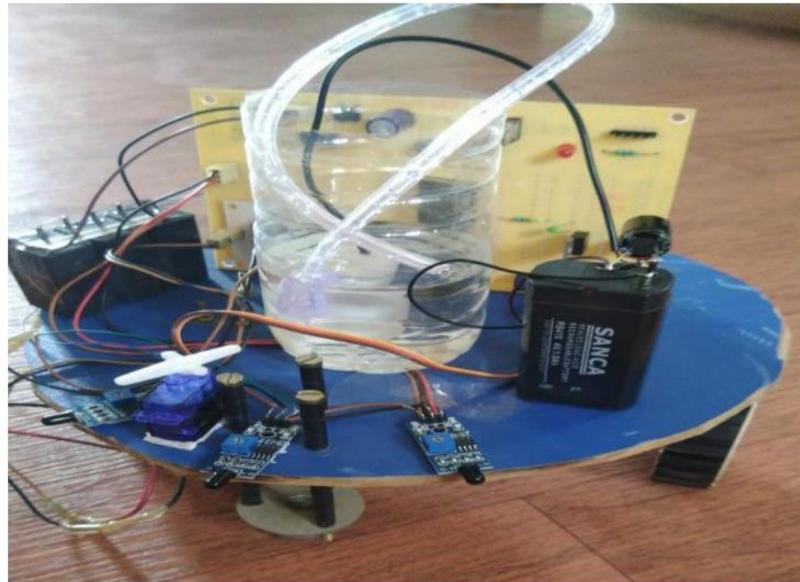
The project aims in designing a robot which is capable of detecting a Fire and it can pump water towards fire by using DC water pump. The robot moves autonomously and upon detection of fire it moves in that direction pumps that water to extinguish the fire. It uses servo motor to move the water jet to maximize the water spreading area. The fire detection mechanism is done by a Fire sensor that makes uses finding the fire to the nearer area. The Robot is made up of DC motors. The predetermined instructions are already loaded in to the Microcontroller by Using Embedded C Programming. All the above processes are controlled by the Microcontroller. The controlling device of the whole system is a

Microcontroller which is aided with flame sensors, microcontroller and there are two DC motors used to Drive The robot in Left Right and To and Fro Motions, The Microcontrollers used in the project are programmed using Embedded C language.

This robot is designed in such a way that there is no requirement of manual attention towards it. This project utilizes two DC Motors respectively. The DC motor generates torque directly from DC power supplied to the motor by using internal commutation, stationary permanent magnets, and rotating electrical magnets. It works on the principle of Lorentz force, which states that any current carrying conductor placed within an external magnetic field experiences a torque or force known as Lorentz force. Advantages of a brushed DC motor include low initial cost, high reliability, and simple control of motor speed. Disadvantages are high maintenance and low life-span for high intensity uses. Maintenance involves regularly replacing the brushes and springs which carry the electric current, as well as cleaning or replacing the commutator. These components are necessary for transferring electrical power from outside the motor to the spinning wire windings of the rotor inside the motor. The driver used for DC Motors is L293D. The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors.

PROPOSED SYSTEM

This project makes use of a micro controller, which is programmed, with the help of embedded C instructions. This Microcontroller is capable of communicating with input and output modules. The controller is interfaced with dc motors, which are fixed to the Robot to control the direction of the Robot. 1.2 Project Overview: An embedded system is a combination of software and hardware to perform a dedicated task. Some of the main devices used in embedded products are Microprocessors and Microcontrollers. Microprocessors are commonly referred to as general purpose processors as they simply accept the inputs, process it and give the output. In contrast, a microcontroller not only accepts the data as inputs but also manipulates it, interfaces the data with various devices, controls the data and thus finally gives the result. The Autonomous Fire Fighting Robot with wireless camera by using 16F877A Microcontroller is an exclusive project that can move the robot according to the instructions given by the above said microcontroller. If a camera is fixed to the Robot, this project enables the user to capture the image in any direction using a wireless camera which is connected to a robot that can move with the speed and direction specified by the user.



Fire Fighting robot

The project “Fire Fighting Robot” was designed such that Robot can move either Forward, left side or right side and it can also used to detect any obstacle that comes near to robot using three fire sensors and changes its direction. The Robot system also detects fire in its way and automatically uses the extinguisher.

Advantages

1. Automatic detection of fire in its way.
2. This system helps in earlier detection of fire accidents.
3. Automatic extinguishers are used in case of fire accident.
4. Lives of human beings and the rate of damage can be reduced.
5. Efficient design.
6. Low power consumption.
7. Automatic change of direction.
8. Fast response.

Disadvantages:

1. Long exposure of sensors to poisonous gas/smoke may decrease its sensitivity.
2. Deliberate exposure may sometimes cause wrong indications.
3. Flame sensor sometimes responds to the Sunlight because of Infrared Rays presence in it.

Applications:

1. This system can be implemented as FIRE-fighting Robot.
2. This system can be used in places where there is a chance of fire accidents like hotels, industries, hospitals, cinema halls etc..

Our project “Fire Fighting Robot” is mainly intended to design a Robot, which is capable of detecting obstacles present in its way. The flame sensors with alerting system interfaced to the microcontroller and programmed in such a way that it alerts if the level of flame of light exceeds the set level and temperature rises beyond the set level and also switches ON the extinguisher DC Water pump This project can be extended by introducing GSM module, which sends alert intimation to the respected authorities (say. Fire station) This project can be extended using multiple ultrasonic sensors and a PIR sensor, this robot becomes capable of detecting human beings in the apartments. In future we can use this project in several applications by adding additional components to this project. By connecting wireless camera to the robot, then we can see the outer world from our personal computer only by using GPRS and GPS. We can use this robot at so many fields and we can use to handle so many situations. By connecting bomb detector to the robot, we can send it to anywhere i.e (battle field, forests, coal mines, to anyplace) by using our personal computer and we can able to detect the bomb at field, here sensor detects the bomb and gives information to micro controller and it gives the information to transceiver and it sends the information to the personal computer. By connecting temperature sensor to the robot we can get the temperature of dangerous zones in personal computer itself instead of sending human to there and facing problems at field we can send robot to there and sensor will detect the temperature and it gives information to the micro controller and micro controller gives the information to the transceiver from that we can get the data at pc side. By connecting smoke sensor to the robot we can get the information related concentration of smoke or gases in respective field’s i.e. (coal mines, dangerous zones, etc). sensor sense the information and it give to the micro controller and it gives to the transceiver and from that we get the information in personal computer. By connecting corresponding instruments to the robot we can use it in agriculture for farming purpose. This robot can move either forward and backward and left and right depend upon our instructions so we can do some part of agriculture from pc only by using robot. By connecting firing instrument and wireless camera to the robot we can FIRE the target from pc. Here by using camera we can see the opposite target and we can FIRE the target from personal computer by pressing selected button and we can easily handle the situations like Mumbai terrorist’s attack without loss of human life’s and we can decrease our soldiers effort too.

CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of

the unit. Secondly, using highly advanced IC's with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

REFERENCES

1. www.wikipedia.com
2. www.allaboutcircuits.com
3. www.microchip.com
4. www.howstuffworks.com
5. Raj kamal –Microcontrollers Architecture, Programming, Interfacing and System Design.
6. Mazidi and Mazidi –Embedded Systems.
7. PCB Design Tutorial –David.L.Jones.
8. PIC Microcontroller Manual – Microchip.
9. Pyroelectric Sensor Module- Murata.
10. Embedded C –Michael.J.Pont