

Fire Fighting Robot

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Abstract

There are several possibilities of fire in any remote area or in an industry. For instance, in garments, go downs, cotton mills, and fuel storage tanks, electric leakages may result in immense fire & harm. In the worst of cases & scenarios, fire causes heavy losses both financially and by taking lives. Robotics is the best possible way to guard human lives, wealth and surroundings. The control circuitry of the robot is built on Arduino UNO. There are four fire sensors interfaced in the control circuitry in the forward, left, right and back side of the robot.

A motor is attached on the robot which will actually simulate the functioning of a water pump. This is a prototype model. Apart from the component's interfacing in the circuit, the main significance is of the Arduino sketch running on the controller circuit. It is the Arduino sketch which provides the software intelligence to sense fire intensity using fire sensors, move robot in the direction where fire intensity is more and increase or decrease speed of motor pump. The Arduino sketch is written and compiled using Arduino IDE.

Keywords: *Arduino UNO, Fire sensors, Arduino IDE*

I. INTRODUCTION

Robotics is one of the fastest growing engineering fields of today. Robots are design to remove the human factor from labor intensive or dangerous work and also to act in inaccessible environment.

The use of robots is more common today than ever before and it is no longer exclusively used by the heavy production industries. The need fire extinguisher robot that can detect and

extinguish fire on its own in long past due

A Firefighting robot is designed and built with an embedded system. It is capable of navigating alone on a modeled floor while actively scanning the flames of fire. The robot could be used as a path guide in a fireplace device or, in normal case, as an emergency device. This robot is designed in such a way that it searches a fire & extinguish it before the fire could spread out of range & control. This type of firefighting robot will later work with firefighters, thus greatly reducing the danger of injury to victims.

HARDWARE DETAILS

Arduino is open source computer hardware and software Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits.

Flame sensor uses a solid-state technique to determine the temperature. By precisely amplifying the voltage change, it is easy to generate an analog signal that is directly proportional to temperature.

SYSTEM BLOCK DIAGRAM

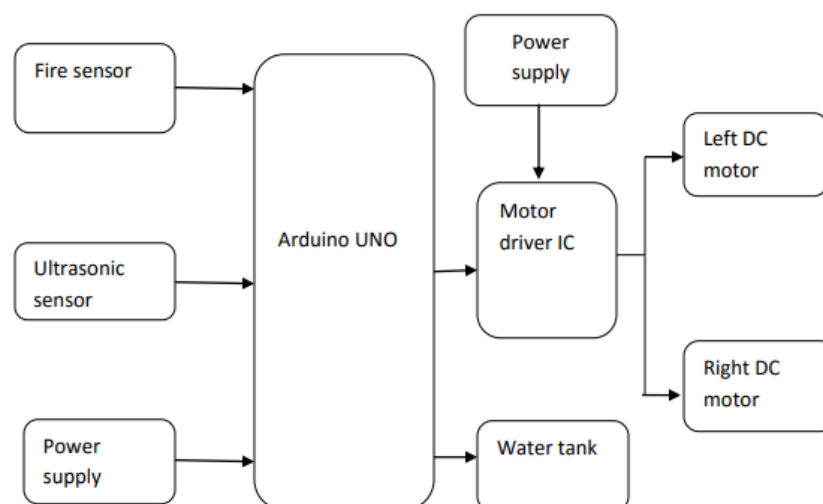


Fig. block diagram of firefighting robot

Ultrasonic transducers are divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

L293D DC Motor Driver IC is a dual H-bridge motor driver integrated circuit (IC). The Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.

Water pump is a device that moves fluids (liquids or gases) by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: direct lift, displacement, and gravity pumps.

WORKING OF THE ROBOT

In case of fire the robot will detect the increased temperature with the help of fire sensor which is situated on three (right, left, front). As the value of analog

sensor mounted on either side goes beyond 400 the sensor gives the signal to the arduino then arduino will give signal to motor connected to wheels, to turn left and move forward till it reaches near fire spot. As the robot will move towards fire the sensor value keeps increasing. As the sensor value goes above 900 then sensor will give signal to the arduino and arduino will give signal to dc motor to stop the robot and robot stops and the water pump turns on to extinguish the fire.



Figure: 1

CONCLUSION

Fire causes tremendous damage and loss of human life and property. It is some time impossible for the firefighter personally to access the sight of the fire because of explosive material, smoke, and high temperature. Through this we can conclude that a robot can be placed where human lives are at risk. The robot can operate in the environment which is out of human

reach in very short time. In such environments, firefighting robots can be useful for extinguishing the fire. A Firefighting robot is designed and built with an embedded system. One only needs to deploy the robot in a fire prone zone and the robot will automatically initiate action once it detects a fire breakout. This Robot finds its applications in Rescue operations during fire accidents where the possibility for service men to enter the fire prone areas is very less.

FUTURE SCOPE

In case of future scope we can connect fire extinguisher instead of water tank which will make the robot costly but this will increase the flexibility in operation and it will increase the speed of extinguishing the fire, it will make the safe operation in case of electrical hazards like short circuit which may causes flow of current in case of water as a extinguisher

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