ARDIUNO BASED FIRE FIGHTING ROBOT

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report **"ARDIUNO BASED FIRE FIGHTING ROBOT"**

is the Bonafide work of **"R.SRIRAGAVAN ,S.VINO ,R.VISWA"** who carried out the

project work under my supervision.

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TABLE OF CONTENT

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 In this project, we will learn how to build a simple robot using Arduino that could move towards the fire and pump out water around it to put down the fire. It is a very simple robot that would teach us the underlying concept of robotics; you would be able to build more sophisticated robots once you understand the following basics. So let's get started...

OBJECTIVE

Fire safety is the set of practices intended to reduce the destruction caused by fire. Fire safety measures include those that are intended to prevent ignition of an uncontrolled fire, and those that are used to limit the development and effects of a fire after it starts.

Fire safety measures include those that are planned during the construction of a car, Threats to fire safety are commonly referred to as fire hazards. A fire hazard may include a situation that increases the likelihood of a fire or may impede escape in the event a fire occurs.

CIRCUIT DIAGRAM
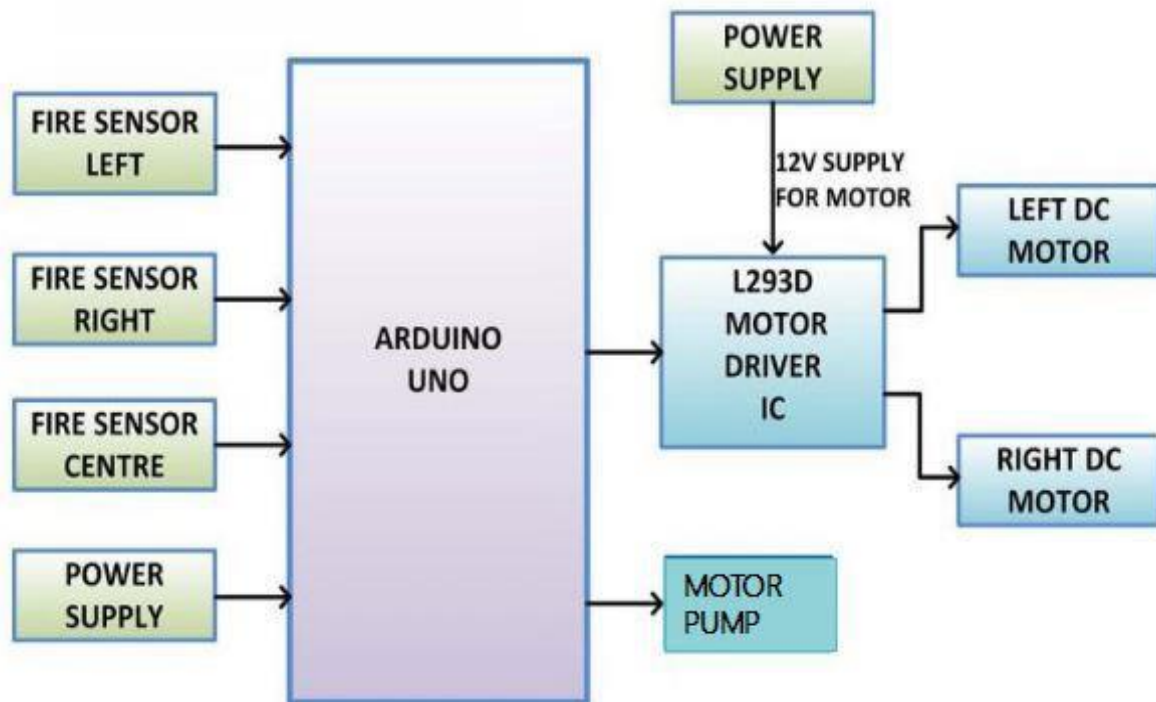
ELECTRONIC CIRCUIT DIAGRAM:

ATmega328P IC(Arduino UNO):

shows the Arduino UNO board. It is basically a micro-controller kit that is used to get data from peripheral devices (sensors, motors, etc.). The Arduino UNO Micro-controller board is based on the ATmega328P IC. The ATmega328P is good platform for robotics application which makes robot to extinguish fire in real time. Arduino UNO board consist the sets of digital and analog pins that may act as an interface to various expansion boards and other circuits. It contains everything needed to support the micro-controller.

HARDWARE DETAIL:

SERVO MOTOR

Servo Motors are electronic devices that are mainly used for providing specific velocity and acceleration

About this Motor(9g Servo)(TowerPro)

Weight: 9 g

Dimension: 22.2 x 11.8 x 31 mm approx.

Stall torque: 1.8 kgf・cm

Operating speed: 0.1 s/60 degree

Operating voltage: 4.8 V (~5V)

Dead band width: 10 μs

Temperature range: 0 oC – 55 oC

Position "0" (1.5 ms pulse) is middle, "90" (~2ms pulse) is all the way to the left. ms pulse) is all the way to the right, ""-90" (~1ms pulse) is all the way to the left.

Modulation: Analog

Torque: 4.8V: 25.0 oz-in (1.80 kg-cm)

Speed: 4.8V: 0.10 sec/60° Weight: 0.32 oz (9.0 g) Dimensions:

Length: 0.91 in (23.1 mm)

Width: 0.48 in (12.2 mm)

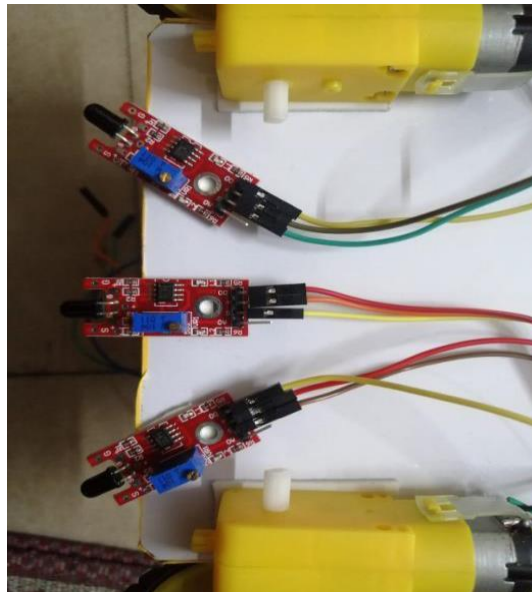Height:1.14 in (29.0 mm)

Motor Type: 3-pole

Gear Type: Plastic

Rotation/Support: Bushing

Rotational Range: 180°

Pulse Cycle: ca. 20 ms

Pulse Width: 500-2400 µs

IR Flame Sensor:

The IR flame sensor senses the environment and detects the presence of fire or flame. The module is based on the IR receiver and basically detects the presence of flammable and harmful gases likes nitrogen, hydrogen, carbon mono oxide. The signal detection capacity is adjustable. The robot contains three flame sensors.

Submersible Water Pump:

Submersible Water Pump. Submersible Water Pump is ideal for making automatic watering system using Arduino. The water pump is an important part of the robot as it will pump water to extinguish the fire.

BO Motors:

BO Motor is a dual shaft motor having 300rpm.It converts electrical energy into mechanical energy. It is the replacement to our metal gear DC motors. Our robot uses four dual shaft motors

HARDWARE COMPONENTS

1. HARDWARE:
- Arduino Uno/ATmega328P.
- IR Flame sensor.
- Servo motor.
- BO motors
- Bread Board
- Jumping Wires
- Submersible Water Pump

SOFTWARE DETAILS

SOFTWARE:

Arduino Using C++ Language

Programming

For programming, the Arduino software provides an integrated development environment (Arduino IDE) and core libraries. The Arduino IDE program is a software program written in Java language and based on the Processing. The Arduino IDE is basically a framework built on top of C and C++ and compiled using avr-gcc and AVR Libc. The open source Arduino IDE makes it easy to write code and upload it to the Arduino Uno for execution. It is available for all major desktop platforms i.e., Windows, Mac OS X, and Linux.

DESCRIPTION:
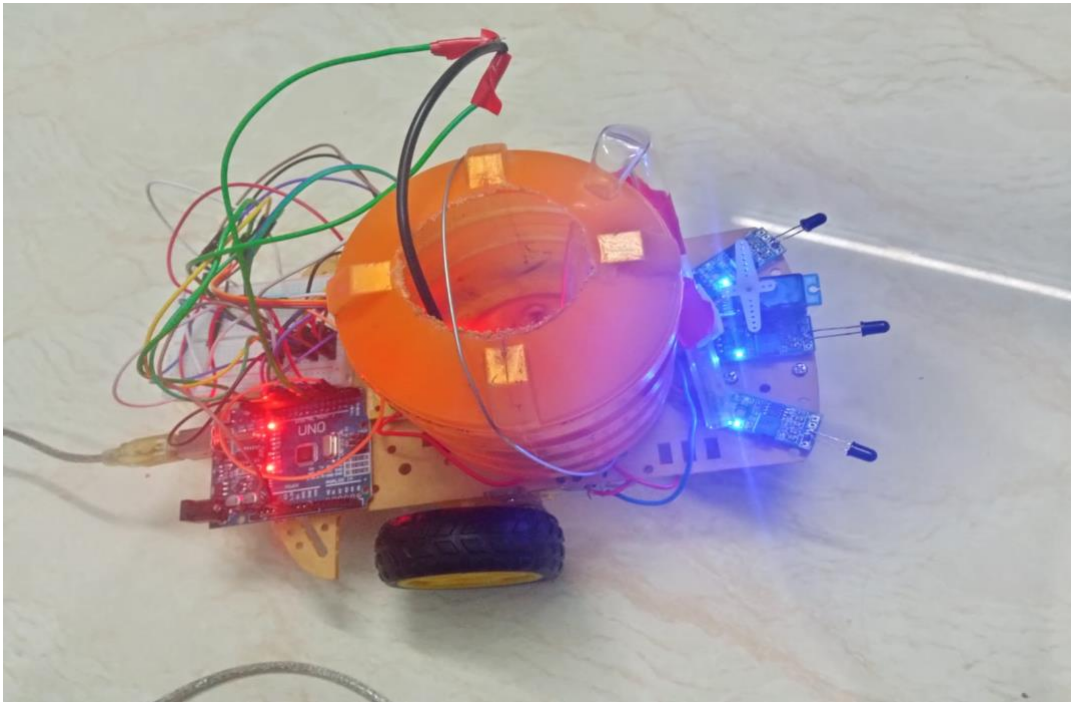
It is recommended to check the output of the robot in steps rather than running it all together for the first time. You can build the robot upto the servo motor and check if it is able to follow the fire successfully. Then you can check if the pump and the servo motor are working properly. Once everything is working as expected you can run the program below and enjoy the complete working of the fire fighter robot. The complete working of the robot can be found at the video given below. The maximum distance to which the fire can be detected depends on the size of the fire, for a small matchstick the distance is relatively less. You can also use the potentiometers on top of the modules to control the sensitivity of the robot. I have used a power bank to power the robot you can use a battery or even power it with a 12V battery

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CONCLUSION

This model of Fire Extinguishing Robot aids to share out the burden of fire fighters in firefighting task. Our project aims to build a real time firefighting robot which moves in a constant speed, identify the fire and then extinguish it with the help of pumping mechanism. The detection and extinguishing was done with the help basic hardware components attached with the robot. Firstly, IR Flame sensors are used for the detection of fire. Secondly, BO Motors and Rubber wheels are used to navigate the robot to reach the fireplace. Finally, the robot extinguishes the fire with the help of submersible water pump and servo motors.