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## Fire Fighting Robot in Apartments

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**Abstract**—The main abstract of the project is to make things easy whenever there is a fire accident in the apartments this robots might helps to put off the fire, although it is a small working model we can also make a robot for real life time assistance in order to help in putting off the fire in apartments. Fire fighting robots are created to perform certain tasks like locating the fire, fire control and suppression, this helps us in a way that no one can be injured and there won't be a that much loss in property. Fire fighting robot is a device which on giving it some instructions to run the machine to help user by performing the operations installed in it in the form of code. Nowadays robotic design became important in helping human. this type of robot will require high demands in the market because of its usefulness as well as environment. This firefighting robot is designed to search for a fire in a small floor plan of a house. In the field of robotics human work is very less and robotics work is very important to protect the human life. As we seeing day by day fire accidents have become more and it lead to hazards. In such case we use the Fire Fighting Robots to save the humans wealth and lives from the fire accidents.

**Keywords**—Flame Sensor; Alarm System; Buzzer; Servo Motor; DC Motor.

### INTRODUCTION

The main advantage of robotics in the human life is to save the life from fire accidents and from major problems. In keeping in mind human got up with an idea to design the Fire Fighting Robots to prevent all the loses from the fire accidents and making the free from heavy work and also its works effectively and very quickly.

The devastation of a fire incident is like a nightmare. Every year many people around the globe lose their life's and beloved one in this accident's. As based on a statistical report provided by the "International Fire And Rescue Services" made on official reports of in more than 34 countries around the globe shows 16.9 thousands of fire accidents in which people lost

their families , and this is so very unfortunate. If we design a robot which can solve this problem is a boon for the entire human kind.

fire fighting robots are the projects which are focused more on to reduce the life risk of fire fighters and to make it more effective to perform the tasks.

### WORKING PRINCIPLE

The brain of the project is Arduino because, in order to sense the fire we have to use the Fire Sensor Module .As we all know that the sensors have IR Receiver that is used for detecting the fire. This is possible when fire burns then it emits the certain amount of infrared light which is received by IR Receiver at sensor module.

Now, we use an operational amplifier to check for a change in the voltage across this IR Receiver. Then if any fire detection is happened then the output pin gives zero voltage else if there is no fire then the output will remain 5v.

So, we will place two of sensors in two different directions of the robot for sensing that at which direction the fire is burning. When we detect the direction of fire , we use our motors to move towards the fire by driving the motors by using L293D motor driver.

When it reaches near fire, we can put it away using water. By using a tiny container to carry water along with the bot , a 5v water motor is kept in the container. This container is kept at the top of the servomotor as to control the direction at which the water has to be sprinkled.

## LITERATURE

Creative ideas and innovative desire has become the curiosity of the mankind . This all is the cause of striving towards the growth at every aspects to have modern technological world. As a student of Electronics and Communication Engineering , we are proud of giving our new innovative ideas and projects to this modern innovative era. These innovations not only reduce the labour requirement but also to efficientize and enhance the current electronic innovations. This potential applications of the creative devices like Multifunctional fire fighting robots are used to perform dangerous activities at oil and chemical industries , nuclear plants , mine fields and at transportation of dangerous substances. By looking at the activities done by the robots , we can say that our fire fighting machine is relatively close to those innovations.

## DISCRIPTION OF COMPONENTS

### I. FLAME SENSOR

A flame sensor is a detector which is used to detect and respond to the flame or fire presence in its surrounding area and take a certain action on it like sending the signals to the alarm. Here we are using flame sensors instead of smoke or heat detector because flame sensor can respond quickly and more accurately than compared to both of them.

It also includes an alarm system or what so ever we give the access to suppress the fire detected. This is used in many industries to detect the fire and to suppress as soon it is detected. flame sensors have the IR receiver through which they can detect infrared light with a wave length of ranging from 700nm to 1000nm and send signals to the alarm so that the robot can react accordingly We need to fit this flame sensor away from the high temperature because in high temperatures the flame sensor will destroy.

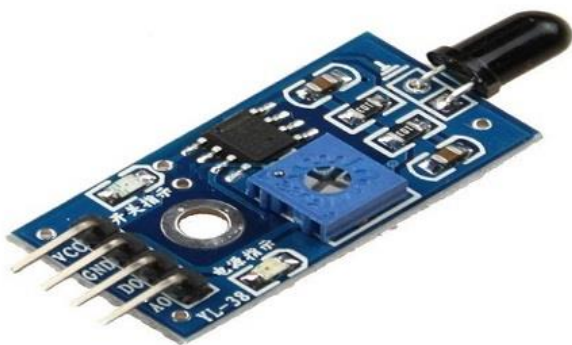


Figure 2: Single channel flame sensor

Pin 1 is used to connect VCC

Pin 2 is used to connect GND

Pin 3 is used to connect D0 (Digital Output)

Pin 4 is used to connect A0 (Analog output)

### II. ARDUINO IDE SETUP FOR USING ARDUINO UNO

Using the board manager, the Arduino allows to install the third party platform packages.

Install Arduino from the Arduino website.

Start Arduino and open preferences window

Enter

Open board Manager from tools then Board menu and select the Arduino Uno board

Now write the Program for the Arduino and compile and correct errors if any found

Now upload the program in to the board.



Figure 3: Arduino UNO

### III. BUZZER

The buzzer is fitted in the circuit for giving alerts to us in different cases such as :

In case there is no water in the water container to put off the flame, the buzzer will produce a sound alert which states there is no water in the container to put off the flame.

In case of the flame is put off then as a signal of task completion another sound will be produced by the buzzer.



Figure 4: Buzzer

Pin configuration

Pin 1 is used for connecting to Vcc

Pin 2 is used for I/O

Pin 3 is used to connect GND

### IV. SERVO MOTOR

We use the servomotor in the circuit to rotate the water pipe which was connected through it from the water container. As soon as the ignition was detected from the flame sensor it makes to rotate the pipe and pump/sprinkle the water on the flame and try to put off the flame.



Figure 5: Servo Motor

### V. L293D MOTOR DRIVER

L293D is a 16-Pin Motor Driver IC. This motor driver ic is the integrated circuit device is a device which operates on low voltage. This ic provides the motor to have the continuous bidirectional direct current. It controls all the DC motor's direction and speed with the range of voltage 4.5v to 36v.

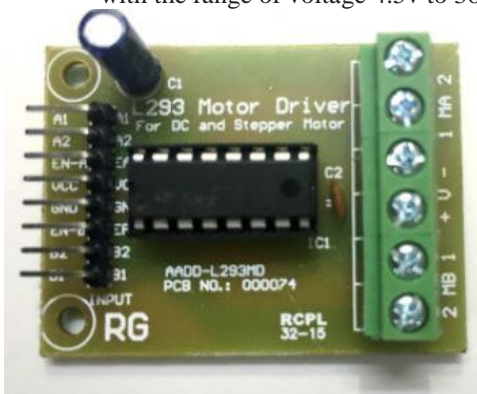


Figure 7: L293D Motor Driver

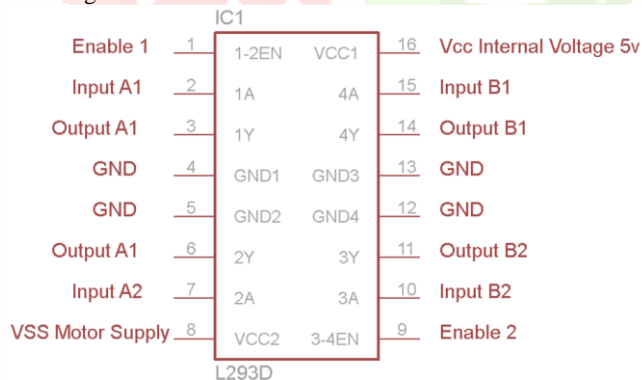


Figure 8: L293D Pin Diagram

### FEATURES:

The control of both speed and direction is possible. The range of the voltage supply to motor is from 4.5v to 36v. This IC can supply current of 600mA per channel continuous and the peak of 1.2A. The supply voltage of this IC varies from 4.5v to 7v. This IC is not only used to drive motor but also used to drive other devices like relay solenoids and switching power transistors. This IC has the transmission time of 300ns. Automatic Thermal shutdown is also available Available in 16-pin DIP, TSSOP and SOIC packages

### VI. DC WATER PUMP



Figure 9: DC pump

Used for pumping the water to put off the flame.

### CONCLUSION

Our project presents the implementation and design of the fire fighting robot which on detecting the fire, move towards it to extinguish the fire by pumping the water through the pump. This project is the explanation of the Arduino how the components are interfaced to it. This working model is potentially used to accompany the fire fighters by preventing an outbreak. This system is capable enough to navigate towards the fire to extinguish by the water pump. By this, various techniques were achieved by studying different components along with their interface. This Fire Fighting device is used at many aspects like fire department, defence, health monitoring, medicine etc. For proving of a better navigation system through hurdles, we can use obstacle sensors. We can even use a memory space to store the logs of fire accident incidents. The capability of the system can be effected as the sensors are only with the limited field of detection. We can also update the wheels to have a better quality of work.

### ACKNOWLEDGMENT

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### RESULT

As a result of add all these elements on the wooden piece (or) plastic (or) another board we will get the final view of the robot as per the following circuit diagram.

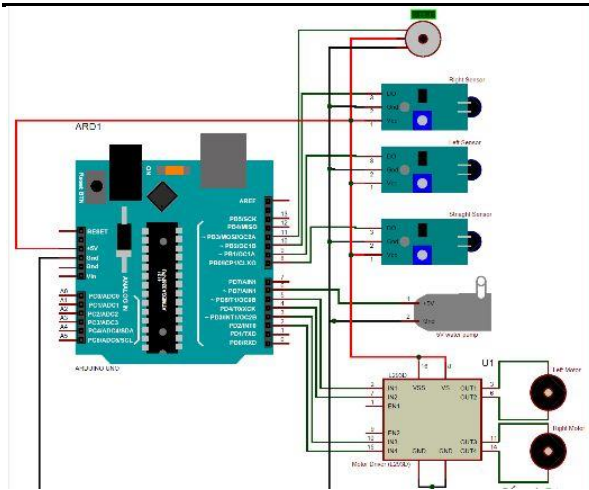


Figure 10: Digital circuit

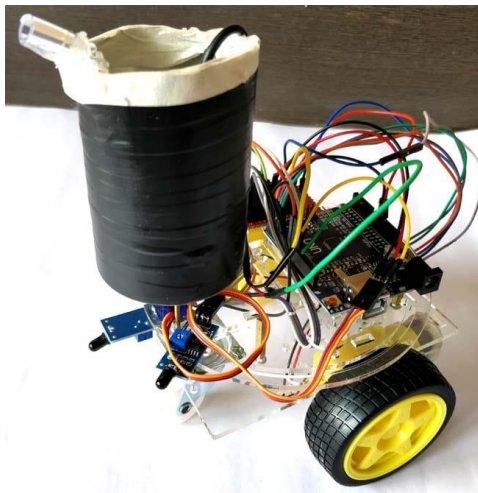


Figure 11: Working model

After the completion of the fitting it might look like the below picture.



Figure 12: While putting off the flame

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