e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:06/June-2022 Impact Factor- 6.752 www.irjmets.com

AUTONOMOUS FIRE FIGHTING VEHCILE

J. Sai Prasad[*1], V. Karthik[*2], R. Kaushik[*3], Mrs. M. Usha Rani[*4]

[*1,2,3,4]Assistant Professor, Department Of Electronic And Communication Engineering,
ACE Engineering College, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT

Robotics has gained popularity due to the advancement of many technologies of computing and Nano Technologies. So, this concept is proposed to design something that can make humans life easier and comfortable. The project, which is to design a fire fighting vehicle, comprises of a machine which not only has the basic features of a robot, but also has the ability to detect fire and extinguish it. So as an engineer we design and build an autonomous system that can detect and extinguish fire, presently Fire Fighting methods are completely human dependent, They have to use ladder and control pipe to sprinkler water which has a high risk for fire fighters. therefore, it is essential to design unmanned fire detecting equipment. As the concept is autonomous, the robot movement and fire sensing with water spraying is done automatically. In this regard, instead of spraying water manually to the fire flames, we can use fire sensors for sensing the fire flames and according to that water can be sprinkled over the fire flames automatically avoiding human interference. So we have built a machine which detects fire through IR sensors and DC motors are used for mechanical purpose to move the vehicle towards the fire, then we used servo motors for sprinkling the water, therefore fire gets extinguished.

Keywords: Arduino, IR Sensor, DC Motor, Servo Motor, Pump, Relay.

I. INTRODUCTION

In this project, we will learn how to build a simple vehicle 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. So, let's get started. The main function of this robot is to become an unmanned support vehicle, developed to search and extinguish fire. There are several existing types of vehicles for firefighting at home and extinguish forest fires. our system comes to the rescue. This firefighting robotic system is powered by Arduino Uno development board with the fire flame sensor for detecting and approaching fire it also makes use of water tank and spray mechanism for extinguishing the fire. S we proposed robot is designed to be able to work on its own or be controlled remotely. In other words, robots can reduce the need for fire fighters to get into dangerous situations. Additionally, having a compact size and automatic control also allows the robot to be used when fire occurs in small and narrow spaces with hazardous environments.

II. WORKING

The main brain of this project is the Arduino, but in-order to sense fire we use the Fire sensor module (flame sensor). When fire burns it emits a small amount of Infra-red light, this light will be received by the IR receiver on the sensor module. So, we place five such sensors in five directions of the vehicle to sense on which direction the fire is burning. We detect the direction of the fire we can use the motors to move near the fire by driving our motors through the L293D module.

III. MODULES OF THE PROJECT

ARDUINO UNO

Arduino is a hardware and software company that designs and manufactures single board microcontrollers. The Arduino language is merely a set of C/C++ functions that can be called from your code. The microcontroller used is ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs),6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

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ESP8266

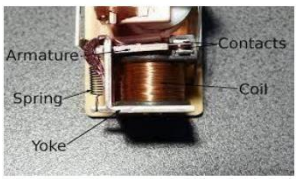
ESP8266 is an UART-Wi-Fi transparent transmission module with ultralow power consumption, specially designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

L293D MOTOR DRIVER IC

A motor driver is an integrated circuit chip which is usually used to control motors in autonomous robots. Motor driver act as an interface between Arduino and the motors. These ICs are designed to control 2 DC motors simultaneously.

RELAY

A Relay is a simple electromechanical switch made up of an electromagnet and a set of contacts. Relays are found hidden in all sorts of devices. In fact, some of the first computers ever built used relays to implement gate logics.



DC MOTOR

A DC motor or direct current motor is an electrical machine that transforms electrical energy into mechanical energy by creating a magnetic field that is powered by direct current. When a DC motor is powered, a magnetic field is created in itsstator. The field attracts and repels magnets on the rotor; this causes the rotor to rotate. To keep the rotor continually rotating, the commutator that is attached to brushes connected to the power source supply current to the motors wire windings.

PUMP

A pump is a device that moves water (liquids or gases), or sometimes slurries, by mechanical action, typically converted from electrical energy into hydraulic energy.

IR FIRE SENSOR

These types of sensors are used for short range fire detection and can be used to monitor projects or as a safety precaution to cut devices off / on. This unit is mostly accurate up to about 3 feet.

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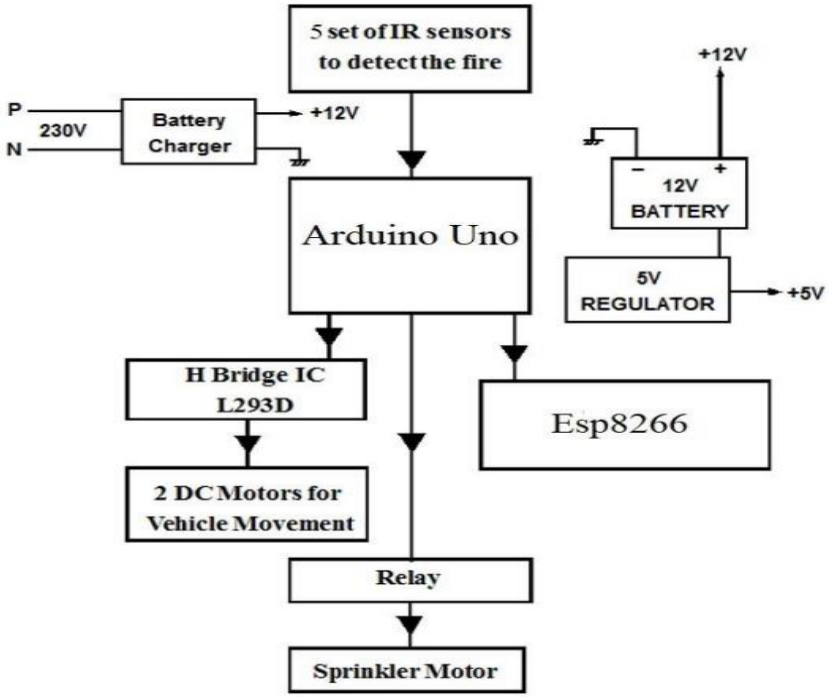
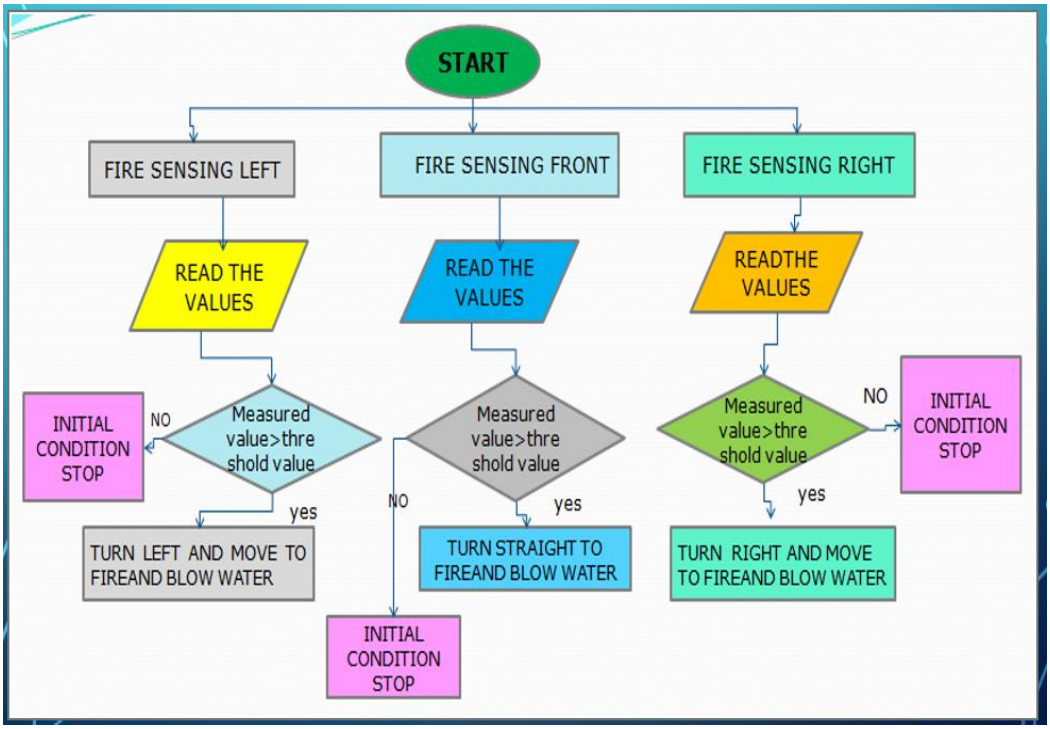
The sensor basically detects IR (Infra-Red) light wavelength between 760 nm – 1100 nm (nano meter) that is emitted from fire flame.

IV. BLOCK DIAGRAM



V. FLOW CHART



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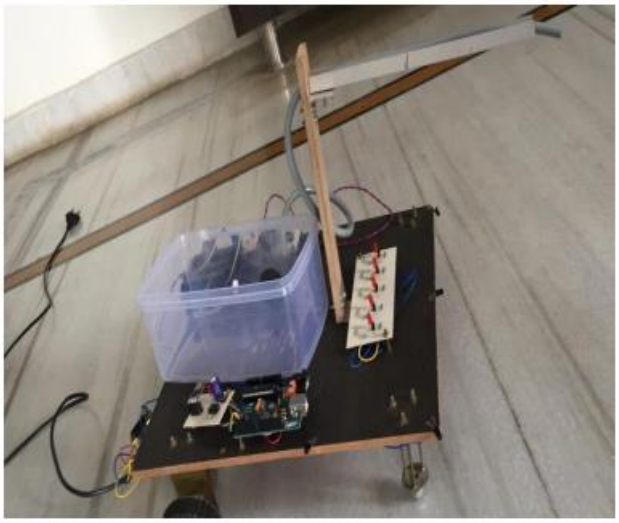
VI. RESULT



VII. CONCLUSION

Thus, we developed a robotic vehicle which will be used for firefighting purpose. This proposes a great chance for automation and will be useful at places where human cannot reach or is dangerous. This robotic vehicle will be helpful in automation industry also. The proposed robot makes movements in forward, backward, left, right and stop also. It reduces the human efforts and protect their lives and property. Our vehicle detects fire and extinguish the fire with the help of water sprinkler pump. For extinguishing that fire robotic vehicle need to reach up to there and it starts movement towards the target with the obstacle avoidance property. Through this we can conclude that a robot can be used in place of humans without risk of human beings' life as well as life of the fire fighters. We can use this robot in our homes, labs, offices etc. This robot will provide us greater efficiency to detect the flame and it can be extinguished before it become uncontrollable and threat to life. Hence, this robot will be very helpful and can play a important role.

ACKNOWLEDGEMENT

We are grateful to our guides Prof.B.GIRI RAJU and Assistant Mrs,M,Usha rani for their continuous support and guidance. Through their guidance, we were able to successfully complete our project. Sincere thanks go to Dr.P.SATISH KUMAR, Head of the department of Electronic and Communication Engineering at Ace Engineering College, for his support and time.

VIII. REFERENCES

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