VISVESVARAYA TECHNOLOGICAL UNIVERSITY

"Jnana Sangama", Belagavi - 590 018, Karnataka, India

MINI PROJECT REPORT (18ECMP68)

ON

"RF CONTROLLED FIRE FIGHTING ROBOT"

Submitted in partial fulfillment of the requirements for the award of the Degree

BACHELOR OF ENGINEERING

In

ELECTRONICS AND COMMUNICATION ENGINEERING

Submitted by

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May 2022

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CERTIFICATE

This is to certify that the project entitled **"RF CONTROLLED FIRE FIGHTING ROBOT"** is a bonafide work carried out by **SYED ADNAN (1MV19EC117)**, **RAHUL R (1MV19EC087), VIVEK N RAJ (1MV19EC125), SACHIN KENCHANAGOWDAR (1MV19EC098)** of **Sir M. Visvesvaraya Institute of Technology**, **Bangalore**, in partial fulfillment for the award of degree of Bachelor of Engineering in **Electronics and Communication Engineering** of the **Visvesvaraya Technological University**, Belagavi during the academic year 2022-2023. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the report submitted to department library. The mini project report has been approved as it satisfies the academic requirements in respect of Project work (18ECMP68) prescribed for Bachelor of Engineering degree.

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A project is incomplete if it fails to thank all those instrumental in the successful completion of the project.

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DECLARATION

We hereby declare that the entire work embodied in this discussion has been carried out by us and no part of it has been submitted previously for any degree or diploma of any institution.

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ABSTRACT

In this project, an RF based fire-fighting and affected area monitoring robot is proposed. This fire-fighting robot can be used as a supplementary to the fire fighters in critical situations. To function this robot, a fire sensor has been used. The fire sensor is used to detect the fireplace. The robot can run in both manual control system and autonomic control system. This project discusses the detail and top working condition of a fire-fighting robot and recapitulates an RF based communication system to monitor the fire affected area using RF Transmitter and Receiver also discusses the elaborate functions of each module and the implementation of the system. All the data are sent to the cloud server for further investigation. The proposed fire fighting robot has been used for many experiments and proper evaluation has been done based on its performance. It has an excellent performance to extinguish the fire in an emergency situation.

TABLE OF CONTENTS

CHAPTERS **PAGE NO**

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

INTRODUCTION

OVERVIEW

The devastation of a fire incident is like a nightmare. Every year many people around the world lose their lives because of it. A statistics report provided by 'International Association of Fire and Rescue Services' made on official reports of fire incidents of 34 countries shows that 16.9 thousand people lost their lives in 2016, and that is very unfortunate. This report is an only official report ,but the number of causalities may be much higher in reality. It also shows that the average occurrence of fire incidents is 2.9 per 1000 inhabitants, which is relatively high. In Bangladesh, the average number of fires per year is 17,743. So, tackling the fire incidents timely and adequately is an important task. While tackling a fire incident, two essential aspects are speed and safety. When a fire incident occurs, it becomes difficult for the firefighters to evaluate the situation without being subjected to harm. It is sometimes impossible for firefighter personnel to get access to the fire affected area. So, the speed and safety of the firefighters become questionable. However, a fire-fighting robot can help to overcome this problem. Fire-fighting robots have the property of being fire-fighting equipment, and that can be an alternative to firefighters to fight a fire and perform rescue operations effectively. This robot can also be used as surveillance of the area after a fire incident. Such a kind of automation will detect fire and use an appropriate extinguishing system accordingly. The fire-fighting robots can become alternatives to firefighters as robots are not affected by smoke or flame and do not require oxygen. So by using them, the number of fire injuries can be minimized. If IoT is incorporated with these robots, then the affected site's environmental situation can be easily interpreted, and coordinated control of multiple robots can be achieved. So, the rescue operation can be more speedy and safe by using fire-fighting robots.

PROBLEM STATEMENT

Design and Implementation of Fire Fighting robot based on real-time system. The security of home, laboratory, office, factory and building is important to human life. Therefore we develop security system that contains a fire protection robot using sensor.

PROBLEM SOLUTION:

In recent years there are many fire fighting robots which can perform only fire extinguishing tasks. We are improving the robot by designing a RF controlled robot for controlling the movements of the robot, this can also be controlled by Wi-Fi/IOT based model. These robots should be capable of working round the clock all year round, and extinguishing the fire where it is not possible for fireman to go.

OBJECTIVES:

- The objective is to present the status of the current trends and implementation of fire safety. The main objective is to develop a RF operated fire fighting robot for fire extinguishing activities.
- To implement a robot capable of interacting with the user to and from a remote location. It should be easy to operate and safe handling. A firefighting robot is capable of extinguishing the fire where it is not possible for fireman to go.
- RF based fire fighting robot is very useful and convenient machine and the fireman can easily extinguish the fire and save people, goods from damage.
- The firefighting robot has pump attached with water tanker through plastic pipe and it is capable of spraying water using DC water pump on fire. To reduce human effort in the fire extinguishing activities.

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE SURVEY

1. Tushar Nandkishor Satbhai, Rahul M. Karande, Anant Vijay Patil, Prof. Manish Patil,- **"FIRE FIGHTING ROBOT" International Journal on Recent and Innovation Trends in Computing and Communication** designed and enhanced to control fire through a robotic vehicle with the advancement in the field of Robotics which they named as "firefighting Robot". They designed the fire extinguishing robotic vehicle which can be controlled through RF communication. This vehicle is controlled through connected remote Key input. In this their proposed vehicle has a water jet spray which is capable of Sprinkling water. (April-2016) Volume 4, Issue 4 (Page no- 1 to 5)

2. Manish Kumbhare, S Kumbhalkar, R. Malik,- in their paper they covered the design and construction of a robot that is able to extinguish a fire which terms as **"Fire fighting Robot", Indian Streams Research Journal** this robot is fully autonomous and implements of following concepts: Environmental sensing and awareness, proportional motor control. This robot process information from its various sensors and key hardware element via SMCL Microcontroller. In this there was a ultraviolet, infrared and visible light to detect various components of its environment.(March-2012) Volume 2, Issue 2 (Page no- 1 to 7).

3. H. U. Zaman, T. A. Khan, S. R. Falgunee, G. M. S. Rashid, and F. H. Talukder,- **"Autonomous Firefighting Robot with optional Bluetooth Control", 4 th International Conference on Computational Intelligence and Computing Research(ICCIC).** in their paper they covered flame detection.It is a large amount of infrared radiation is emitted along with a sparse amount of UV rays and visible rays during a fire.However, some fire occourences,such as hot charcoal,may not emit visible light,but it does emit infrared.Thus, a flame sensor is used in this robot that detects infrared rays and sends a signal upon fire detection to assure the occurence of fire.(September-2018)(Page no-1 to 4).

CHAPTER 3

MEHODOLOGY

METHODOLOGY

- The development of the RF controlled Fire Fighting robot consists of the integration of hardware techniques and software tools. The assembly of the robotic system is built using ARDUINO UNO, DC motor, Single channel Relay, Four channel Relay, Flame sensor, RF module and servo motor. Robotic mechanism runs by their internal motors and motor drivers that drive the motors in desired directions.

- The base frame is made for the robot with 2 wheels connected and driven the rear wheel is dc motor. Here we used 4 inch robot wheel. The Wheel is plastic with rubber tires. This wheel is compatible with DC motors. The DC motor is controlled by the RF module for the movement of the Robot.

- The RF transmitter transmits the signal to RF receiver which sends this signal to the four channel relay which controls the direction of the DC motor. The Fire Fighting Robotic System is powered by Arduino. The Flame sensor is used to detect the flame.

- When the flame is detected it sends the signal to Arduino UNO which in turn activates the mServo motor and the pump. Once the water pump is activated it extinguishes the fire. The servo motor is capable of spraying the water to cover the maximum area. To summarize the navigation of the vehicle is based on the RF module and the Fire extinguishing is controlled by the Arduino UNO.

CHAPTER 4

PROPOSED BLOCK DIAGRAM

4.1 BLOCK DIAGRAM

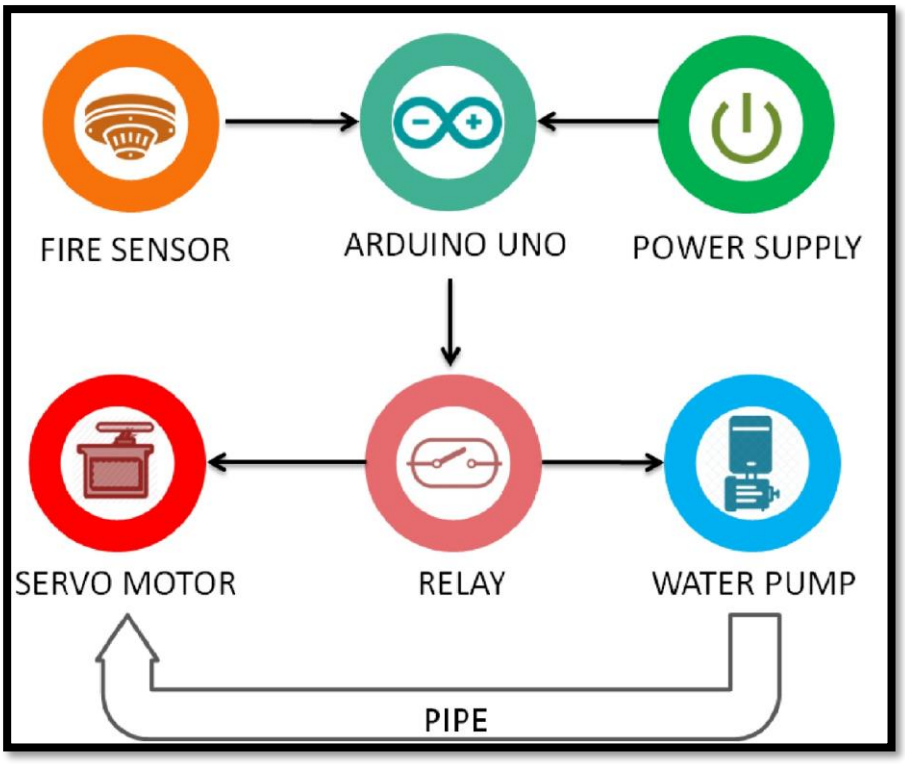

Figure 4.1: Fire Extinguisher block diagram

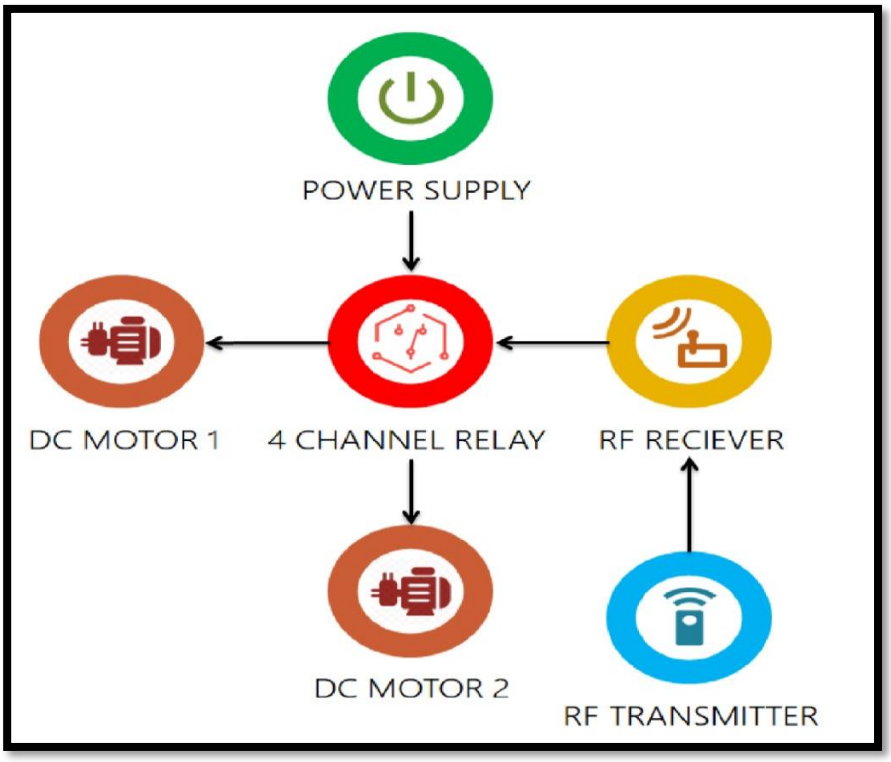

Figure 4.2: Motion Control block diagram

FIRE EXTINGUISHER

The Flame sensor when exposed to external stimulus (fire) the internal circuit of the sensor is completed and it sends a signal to the Arduino which acts as an input to the Arduino. The Arduino later depending upon the code entered signals the relay which acts as a switch that allows interaction between Water pump and Servo Motor. The servo motor and water pump are connected to each other by the means of a Pipe. The water pump pumps the water from the water tank which is located besides it and stores water for extinguishing. The servo motor rotates in the direction of the detected flame and since the pipe is connected is to the servo motor, the system extinguishes the flame. All of this is powered by a power supply which is a 12V battery and Li ion batteries that are connected to the jack port of the Arduino. The purpose of this entire system is to extinguish the flame, but to reach the flame we need the help of Motion control System.

MOTION CONTROL SYSTEM

The Motion control system contains, RF transmitter, RF Receiver, 4-Channel Relay, DC motors, Power supply which includes a 12V battery and 3.7V Li ion batteries. 0The RF Transmitter transmits the RF signal which is powered by a 12V battery. The modulation technique used here is ASK. The transmitted signal is received by the RF receiver. The receiver is connected to the 4-Channel Relay. The relay is activated based on the output received by the receiver. The relay is connected to the DC motors which run whenever the relay is activated. The robot can be controlled to move in all directions due to the presence of a smooth cap located at the bottom of the system which enables the robot to rotate in any direction. This entire system is powered by Li ion rechargeable battery and 12V battery. The purpose of this entire of system is to move the extinguisher from one place to another.

CHAPTER 5

HARDWARE AND SOFTWARE IMPLEMENTATION

HARDWARE IMPLEMENTATION

This section gives details of the hardware components required for the system implementation and deployment. Fire fighting robot requires the following hardware components:

- ARDUINO UNO
- Power Supply
- DC motor
- Relay
- Microcontroller –Node MCU(ESP-8266)
- Flame Sensor
- RF Module
- Water Pump

ARDUINO UNO:

Arduino board, Arduino is an open source computer hardware and software that designs single-board microcontrollers the products are shared as an open source hardware and software. Arduino boards are available in preassembled form or by designing the kits with respect to different application like microcontroller

FEATURES OF ARDUINO UNO:

- Arduino UNO microcontroller here used is a ATmega328P it is a 8-bit AVR family microcontroller.
- Required input voltage is 7-12V.
- There are 6 analog inputs.
- There are 14 digital input and output pins.
- 40 µA of DC current for the input and output pins.
- 50 mA DC current on 3.3Vpin.
- It used 32Kb off lash memory.
- It uses16MHz frequency clock speed.

PIN DIAGRAM OF ARDUINO UNO:

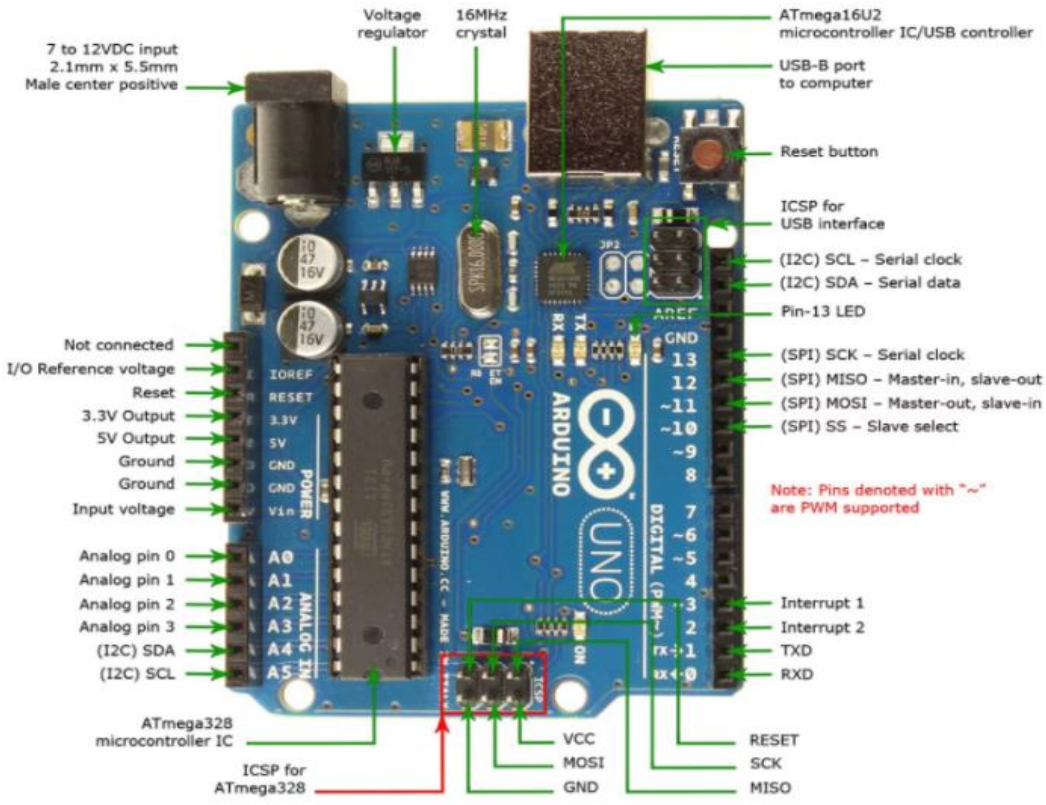

Figure 5.1: Pin diagram of ARDUINO UNO

From the above figure it can be seen that each pin name has its own categories and descriptions.

- Vin, 3.3V, 5V, GND these pins are used for the power connection. Vin is the input voltage given to the Arduino when external power supply is used . 5V regulated power Vin, 3.3V, 5V, GND these pins are used for the power connection. Vin is the input voltage given to the Arduino when external power supply isused.5V regulated power supply is used for powering the microcontroller and other components on the board.

- 3.3V is the supply generated by on board voltage regulator. GND pin is used for grounding.

- Reset pin is used to reset the microcontroller.

- Analog pins are used to provide analog inputs in the range 0-5V.

- Digital pins from 0-13 are the input output pins which are used for the input and output operations.

- Tx and Rx are serial communication port used to receive and transmit serial data.

- Pin 2,3 are the external interrupts they trigger an interrupt.

- Pin 3, 5, 6, 9, 11 is pulse width modulator it provides 8 bit PWM output.

- Pin 10, 11, 12, 13 is serial peripheral interface used for SPI communication.

- Pin 13 inbuilt LED to on the LED.

- Pin A4,A5 is used for TW1 communication.

SOFTWARE:

Arduino IDE (integrated development environment) is the required Arduino software. This software contains:

- Text editor for editing code of interest and writing code of interest.
- A tool bar with buttons for series of menus and for common functions.

Arduino provides a great advantage of working with other platforms like python, cloud computing etc, because Arduino packages which allow to work with the other platforms.

ARDUINO PROGRAMMING:

Once Arduino IDE is installed on the computer, connection is done to the board with computer using USB cable. Now open the Arduino IDE and choose the correct board by selecting Tools>Boards>Arduino/Genuine Uno and choose the correct Port by selecting Tools>Port. Arduino Uno is programmed using Arduino programming language based on wiring.

The programming languages which are supported by Arduino are:

- C language.
- C++ language.
- Java language.
- Java script language.

Arduino software provides great relax to programmers by providing C as programming language.

Flame Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. The IR Flame sensor used in this project is shown below, these sensors are also called Fire sensor module or flame detector sensor sometimes.

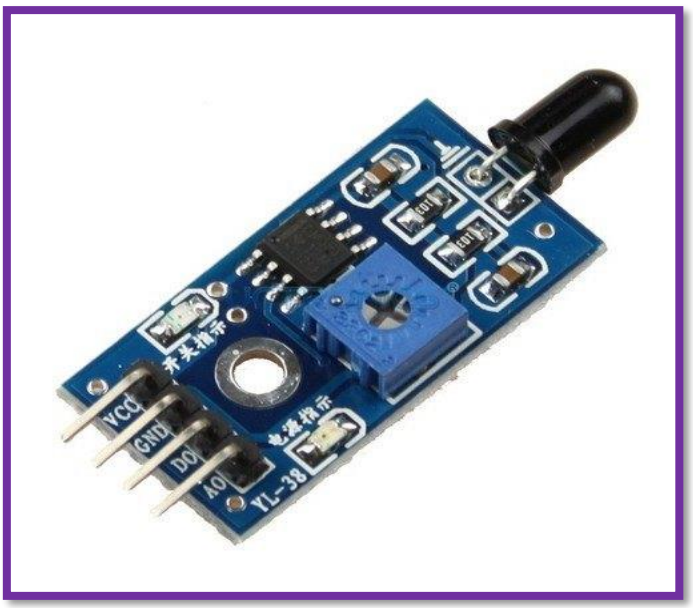

Figure 5.2: Flame Sensor

Below is the Pin Description of the Flame sensor Module:

Pin	Description
Vcc	3.3 – 5V power supply
GND	Ground
Dout	Digital output

A fire detector is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system. When used in applications such as industrial furnaces, their role is to provide confirmation that the furnace is working properly; it can be used to turn off the ignition system though in many cases they take no direct action beyond notifying the operator or control system .

There are different types of flame detection methods. Some of them are:

Ultra violet detector, near IR array detector, infrared (IR) detector, Infrared thermal cameras, UV/IR detector etc.

When fire burns it emits a small amount of Infra-red light, this light will be received by the Photodiode (IR receiver) on the sensor module. Then we use an Op-Amp to check for a change in voltage across the IR Receiver, so that if a fire is detected the output pin (DO) will give 0V(LOW), and if the is no fire the output pin will be 5V(HIGH).

In this project, we are using an **IR based flame sensor**. It is based on the YG1006 sensor which is a high speed and high sensitive NPN silicon phototransistor. It can detect infrared light with a wavelength ranging from 700nm to 1000nm and its detection angle is about 60°.

The flame sensor module consists of a photodiode (IR receiver), resistor, capacitor, potentiometer, and LM393 comparator in an integrated circuit. The sensitivity can be adjusted by varying the onboard potentiometer. Working voltage is between 3.3v and 5v DC, with a digital output. A logic high on the output indicates the presence of flame or fire. A logic low on output indicates the absence of flame or fire.

Applications of flame sensors

- Hydrogen stations
- Combustion monitors for burners
- Oil and gas pipelines
- Automotive manufacturing facilities
- Nuclear facilities
- Aircraft hangars

RF Module

- As the name suggests, RF module operates at Radio Frequency. This frequency range varies between 30 kHz & 300 GHz
- Uses Amplitude Shift Keying (ASK) Modulation technique

RF TRANSMITTER

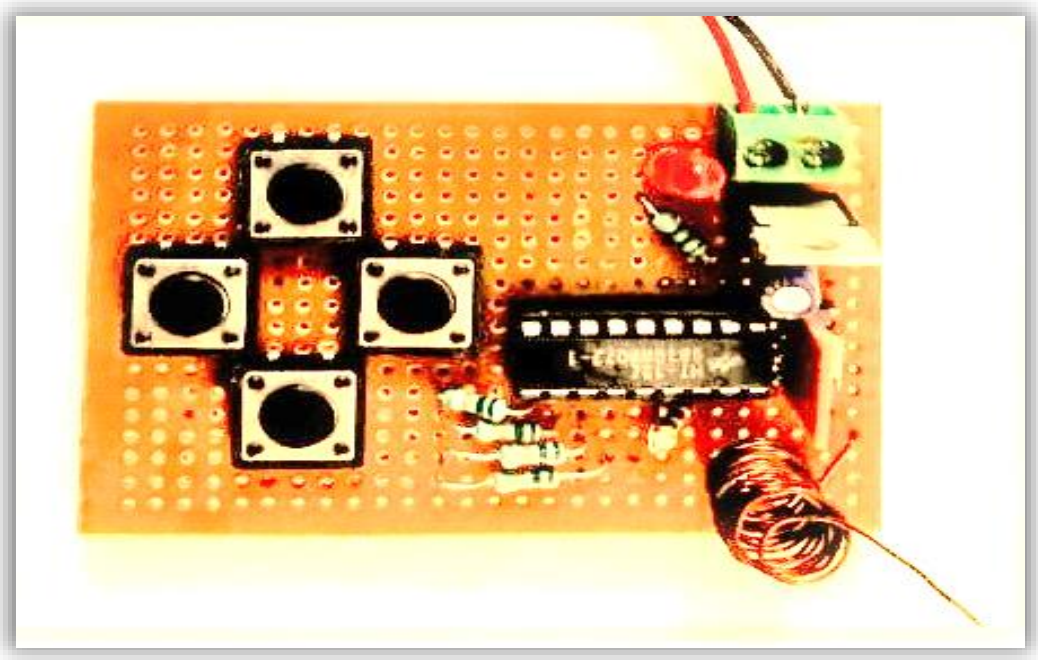

Figure 5.3: RF Transmitter

- Supply voltage of transmitter is between 3V to 6V
- The transmitter frequency range is about 433.92MHz
- Output power of transmitter is between 4Dbm to 12Dbm
- The transmission occurs at the rate of 1 Kbps – 10 Kbps.

RF RECEIVERs

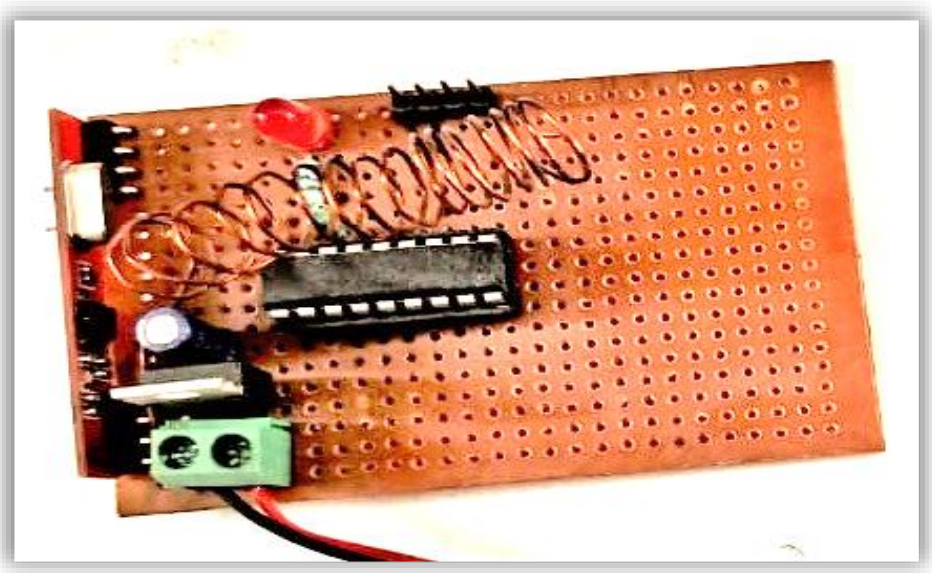

Figure 5.4: RF Receiver

- Receiver supply current 3.5 mA-5.5mA
- operating voltage of receiver is 5V
- The typical Received Power is 105 Dbm
- The Receiver operates at a frequency 433MHz

Applications:

1. Home automation
2. Transmit Serial data for short distance
3. Car security system
4. Wireless logging
5. Short distance communication

DC MOTOR

Electric motors are everywhere! almost every mechanical movement that can see around is caused by an AC (alternating current) or DC (direct current) electric motor. Let us start by looking at the overall plan of a simple two-pole DC electric motor. A simple motor has six parts, as shown in the diagram below:

1. Armature or rotor
2. Commutator
3. Brushes
4. Axle
5. Field magnet
6. DC power supply of some sort

An electromagnet is the basis of an electric motor. It's understood how things work in the motor by imagining the following scenario. Say that created a simple electromagnet by wrapping 100 loops of wire around a nail and connecting it to a battery. The nail would become a magnet and have a north and south pole while the battery is connected. Now say that take the nail electromagnet, run an axle through the middle of it and suspend it in the middle of a horseshoe magnet as shown in the figure below. If were to attach a battery to the electromagnet so that the north end of the nail appeared as shown, the basic law of magnetism tells that what would happen: The north end of the electromagnet would be repelled from the north end of the horseshoe magnet and attracted to the south end of the horseshoe magnet. The south end of the electromagnet would be repelled in a similar way. The nail would move about half a turn and then stop in the position shown.

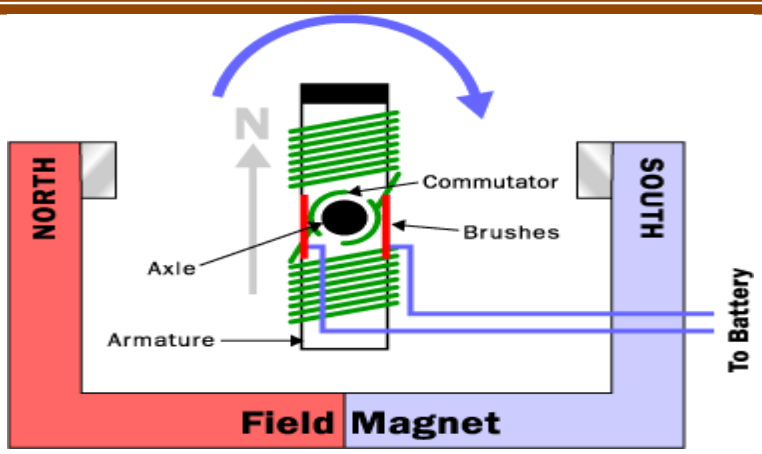

Fig 5.5: Working principle of motor

This is half-turn of motion is simply due to the way magnets naturally attract and repel one another. The key to an electric motor is to then go one step further so that, at the moment that this half-turn of motion completes, the field of the electromagnet flips. The flip causes the electromagnet to complete another half-turn of motion. it flip the magnetic field just by changing the direction of the electrons flowing in the wire. If the field of the electromagnet were flipped at precisely the right moment at the end of each half-turn of motion, the electric motor would spin freely. If ever have the chance to take apart a small electric motor, will find that it contains the same pieces described above: two small permanent magnets, a commutator, two brushes, and an

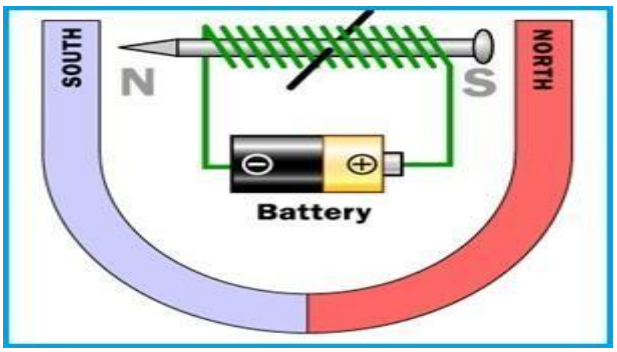

Fig 5.6: Electromagnet in horse magnet

Electromagnet made by winding wire around a piece of metal. Almost always, however, the rotor will have three poles rather than the two poles as shown in this article. There are two good reasonsfor a motor to have three poles:

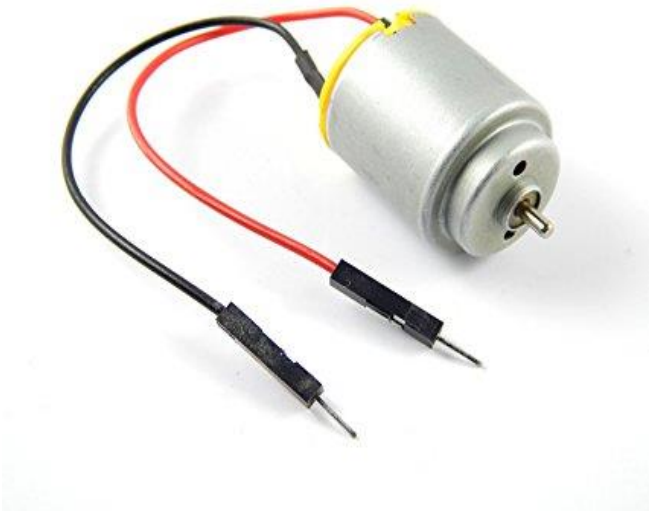

Fig 5.7: DC motor

It causes the motor to have better dynamics. In a two-pole motor, if the electromagnet is at the balance point, perfectly horizontal between the two poles of the field magnet when the motor starts, imagine that the armature getting "stuck" there. That never happens in a three-pole motor. Each time the commutator hits the point where it flips the field in a two-pole motor, the commutator shorts out the battery (directly connects the positive and negative terminals) for a moment. This shorting waste energy and drains the battery needlessly. A three-pole motor solves this problem as well. It is possible to have any number of poles, depending on the size of the motor and the specific application it is being used in.

Four Channel Relay

Fig 5.8: Four channel Relay

Relay is an electrically operated switch.

Four-Channel Relay Module Specifications

1. Supply voltage – 3.75V to 6V
2. Trigger current – 5mA
3. Current when the relay is active - ~70mA (single), ~300mA (all four)
4. Relay maximum contact voltage – 250VAC, 30VDC
5. Relay maximum current – 10A

Pin Number	Pin Name	Description
1	GND	Ground reference for the module
2	IN1	Input to activate relay 1
3	IN2	Input to activate relay 2
4	IN3	Input to activate relay 3
5	IN4	Input to activate relay 4
6	V_{CC}	Power supply for the relay module
7	V_{CC}	Power supply selection jumper
8	JD-V_{CC}	Alternate power pin for the relay module

Four-Channel Relay Module Pin out

The four-channel relay module contains four 5V relays and the associated switching and isolating components, which makes interfacing with a microcontroller or sensor easy with minimum components and connections. There are two terminal blocks with six terminals each, and each block is shared by two relays. The terminals are screw type, which makes connections to mains wiring easy and changeable.

The four relays on the module are rated for 5V, which means the relay is activated when there is approximately 5V across the coil. The contacts on each relay are specified for 250VAC and 30VDC and 10A in each case, as marked on the body of the relays.

The switching transistors act as a buffer between the relay coils that require high currents, and the inputs which don't draw much current. They amplify the input signal so that they can drive the coils to activate the relays. The freewheeling diodes prevent voltage spikes across the transistors when the relay is turned off since the coils are an inductive load. The indicator LEDs glow when the coil of the respective relay is energized, indicating that the relay is active. The optocouplers form an additional layer of isolation between the load being switched and the inputs. The isolation is optional and can be selected using the V_{CC} selector jumper. The input jumper contains the main V_{CC}, GND, and input pins for easy connection using female jumper wires.

WATER PUMP

Fig 5.9 water pump

It is used to pump water when an abnormal condition arises in the system. When excess temperature, smoke and flame detected, the water pump starts pumping water. Water pump is connected to the relay, the relay becomes energizes according to the instruction from the MCU.

SOFTWARE IMPLEMENTATION:

projcode | Arduino 1.8.19

File Edit Sketch Tools Help

projcode

```
#include <Servo.h>
Servo myservo;

int flame=6;
int pump=8;

void setup()
{
Serial.begin(9600);
pinMode(pump, OUTPUT);
pinMode(flame, INPUT);
myservo.attach(3);
myservo.write(0);
}

void loop()
{
  int flameval=digitalRead(flame);
  if (flameval == 1)
  {
     digitalWrite(pump,LOW);
     myservo.write(110);
  }
  else
  {
      digitalWrite(pump,HIGH);
       myservo.write(130);
  }
}
```

Fig 5.10 code implementation

1. For the code implementation first of all, we include the library for the servo motor.
   .
2. Then we initialize variable 'myservo' for the servo motor which will help us in using the Library functions. We initialize two integers with variable names 'flame' and 'pump' Variable 'flame' is given for the flame sensor which holds an integer value 6. Variable 'pump' is given for the water pump which holds an integer value 8.

3. Then we call 'void setup' function which is the place to setup communication, setup modes for digital pins(input/output), initialize any hardware component(sensor/actuator) plugged to the Arduino. The 'Serial.begin(9600)' sets the baud rate for the serial data communication.

4. Then we use 'pinMode()' function to configure a specific pin to behave either as an input or an output. We configure pin 8 as output(pump) and pin 6 as input(flame sensor). 'myservo.attach(3)' attaches the myservo variable to pin 3. 'myservo.write(angle)' is used to write a value to the servo, controlling the shaft accordingly.

5. Then a loop is started with initializing variable 'flameval' equivalent to 'digital Read(flame)'which gives the value from a specified digital pin, either HIGH or LOW.

6. If the 'flameval' is HIGH (when there is no flame detected) for which the 'pump' is made LOW and servo shaft is at 110 degrees. If the 'flameval' is LOW (when flame is detected) for which the 'pump' is made HIGH and servo shaft shifts to 130 degrees .

CHAPTER 6

CIRCUIT CONNECTIONS

CIRCUIT CONNECTIONS:

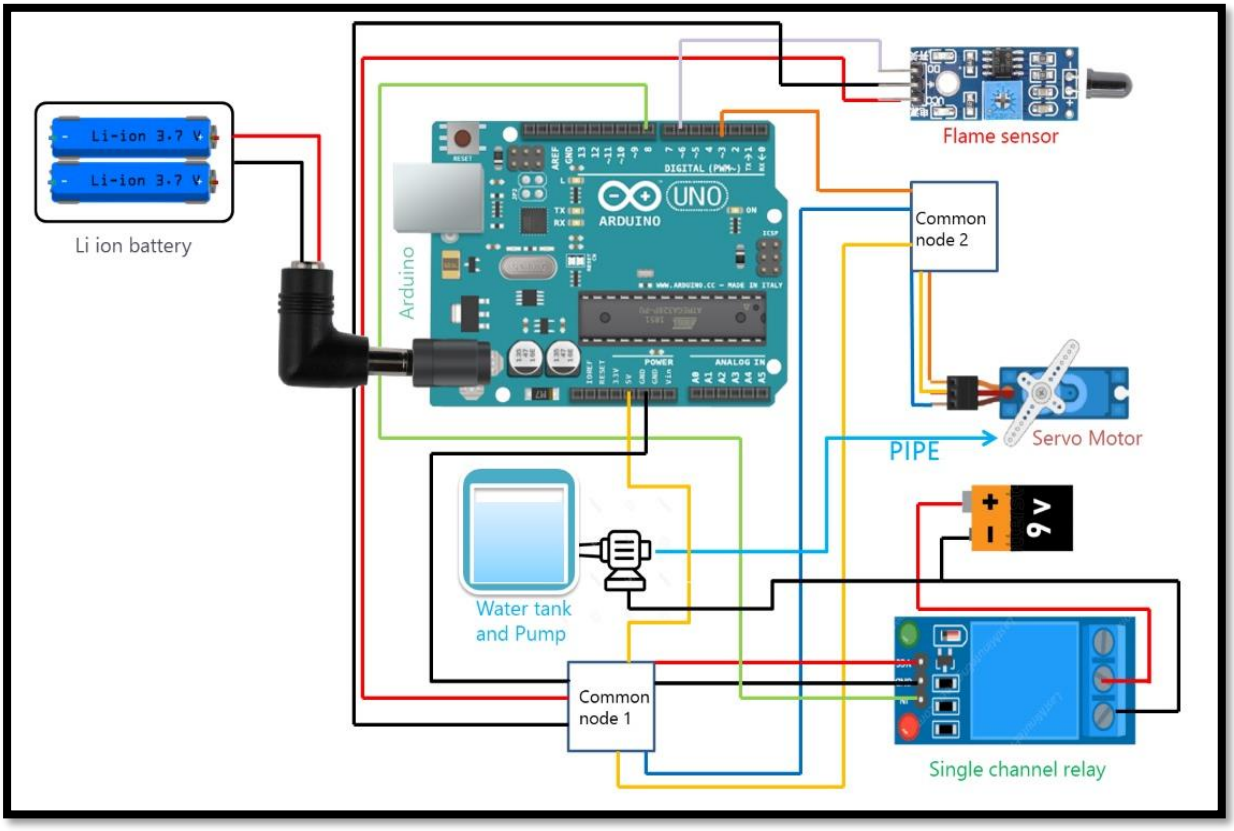

Fig 6.1 Fire extinguishing circuit diagram

When the control buttons of the transmitter is pressed, the IC (HT-12E) which is connected to power supply battery starts transmitting radio frequency signal at 433 MHz frequency consisting of its ID and Data byte which indicates that key that was pressed. The signal is transmitted using ASK modulation. The signal is received by the receiver whose IC(HT-12D) decodes the output and converts the serial data received by the RF Receiver into 4-bit parallel data (D0, D1, D2, D3) and drives the output accordingly. The receiver is powered by a 9V battery. The Gnd and Vcc pins of the receiver are connected to Gnd and Vcc pins of the 4 - channel relay. The data pins of the receiver are connected to the input pins of the 4channel relay (IN1, IN2, IN3, and IN4).Since the received signal is given as the input to the 4-channel relay, the relay responds to the change in the transmitted input. This change is indicated by the presence of the Led's which provide relay output status.When the robot has to move towards right, then the Led of the 2nd relay is tuned ON.Based on the above combinations, the user can control the motion of the robot. Hence this system is called Motion Controller system.

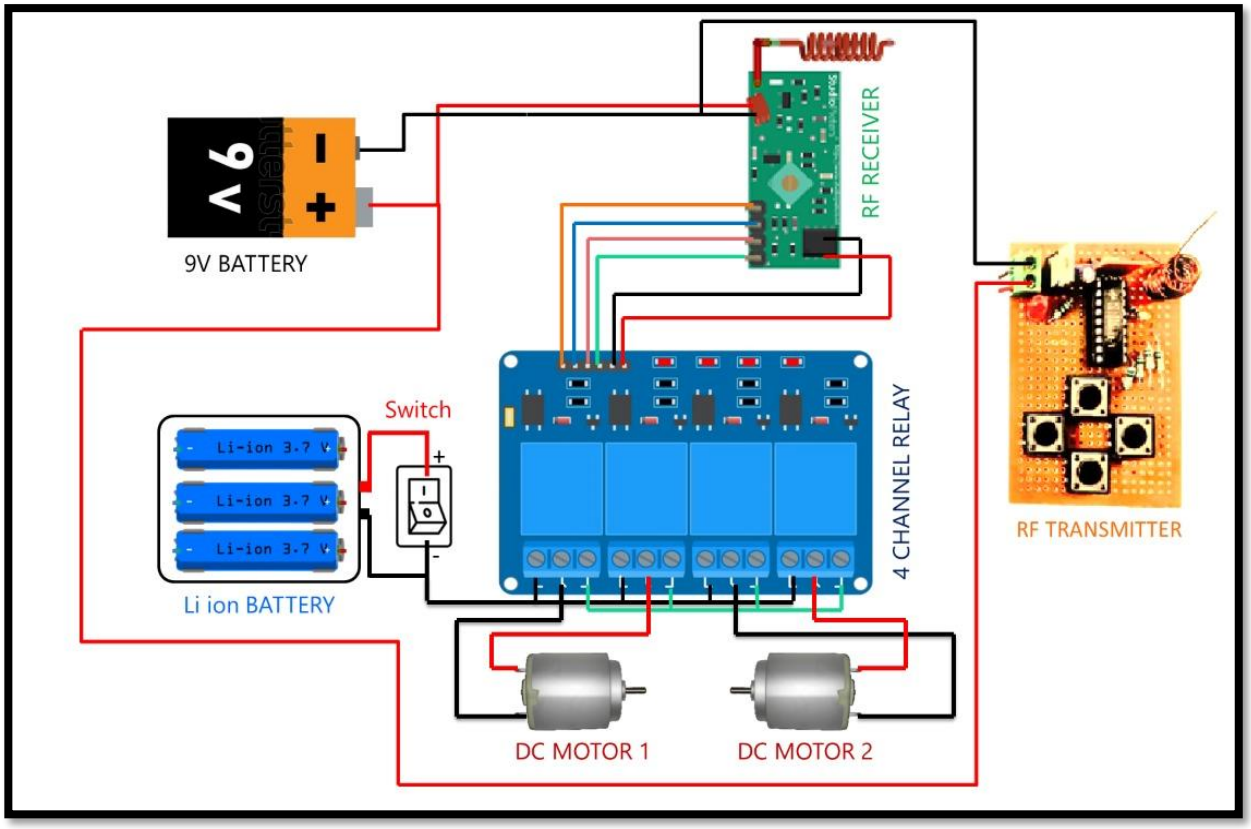

Fig 6.2 Motion control circuit diagram

The C (Common contact) pins of all the 4 relays are serially with each other. Similarly the NO (Normally open) pins of the relays are shorted serially. The NC (Normally closed) pins of the 1st and 2nd relay is connected to the 1st DC motor while the NC pins of the 3rd and 4th relay is connected to 2nd DC motor. The entire relay system is powered by a rechargeable Li ion battery (12V) which is activated by the switch that is controlled by the user. When the robot has to move forward, the LED of the 2nd and 3rd relay is turned ON indicating the completion of closed circuit.

- When the robot has to move backward, the Led of the 1st and 4th relay is turned ON
- When the robot has to move towards left, then the Led of the 3rd relay is turned ON
- When the robot has to move towards right, then the Led of the 2nd relay is tuned ON.

Based on the above combinations, the user can control the motion of the robot.

Hence this system is called Motion Controller system.

CHAPTER 7

OUTCOME

OUTCOME

The hardware mechanisms are successfully interfaced with the Arduino Uno. Test results shows that the various field activities like robot movement, flame detection and Fire extinguishing are performed and controlled with the help of RF module.

OUTCOMES OF RF CONTROLLED FIRE FIGHTING ROBOT

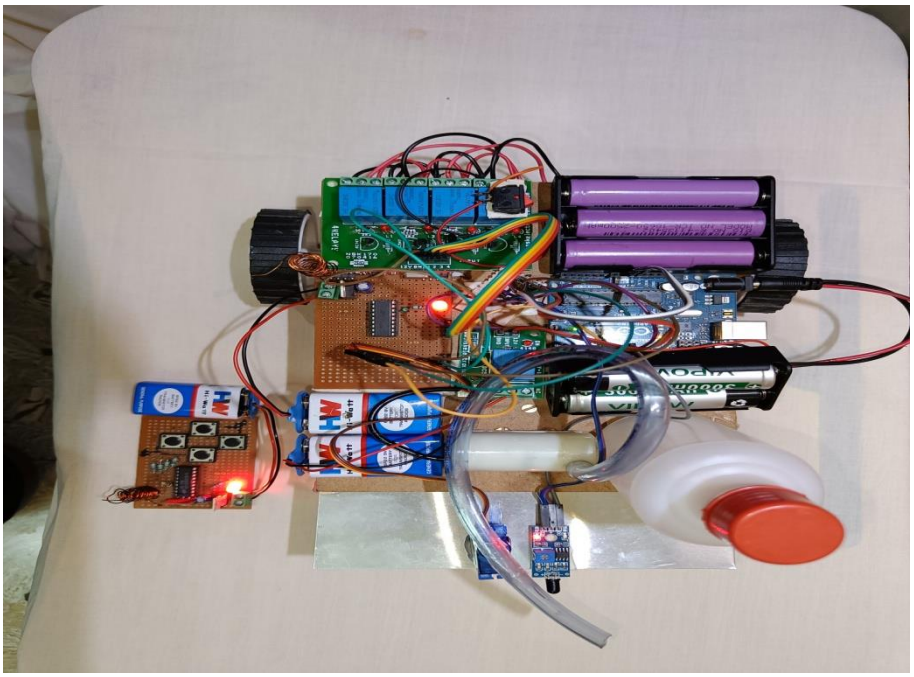

Fig 7.1 Top View of the model

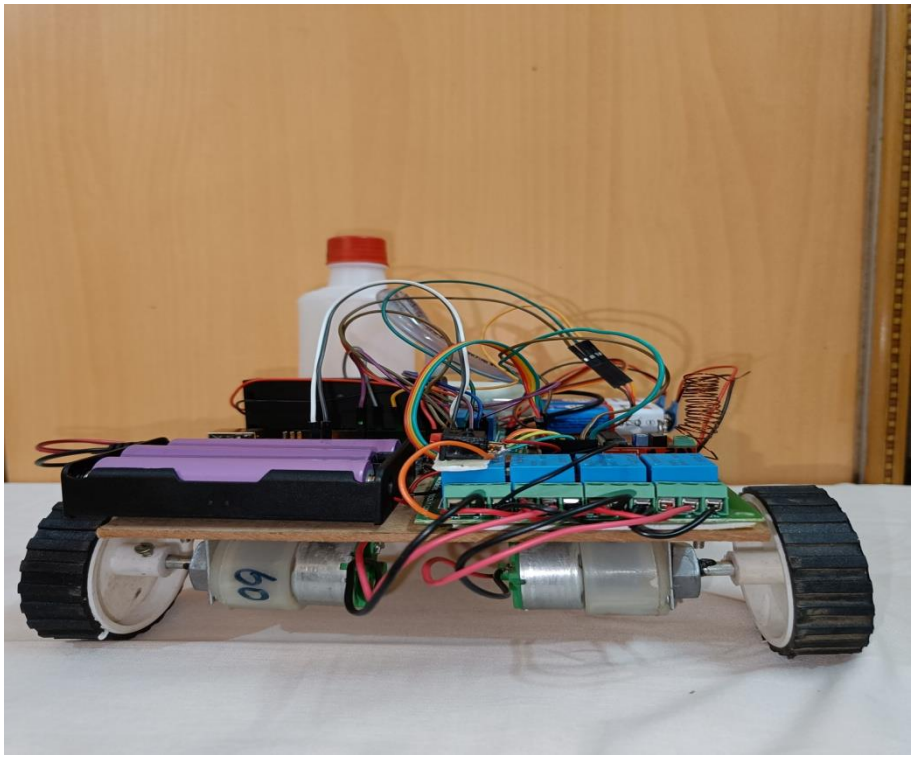

Fig 7.2 Rear View of the model

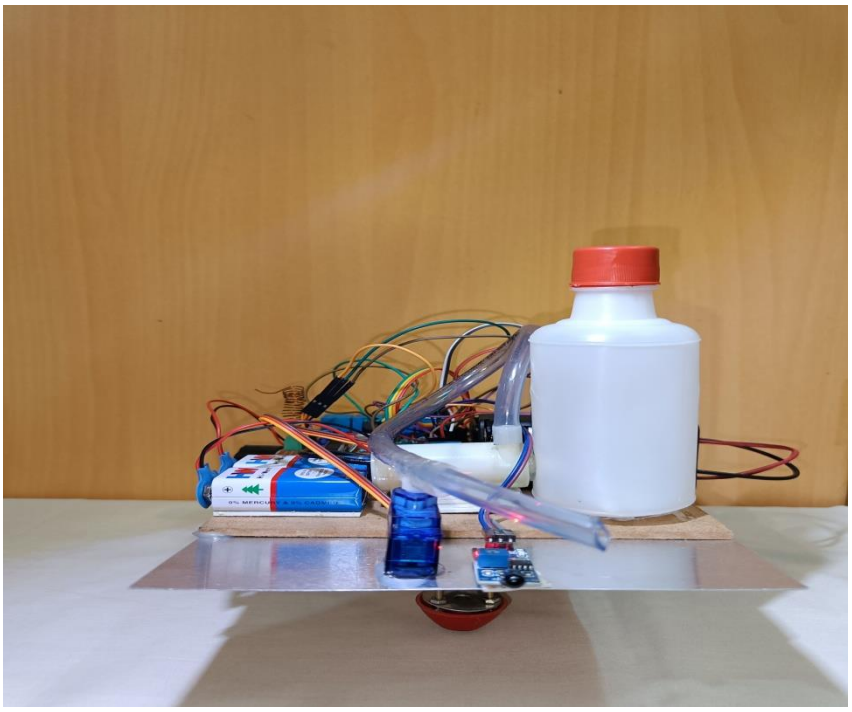

Fig 7.3 Front View of the model

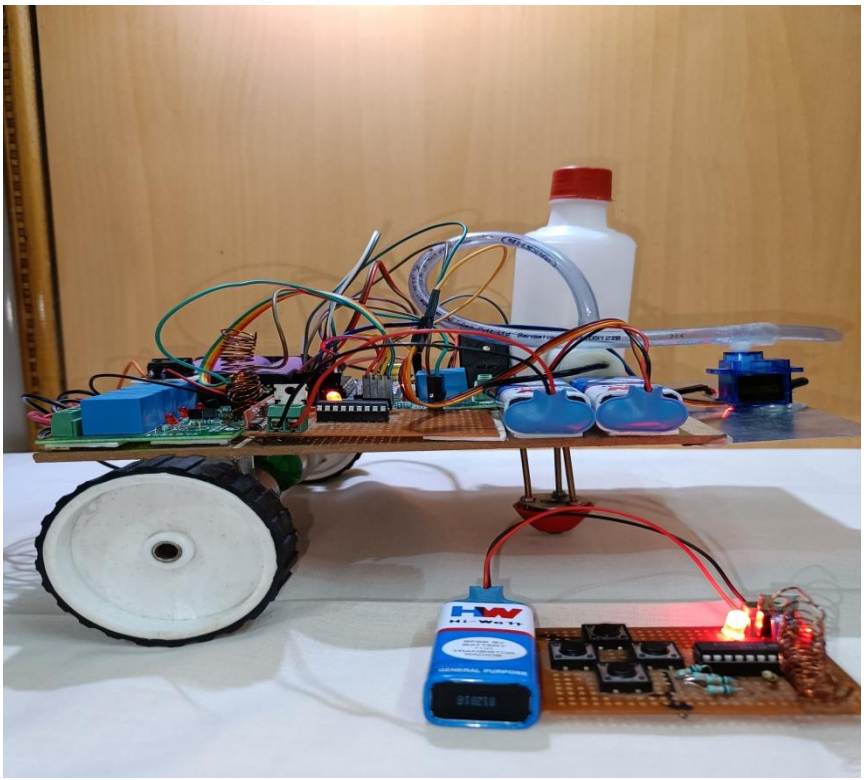

Fig 7.4 Side View of the model

CHAPTER 8

MERITS, DEMERITS ANDAPPLICATIONS

MERITS

- Fire Extinguishing ability
- Improves Safety
- Reduces Risk to Human lives.
- Time and manual power is reduced.
- Can be implemented with different methods like RF, Wi-Fi/IoT modules.
- Increases the Fire Extinguishing efficiency.
- It is a innovative work in the field of robotics that operates towards a sensible and obtainable access to save the lives and prevents the danger to property.

DEMERITS (LIMITATIONS)

- Robots cannot easily adapt to unusual conditions like a human being can
- People are made unemployed
- Little Period of working time and low storage of water provided
- A periodic human presence in the field is likely to be necessary.

APPLICATIONS

- Analyzing and locating fires.
- Conducting search and rescue.
- It is replacing the conventional techniques to perform the same tasks, with efficiency.
- Monitoring hazardous variables and the primary task of fire control and suppression.
- Safety to homes, factories and offices etc.
- Used in application where there is a risk to human life.

CHAPTER 9

CONCLUSION AND FUTURE SCOPE

CONCLUSION

In this project, a firefighting and affected area monitoring robot is proposed based on the RF module, which is capable of taking instant steps during fire accidents. This robot can be used to reduce the risk of human firefighters and in the area which is out of reach for human beings. The industries with a higher risk of fire accidents can use this robot to avoid huge damages.

FUTURE SCOPE

The firefighting robot will have future scope that it can work with firefighters, which greatly reduce the danger of injury to victims. It is a innovative work in the field of robotics that operates towards a sensible and obtainable access to save the lives and prevents the danger to property.

In future venture, video monitoring can be done for the field to be monitored more accurately. More advanced and fast system can be developed with more focus on implementation of right mechanical parts and their designing. Implementation of advanced sensors would control the motion of the robot even under worst field conditions. Use of ultrasonic sensors and cameras for measuring the area covered by the robot improves the performance of the robot.

CHAPTER 10

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REFERENCES:

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