FIRE FIGHTING ROBOT

INTRODUCTION TO ENGINEERING

REPORT

Submitted By

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FRESHMAN ENGINEERING

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BONAFIDE CERTIFICATE

Certified that this project **"FIRE FIGHTING ROBOT " is** the bonafied work of **S. Eswar Manoj (21UEEE0021), K.Mahesh (21UEEE0009) , K.Revanth Kumar (21UEEE0008), S.D.S.Prasad (21UEEEC0298), CH.Naveen Reddy (21UEEC0056), M.V.Kartikeya (21UEEE0013)** who carried out this project under my supervision**.**

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EXAMINER 1 **EXAMINER 2**

ABSTRACT

Fire Fighting is an important job but it is very dangerous occupation. Due to that, robots are designed to find a fire before it rages out of control. It could be used to work with fire fighters to reduce the risk of injury to victims. The firefighting robot competition that purposely to simulate the real-world operation of an autonomous robot to stop five fires with in three minutes. The robot development is consisting of three elements which is the hardware, electronic, programming part, C-language is used to determine the robot action gain from the sensor input. 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 fire fighters and would also prevent them from risking human lives. Fire Fighting robots using Arduino which will automatically sense the fire and start the water pump that would teach us the underlying concept of robotics.

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CHAPTER I

INTRODUCTION

Robotics is part of Today's communication. In today's world ROBOTICS is fast growing and interesting field. It is simplest way for latest technology modification. Now a day's communication is part of advancement of technology, so we decided to work on Robotics field, and design something which will make human life simpler in day today aspect. Thus, we are supporting this cause. Robots with different features which are facilitated with different sensors that detect before the fire is out everyday aims to develop fire fighting robot. Now a days the robot industry becomes visible as a model that is produced as an alternative to human element in a new branch. Fire's most important. Some of robots in many different models designed to help fire fighters in the fire. During the design and to development and the mechanical system; draft drawing and the measurements, computer design and models was able to detect fire source randomly placed in random obstacle areas and extinguished with determined fire extinguish system.

CHAPTER II

EXISTING SYSTEM

The existing system is manual controlled suing water, water mist, foam. But all these are been operated by a human being. High temperature prone or low oxygen prone fire accident areas have high probability to take the life of the extinguisher. A fire fighter is one that has a small fire extinguisher. The attaching a small fire extinguisher to the robot, the automation took out the fire by human controlling. This project covers the design and construction of a robot that is able to sense and extinguish fire. On the other hand, robots decrease the need for fire fighters to get into dangerous circumstances.

CHAPTER III

PROBLEM IDENTIFICATION

These technologies are used to develop machines that can substitute for humans and replicate human actions. Robot can be used in many situations and for lot of purposes but today many are used in dangerous environments including bomb detection and deactivation manufacturing process anywhere humans cannot survive high heat water in space robots can take on any form but some are made to resemble humans in appearance

There are several possibilities of fire in any remote area or in an industry. For instance, in garments godowns, 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

CHAPTER IV

PROPOSED SYSTEM

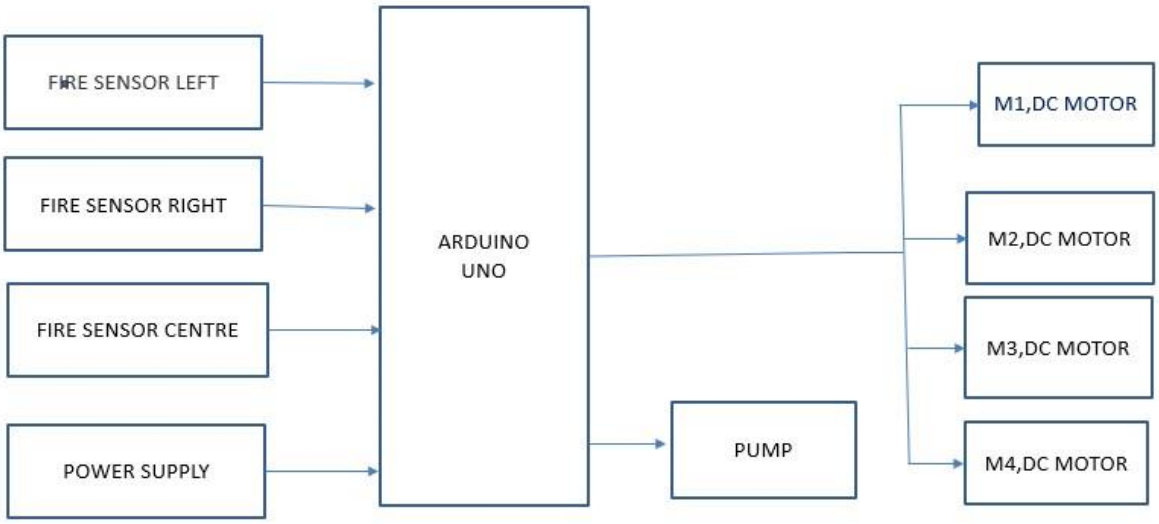
The manual extinguishing of fire accidents can cause harmful damages for properties as well as fire fighters. To overcome this problem we have come up with this idea. This concept uses a robotic system to identify the location of fire. Further aims the water pipe to the fire location and shoots out the water.

This is entirely embedded and doesn't require human involution.

CHAPTER V

BLOCK DIAGRAM / DESIGN

BLOCK DIAGRAM:



CHAPTER VI

MATERIALS

FLAME SENSORS:

A flame 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, and activating a fire suppression system.

Figure:6.1 Flame sensor

AURDINO(UNO)(R3):

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may interfaced to various expansion boards (shields) and other circuits.

Figure 6.2 Arduino UNO

JUMPER WIRES:

A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Figure 6.3 jumper wires

L293 Motor Driver:

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.

Figure 6.4 L293 MOTOR DRIVE

SERVO MOTORS (SG90):

The SG90 micro servo motor. In the background is a rotary angle sensor module and a potentiometer. Both can be used to control the servo motor. The SG90 is such a servo motor that can rotate approximately 180°.

Figure 6.5 servo motor

9V BATTERY:

9V tells us that the battery supplies 9volts under a nominal load. The same principle holds for a 9V battery bank in that it provides 18 volts. As we discussed before, most car and RV batteries are 9V.

Figure 6.6 9v battery

CHAPTER VII

WORKING

The robot firefighter uses a servo to continuously rotate the fire sensor 180 degrees back and forth. When the fire sensor is triggered, the servo is stopped and the water pump is turned on through the relay module, and the robots sprays water and executes the fire. The distance of the water jet can be adjusted by turning the spray nozzle. When the fire is extinguished, the server starts working again by turning the fire sensor. For such a simple fire extinguished robot we used the Arduino UNO, but you can use any other Arduino. Connected the servo to a 5V battery, and the Arduino and the water pump are connected to a 12V battery. Amazing robot firefighter with the fire sensor on Arduino.

CHAPTER VIII

SOFTWARE DETAILS

In this Arduino IDE is used to code the Arduino UNO. The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

CHAPTER IX

PROGRAM

```
#include <Servo.h>

#define SENS  2

#define RELE  10

#define SERVO 11


#define RON   LOW

#define ROF   HIGH


Servo servo;


bool  flSt  =  false;

int16_t i = 0; bool

up = false;


void Sens()
```

```
{
  if
(!digitalRead(SENS))
{    flSt = true;    }   else
{    flSt = false;
  }
}

void setup( )
{
  pinMode(SENS,    INPUT_PULLUP);
pinMode(RELE, OUTPUT);   digitalWrite(RELE, ROF);
servo.attach(SERVO);   servo.write(0);
}

void loop( )
{
  Sens();
if (flSt)
```

```
 {
   if                    (servo.attached())
servo.detach();     digitalWrite(RELE,
RON);
 }
else
 {
   digitalWrite(RELE,   ROF);     if
        (!servo.attached())
servo.attach(SERVO);
   else    {
if       (!up)
{        do

       {
        Sens();          i++;          servo.write(i);
if (i ==
180) up = true;
```

```
        if (flSt)          {
servo.detach();
break;
        }
       }
       while (i <= 180 &&! flSt);
     }
else
{       do
{
        Sens();          i-;
servo.write(i);
if (i == 0) up = false;
if

(flSt)
        {
servo.detach();
break;
```

```
          }
        }
        while (i >= 0 &&! flSt);
      }
    }
  }
}
```

CHAPTER X

HARDWARE DISCUSSION

This project requires a few hardware parts to make the skeleton stable and for functioning of mechanical elements. It needs a container to store some amount of water. This container should be integrated to a 12v pump. It requires a stand for the container to create space underneath the container for fixing the pump. A flexible plastic water pipe to run water along and spray out. The pipe is to be glued on servo motor in order to turn the direction along the fire presence.

CHAPTER XI

ADVANTAGES / DISADVANTAGS

ADVANTAGES

- Providing safe interior fire operations on large commercial fires.
- Tackling blazes on wood-framed structures under construction.
- Establishing a structural defense against wildfires.
- Completing the rescue of large animals.
- Helping to extinguish fuel tanker fires.
- Fighting auto storage fires.

DISADVANTAGES

- No monitoring system for the vehicle which makes us hard in finding the device.
- No remote control for the robotic movement.
- Our system used only for less 3.5 kg application.
- It is not used to put out large fires.

CHAPTER XII

CONCLUSION

The Fire Fighting robot helps to detect the exact direction of the fire source. It has the capability of sensing accurately with increased flexibility, low cost in the long run, it is reliable and economical, by placing the sensors appropriately can efficiently detect the location of the fire. By using firefighting robots can reduce the effect of fires accidents which usually start from small flame, therefore people life and money would be saved. The robot can successfully find fire and reach it without running into obstacle.

REFERENCES

SL.NO.	TITLE	NAME OF JOURNAL/PUBLICATION	AUTHOR	YEAR
1	Fire Fighting Robot with Fire Fighting Circuit	Renewable energy world magazine	Prof.Samantha Cardoso	June 1, 2009
2	Design and implementation of RF based firefighting robots	IJSRD - International Journal for Scientific Research & Development	Amira Salkar	2016
3	Control of a Autonomous industrial Fire Fighting Mobile Robot	IJSRD – International Journal for Scientific Research & Development	Anaska Gomes	24th August, 2015
https://circuitdigest.com/microcontroller https://youtu.be/nMdZ2xcrKRk				

CHAPTER XIII

LIST OF MODELS

Carpentry:

- **Wooden window**
- Sliding door
- Wheel chair
- Crank and slotted link
- WOODEN SHELF

Electronics:

- Power supply board
- **Portable mobile charger circuit**
- Emergency light
- Relay Board

Machine Shop :

- Machine Vice
- Bolt and nut assembly
- Simple and compound Gear train
- **Sheet metal tray**

13.1 MODEL 1-CARPENTRY: WOODEN WINDOW

AIM: To make the wooden window by using wooden pieces.

APPARATUS: Wooden pieces, coping saw, Scissors, Super Glue and Hinges.

PROCEDURE:

1. Take some wooden pieces and cut them into required sizes.

2. Attach some of the wooden pieces to form the frame and door of the window.

3. Now attach the hinges and window handle as showed in the below design.

4. Finally the wooden window in ready.

DIAGRAM

Figure 13.11 wooden window

RESULT:

Hence wooden window has been successfully completed.

13.2 Model:2-ELECTRONICS: PORTABLE MOBILE CHARGER

AIM: To Make Portable Mobile Charger

APPRATUS: Wire Cutter, PCB Board, Wires, 1K OHM Resistor, LED Light, 9V Battery, 7805 IC, Soldering Iron

PROCEDURE:

1. Take a dot board and insert the components in it as shown in the design.

2. Now take the soldering iron and do the soldering.

3. After soldering take the 9V battery and connect to the circuit.

4. Finally the portable mobile charger is ready.

DIAGRAM:

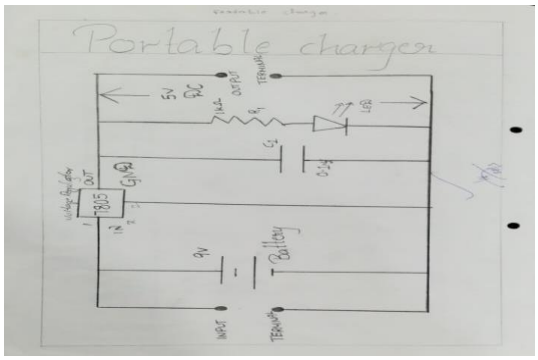


Figure 13.2.1 ccircuit diagam of battery

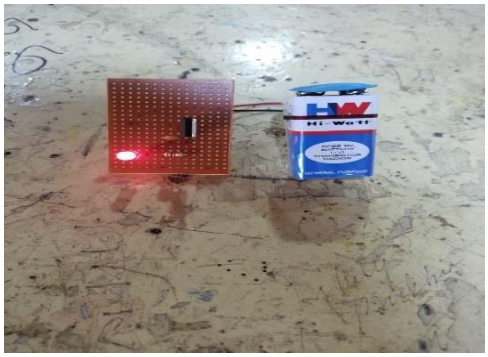


Figure 13.2.2 portable mobile chaarger

RESULT:

Hence portable mobile charger has been successfully completed

13.3 MODEL 3 -MACHINE SHOP: SHEET METAL TRAY

AIM: To make a sheet metal tray using sheet metal.

APPARATUS: Sheet metal, scissors, cutting plier and hammer.

PROCEDURE:

1. Take the sheet metal and make the measurements as shown in the below design.

2. After taking the measurements cut the sheet metal using scissors carefully.

3. Now fold the sheet metal to obtain perfect shape as a tray.

4. Finally the sheet metal tray is read

DIAGRAM:

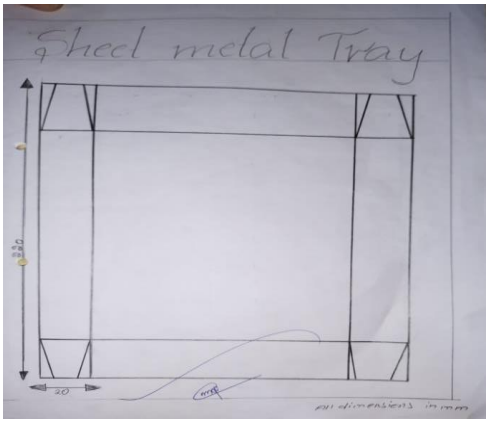


Figure 13.3.1 sheet metal tray design

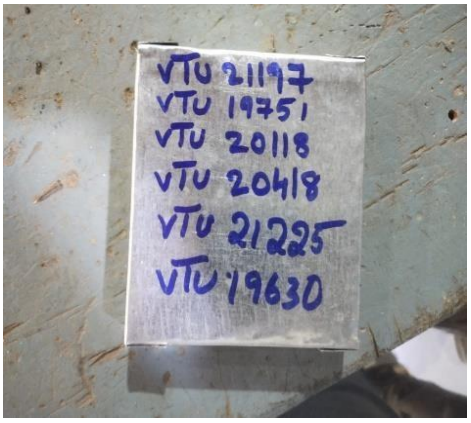


Figure 13.3.2 sheet metal tray

RESULT:

Hence sheet metal tray has been successfully completed