FIRE DETECTOR & EXTINGUISHER ROBOT

A Project report

submitted by

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BONAFIDE CERTIFICATE

Certified that this project report titled **"FIRE DETECTOR & ESTINGUISHER ROBOT"** is the bonafide work of "P.V.SUDHARSHAN KUMAR REDDY **(17127164), S.DHEERAJ(17127167), G.MANOJ KUMAR REDDY(17127172), AJAY (17127139)"** who carried out the project work under my supervision. Certified further that to the best of my knowledge the work reported here does not form part of any other project / research work on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

INTERNAL EXAMINER   EXTERNAL EXAMINER

ABSTRACT

This project is a prototype of an automatic fire alaram and extinguishing system.

❖ It works on the principle of detection of fire by sensing raise in temperature,using a thermostat.

❖ As soon as the fire is detected the circuit becomes live thereby giving an audio alarm and simultaneously activating fire detecting system.

Detecting fire and estinguishing is a harzardous job for a fire estinguisher, it often risks the life of that person . The project aim is giving a technical solution to the mentioned problem. A robot is a mr=echanical design that is capable of carring out of a complex series of action automatically.

This mobile robot is controlled using a mobile phone , the flame sensors detects the fire and gives the further signal to estinguisher . The whole system is programmed using an arduino   uno board which forms the braain of the system.

ACKNOWLEDGEMENT

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CHAPTER-1

INTRODUCTION

The modern definition of a robot can be an electro-mechanical device which follows a set of instructions to carry out certain jobs, but literally robot means a 'slave'. Robots find wide application in industries and thus are called there as industrial robots and also in sci-fi movies as humanoids. This and coming articles will provide an introduction to the Robotics.

Robotics is a branch of engineering and science that includes electronics engineering, mechanical engineering and computer science and so on. This branch deals with the design, construction, use to control robots, sensory feedback and information processing. These are some technologies which will replace

humans and human activities in coming years. These robots are designed to be used for any purpose but these are using in sensitive environments like bomb detection, deactivation of various bombs etc.

Robots can take any form but many of them have given the human appearance. The robots which have taken the form of human appearance may likely to have the walk like humans, speech, cognition and most importantly all the things a human can do.

The three laws state that:

❖ Robots will never harm human beings.

❖ Robots will follow instructions given by humans with breaking law one.

❖ Robots will protect themselves without breaking other rules.

Characteristics:-

There are some characteristics of robots given below:

Appearance: Robots have a physical body. They are held by the structure of their body and

are moved by their mechanical parts.   Without appearance, robots will be just a software program.

Most of the robots of today are   inspired by nature and are known as bio-inspired robots.

The aim of this project is to design an robot with complete system allow the robot to wonder about its environment and to interact with a certain object that its encounter. In order to achieve the aim of this project, several objectives are needed to be complete.

OBJECTIVE:

❖ To detect fire in the disaster prone area.

❖ Also find audio and visual indications.

❖ Estiguises fire detection.

❖ Reduces the effort of labour and level of destruction.

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<u>LITERATURE REVIEW</u>

This is   proposed a method to control fire, using the fire-fighting robot. In this model, a sensor was used to sense the fire and navigate robot towards it (2014). Lynette Miller Daniel Rodriguez (2003) have proposed a design prototype "firefighting robot", which contains Light Emitting Diode (LED) to indicate the fire status. In this paper, all the components used are described in detail. This project was based on the line following conditions (Hardey et al., 2012). Shah et al. (2013) have been proposed a firefighting robot along with path guide in the normal mode of operation. Due to this work, the human effort were reduced.

CHARECTERISTICS:

There are some charecteristics are given below:

<u>Appearance</u>: Robots have a physical body. They are held by the structure of their body and are moved by their mechanical parts. Without appearance, robots will be just a software program.

Brain: Another name of brain in robots is On-board control unit. Using this robot receive information and sends commands as output. With this control unit robot knows what to do else it'll be just a remote-controlled machine.

<u>Sensors</u>: The use of these sensors in robots is to gather info from the outside world and send it to Brain. Basically, these sensors have circuits in them that produces the voltage in them.

<u>Actuators</u>: The robots move and the parts with the help of these robots move is called Actuators. Some examples of actuators are motors, pumps, and compressor etc. The brain tells these actuators when and how to respond or move.

<u>program</u>: Robots only works or responds to the instructions which are provided to them in the

form of a program. These programs   only tell the brain when to perform which operation like when to move, produce sounds etc. These programs only tell the robot   how to use sensors data to make decisions.

Behaviour: Robots behavior is decided by the program which has   been built for it. Once the robot starts making the movement, one   can easily tell which kind of program is being installed inside the   robot.

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METHODOLOGY

COMPONENTS REQUIRED FOR FIRE DETECTOR AND ESTINGUISHERS:

- ❖ ARDUINO UNO
- ❖ FLAME SENSOR
  - ❖ LED LIGHTS
- ❖ BUZZER
  - ❖ JUMPERS
- ❖ WIFI MODULE
- ❖ YO YELLOW
- ❖ BLUEETOOTHHC 05
- ❖ MOTOR SHEILD
- ❖ WATER PUMP

By using the above components we can make a robot which can detect and extinguish the fire.

ARDUINO UNO:

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 pins that may be interfaced to various expansion boards and other circuits.

FLAME SENSOR:

This Flame Sensor can be used to detect fire source or other light sources of the wave length in the range of 760nm - 1100 nm. It is based on the YG1006 sensor which is a high speed and high sensitive NPN silicon phototransistor. Due to its black epoxy, the sensor is sensitive to infrared radiation. Sensor can be a great addition in a fire fighting robot, it can be used as a robot eyes to find

the fire source. When the sensor detects flame the Signal LED will light up and the D0 pin goes LOW.

A LIGHT-emitting diode is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons.

BUZZER:

A buzzer or beeper is an audio signalling device, which may be

mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

BREAD BOARD:

A breadboard is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used for slicing bread
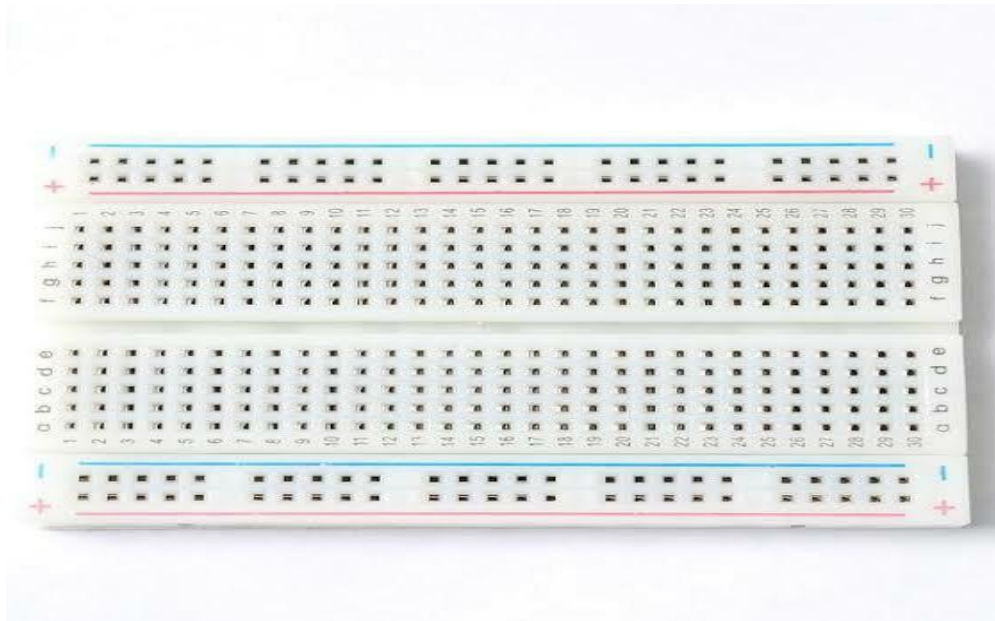
JUMPERS:

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.
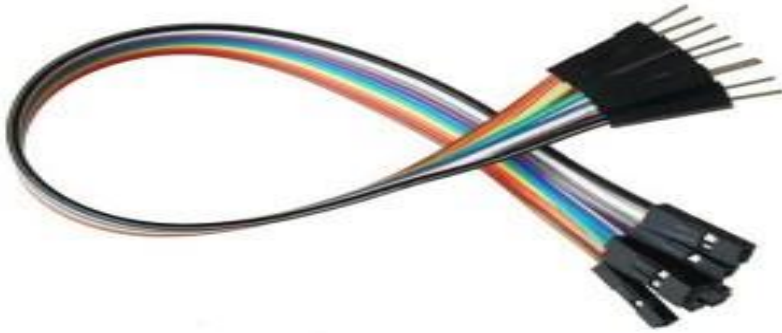
`BLUETOOTH MODULE HC-05:

HC-05 is a Bluetooth module which is designed for wireless comunication. This module can be used in a master or slave configuration.

MOTOR SHEILD:

The Motor Shield is a driver module for motors that allows you to use Arduino to control the working speed and direction of the motor. Based on the Dual Full- Bridge Drive Chip L298, it is able to drive two DC motors or a step motor.
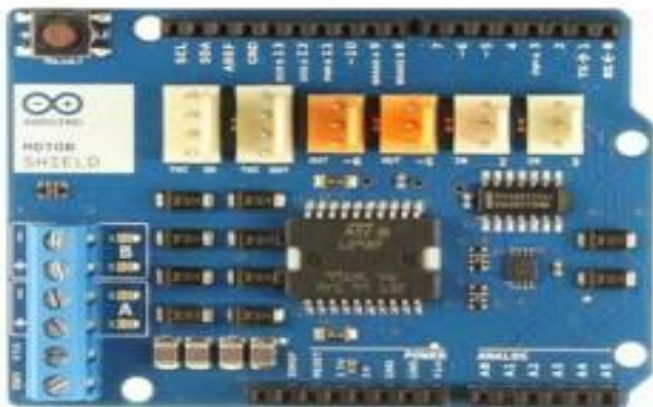
BO MOTOR:

BO(Battery Operated) light weight DC geared motor which gives good torque and rpm at lower voltages. This motor can run at approximately 300 rpm.

BO YELLOW WHEELS:

Wheels for BO motors - 65mm x 35mm , a dc   motor used for various applications and robotic   projects.
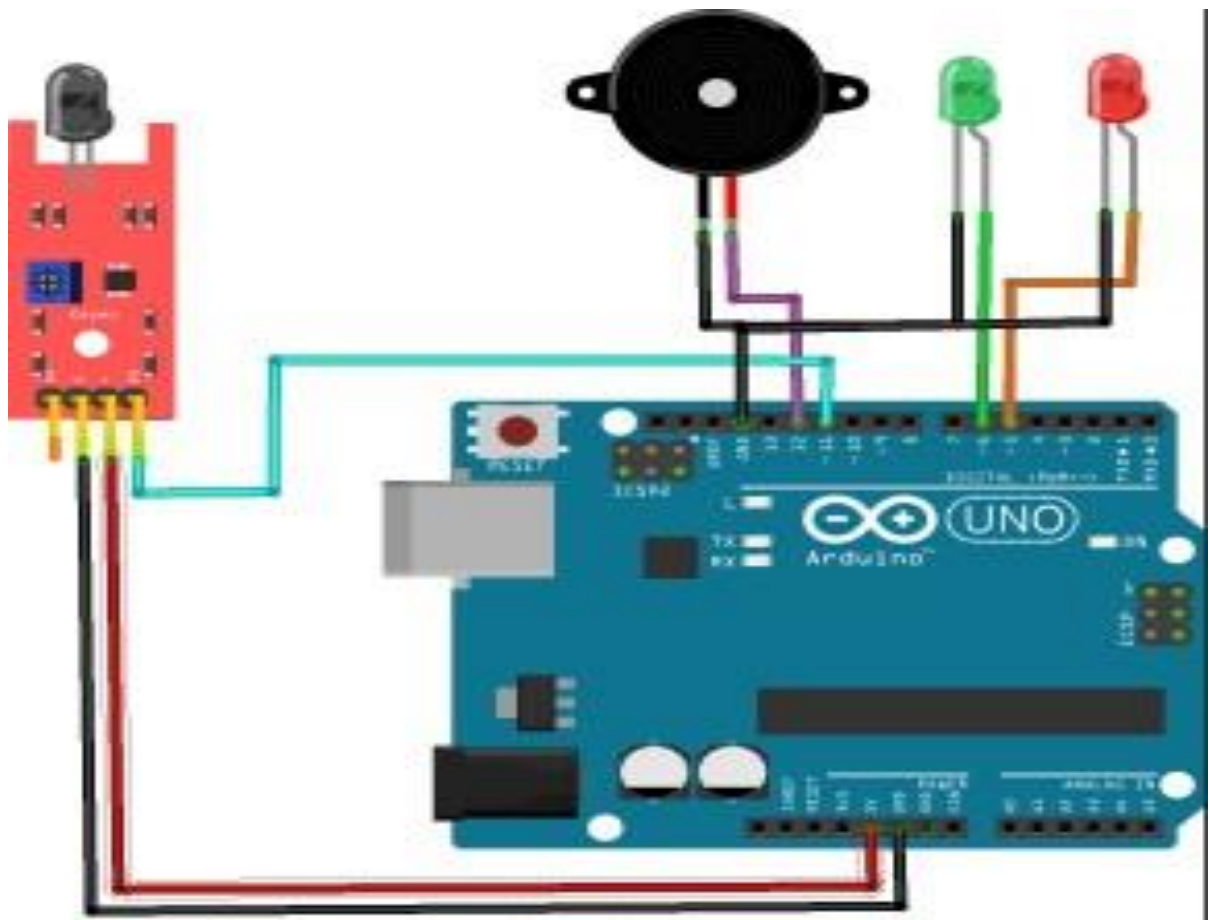

Working:

Construction of a robot:

Fire detector:

By using the jumpers we can give connections to Arduino and bread board a flame sensor is also connected to bread board and led lights, buzzer are also connected to bread board.All the connections are given according to coding.

CIRCUIT DIAGRAM:

CODING:

```
//Arduino Flame Sensor
const int buzzerPin = 12;
const int flamePin = 11;         int
Flame = HIGH;
int redled = 5;    int greenled = 6;
void setup()
{
pinMode(buzzerPin,         OUTPUT);
pinMode(redled,            OUTPUT);
pinMode(greenled, OUTPUT);

pinMode(flamePin,            INPUT);
Serial.begin(9600);
```

```
}
void loop()
{
Flame = digitalRead(flamePin);    if
(Flame== LOW)
{
digitalWrite(buzzerPin,        HIGH);
digitalWrite(redled,           HIGH);
digitalWrite(greenled, LOW);
}
else
{
digitalWrite(buzzerPin,        LOW);
digitalWrite(greenled,         HIGH);
digitalWrite(redled, LOW);
}
}
```

After the connections and transferring the coding to Arduino, the fire is detected as shown below.
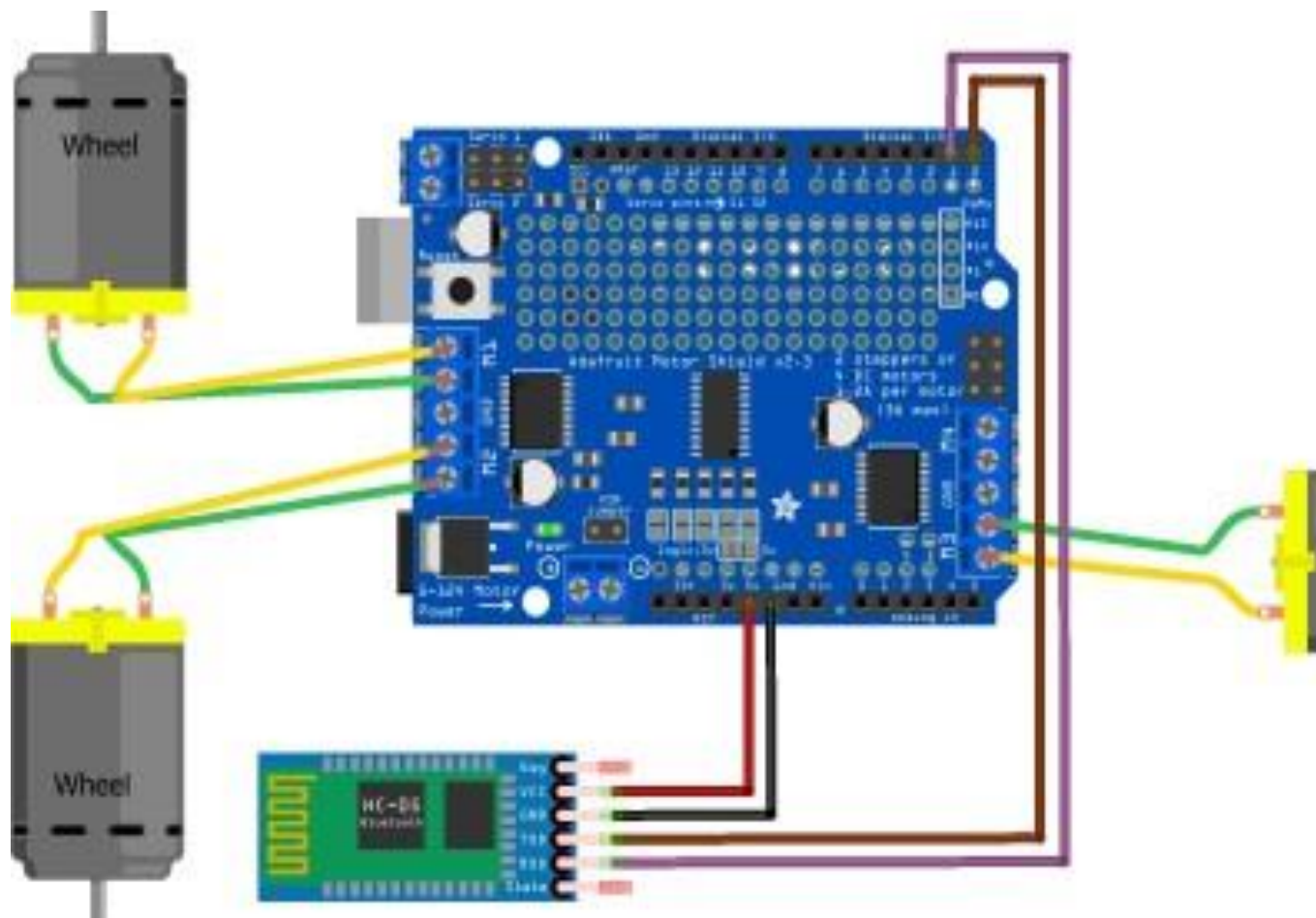
FIRE EXTINGUISHER:

All the required connections are given according to the coding.By using Male Female jumpers the Bluetooth module is connected to Arduino. The motor Shield and Arduino are connected.

CIRCUIT DIAGRAM:

CODING:

```
#include <AFMotor.h>
AF_DCMotor right_motor(1, MOTOR12_8KHZ);    AF_DCMotor left_motor(2, MOTOR12_8KHZ);
AF_DCMotor three_motor(3, MOTOR12_8KHZ);

String readString;

void setup() {    Serial.begin(9600);
right_motor.setSpeed(255);
```

```
    left_motor.setSpeed(255);
    three_motor.setSpeed(255);

    }

    void loop()

    {

    while(Serial.available()){    delay(50);

    char c=Serial.read();    readString+=c;

    }

    if(readString.length()>0){    Serial.print
    ln(readString);

    if                            (readString
    =="FORWARD"){              //forward
    right_motor.run          (FORWARD);
    left_motor.run           (FORWARD);
    delay(500);

    }

if (readString =="BACKWARD"){ //backward
right_motor.run (BACKWARD);
left_motor.run (BACKWARD);
delay(500);
}
```

```
if (readString =="STOP"){   //stop
right_motor.run (RELEASE);   left_motor.run
(RELEASE);   delay(500);

}
if (readString =="RUN WATER"){//ON
Water Pump   three_motor.run (FORWARD);

delay(500);

}
if (readString =="STOP WATER"){   //OFF
Water Pump   three_motor.run (RELEASE);

delay(500);

}
readString="";

}
```

After all the connections are given according to the coding and circuit diagram the fire is extinguished as shown below.

The fire detecting robot helps in following ways:

❖ To detect the exact direction of the fire source.

❖ Reduce human effect.

❖ Relieable and economical.

❖ Not sensitive to whether conditions.

❖ Capability of sensing accurately with increased flexibility.

❖ Cctv cameras are relatively in expensive atv purchase can monitor a large area.

❖ Smoke detectors are relatively inexpensive to buy.

❖ Water provides cooling, protection for fire party.

❖ It pass through solid longer range .

❖ Not sensitive to light.

DISADVANTAGES:

❖ It cannot be work beyond the limit.

❖ High cost

❖ Data rate transmission is lower than wire transmisson.

❖ Communication devices mostly used In similar freqwency so interfernce occurs if the adress are not specified.

❖ No monitoring system for the vehicle.

❖ No remote control for the robotic movement.

❖ It is not used to put out large fires.

APPLICATIONS:

INDUSTRIES ARE USING FOR RF SOLUTIONS:

For monitoring control process, inventary tracking,data links.

CUSTOMER PRODUCTS:

Electronic toys, Home security, gate and garge door openers.

CHAPTER – 4
FUTURE SCOPE

* The project has been motivated by the desire to design a system that can detect fires and take appropriate action, without any human intervention .

* This provides us te oppurtinity to pass on to robots task that traditionally humans had to do but where inherently life frightening.

* Fire fighting is an obvious candidate for such automation.

* Fall detection systems needs to designed more accurately to avoid falls alarams.

* Design a fire fighting using numerical approach.

- Select the suitable material to develop the robot.

- Remote control of robot.

- Improve weight capacity of robot.

- Camera and vedio transmissions can be added.

- Connecting more devices .

- It can be used for high security in banks and other organisations.

- The aim in future would to be implement the system and its principles on a humanoid robot to avoid human loss during vast fire accidents and wars,where the human rescue operations cannot be performed.

CHAPTER – 5

RESULT AND DISCUSSION

In the fire detecting extinguishing robot project, the aim was to develop a system the detects and extinguishes the fire starts and informs the electronic environment.

With the help of Arduino, Bluetooth and necessary connections made according to the coding given the fire is detected and extinguished.

Overall, a fire detecting robot that can be controlled from some distance has been successfully developed.It has advantages features such as ability to detect location of fire automatically .

Finally, the robot can detect the fire with help of flame sensor and it can detect with help of buzzer alaram.As per extinguisher we can control the robot with Bluetooth sensor and fire will be conrol with help of extinguisher.

CHAPTER - 6
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