

IMPULSIVE FIRE EXTINGUISHER

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering Degree in
Electrical and Electronics Engineering

by

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade “A” by NAAC

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APRIL 2021



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **MOHANAPRIYA V** (Reg. No. 37140053) and **BHAVANI C** (Reg. No. 37140016) who carried out the project entitled "**IMPULSIVE FIRE EXTINGUISHER**" under our supervision from December 2020 to April 2021.

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DECLARATION

We **MOHANAPRIYA V** (Reg. No. 37140053) and **BHAVANI C** (Reg. No. 37140016) hereby declare that the Project Report entitled “**IMPULSIVE FIRE EXTINGUISHER**” done by us under the guidance of **Dr. BHUVANESWARI** is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electrical and Electronics Engineering.

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ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to the Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to **Dr. N. M. Nanditha., Dean, School of Electrical and Electronics Engineering** and **Dr. V. Sivachidambaranathan, Head of the Department, Dept. of Electrical and Electronics Engineering** for providing us necessary support and details at the right time during the progressive reviews.

We would like to express our sincere and deep sense of gratitude to our Project Guide **Dr. BHUVANESWARI** for his valuable guidance, suggestions and constant encouragement paved the way for the successful completion of our project work.

We wish to express our thanks to all Teaching and Non-teaching staff members of the Department of Electrical and Electronics Engineering who were helpful in many ways for the completion of the project.

ABSTRACT

The preceding model have turn out to be advanced the use of Internet of Things. A new generation automatic fire extinguishing systems have been proposed to beat the flames on the spacecraft platform. The mode of operation have turn out to be finished as controlling the robotic the use of an Android telcel smartphone through IOT. This robot has been changed to be set of guidelines primarily based totally absolutely, which plays its art work primarily based totally absolutely at the situation and assigned proper right here is the hearthplace twist of future zone. Impulsive extinguisher may be a Hardware based model accustomed automatically extinguish the fireplace during fire accidents The robotic mechanically shuts off on the equal time as it's far detected. It furthermore offers the statistics that all and sundry desires to be rescued or individual who's caught beneath neath a number of the activities In such cases, a hearthplace robotic is used to guard human life, cash and the encompassing surroundings from a hearthplace twist of This version is an IOT-primarily based totally absolutely hearthplace preventing robotic that detects hearthplace. Once informed, officials can start visualizing the hearthplace area and talk with the hanged humans with the assist of set up computerized receivers. Instructions may be given to the robotic concerning its movement, turning on its water pump. It starts to maneuver within the direction with reference to fire intensity once when it senses the hearth. The motor speed is adjusted with regard to the temperature range to pump the water. So that this robot pumps the accurate amount of water which is required to extinguish the fireplace

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IMPULSIVE FIRE EXTINGUISHER

CHAPTER 1

1.1 ABSTRACT:

The preceding model have turn out to be advanced the use of Internet of Things. A new generation automatic fire extinguishing systems have been proposed to beat the flames on the spacecraft platform. The mode of operation have turn out to be finished as controlling the robotic the use of an Android telecellsmartphone through IOT. This robotic has been changed to be set of guidelines primarily based totally absolutely, which plays its art work primarily based totally absolutely at the situation and assigned right proper right here is the hearthplace twist of future zone. Impulsive extinguisher may be a Hardware based model accustomed automatically extinguish the fireplace during fire accidents. The robotic mechanically shuts off on the equal time as it's far detected. It furthermore offers the statistics that all and sundry desires to be rescued or individual who's caught beneathneath a number of the activities. In such cases, a hearthplace robotic is used to guard human life, cash and the encompassing surroundings from a hearthplace twist of. This version is an IOT-primarily based totally absolutely hearthplace preventing robotic that detects hearthplace. Once informed, officials can start visualizing the hearthplace area and talk with the hanged humans with the assist of set up computerized receivers. Instructions may be given to the robotic concerning its movement, turning on its water pump. It starts to maneuver within the direction with reference to fire intensity once when it senses the hearth. The motor speed is adjusted with regard to the temperature range to pump the water. So that this robot pumps the accurate amount of water which is required to extinguish the fireplace.

1.2 INTRODUCTION:

The present robotic works best primarily based totally absolutely at the command given with the aid of the usage of the person and furthermore it cannot encounter any hostages that trapped in twist of future. It is likewise hard to view through the stay stream. The proposed robotic detects the presence of hearthplace then it actions toward that particular direction and it pours water or activates extinguisher mechanically. A pump might be related to robotic for extinguishing reason and dc motor assist the moving from one place to every other place. One such very now now not unusualplace situation arises because of fires in industries, art work locations related to risky substances. Controlling those fires with the aid of the usage of experts furthermore effects in lack of life (each twelve months there is a great sized mortality price of firemen on duty). Robotics branch has been developing with new fashions which can possibility human requirement to in my view byskip inner a constructing to extinguish hearthplace. The modernization consists of adding supplementary equipment to the prevailing automatic fire extinguishing systems used at the Launch pads through the addition of multi-barrel modules (MMS) that enable volley dispersion of extinguishing media. Automatic prevention of fireplace,unlike traditional device.after throwing into or rolling into fire,it will explode and provides off a loud sound to catch everyone's attention nearby. you'll also place it near fire hotspots are like flammable objects,circuit breaker box and gasoline tank. In cases of fireplace, it'll put out the fireplace by itself thus guarding lives and properly.the ball is fully automatic extinguisher

1.3 LITERATURE SURVEY

Alonso Cervantes, Augusto Rodin 498, M´exico, Ciudad de M´exico at September-2019 proposes conceptual design of a fire fighter drone. A mechatronic layout of a hearthplace fighter drone is offered for the duration of this paper. Unmanned aerial cars are round for years, they gift dispositions that aloud them for use for numerous purposes. Nowadays this gadgets have end up greater famous and their software program will increase all of sudden in varies fields. This paper specializes in the implementation of an occasional price tool that allows you to assist to adjust a hearthplace through way of manner of enforcing a mechatronic gadgets, it is feasible to pick out a hearthplace on time and extinguish it with out

risking people lives. it is an emergency responder tool that allows you to help firemen in preventing excessive rise fires. It tells approximately the drone with built in tool. The customer will function the drone as quick as alevn though there can be hearthplace everywhere remotely.It tells approximately the drone with built in tool.The customer will function the drone as quick as alevn though there can be hearthplace everywhere remotely[1].

P.Arun Mozhi Devan Assistant Professor Electronics and Instrumentation Engineering at May-2018 proposes fire safety and alerting system in railways (may-2018) In in advance device for the duration of summer time season and warmth seasons defective detection of temperature sensors will takes region way to excessive warmness propose on the equal time as fueloline sensor which have been used furthermore considers the outside surroundings smoke in the air as He is powered by an automatic braking device that can separate the burn comparator from the unaffected compartments, otherwise no movement will be taken. If the sensors in any box face the stove, it sends the statistics to the education pilot via GSM. It sends the statistics to the educate pilot through GSM if the sensors encounter hearthplace in any of the compartments.So that when you have got were given the sign ,the pilot will cut up the fired compartment from the unaffected compartments[2].

J. Joy Mathavan Department of Engineering Technology Faculty of Technology, University of Jaffna Kilinochchi, Sri Lanka joymathavan1991 at September-2020 proposes hardware implementation of fire detection, control and automatic door unlocking system for automobiles (september-2020) it is to release the car door automatically collectively with alerting the motiveforce with an alarm if the door is locked unfortunately. If temperature is excessive then the sensors supply sign to servo motor so the door opens automatically.The first rate benefits of FireSite in Avenue distribution cannot be overstated.but pretty thousand cars are broken

through way of manner of undesirable hearthplace on a normal on a worldwide scale, incendiary losses to the car and coverage industries have all at once met billions of bucks during the last decade. A now no longer thus far off contributory trouble is that the lack of a complex hearthplace protection device on the car. An revolutionary answer module for implementation of hardware in detection of hearthplace and manipulate for cars the use of recent algorithms, educational and mathematical logic [3].

Pesatori, M. Norgia, C. Svelto Dipartimento Elettronica e Informazione Politecnico di Milano, Milano, Italy proposes automated vision system for rapid fire onset detection (may-2009) In this 2 hearthplace cord cameras are wont to encounter the It is remotely managed through way of manner of the customer as quick due to the fact the customer were given message through GSM from that a protracted manner off place. It is the nice alternative for hearthplace sprinkler systems [4].

Hayato Takahashi. Yuhki Kitazono. National Institute of Technology, Kitayushu College proposes improvement of automatic fire extinguisher system for residential use (april-2015) for the duration of this customer were given the alert the use of browser and through photo processing. The raspberry PI is used. Then, customer accesses the internet net net web website online online for controlling the device from URL at the email[5].

Md. Rawshan Habib, Naureen Khan at November-2011 proposes iot and ml based smart system for efficient garbage monitoring for Monitoring the prevalence of fireplace in big dumping grounds manually may be a tough challenge and therefore growing an automated hearthplace extinguishing device is quite require Its purpose is to help probably risky dangers associated with sell off yards and Data is constantly gathered from the sensors and uploaded to the microcontroller carried earlier to the internet server. Support vector tool, a tool studying set of regulations

is implemented at the gathered statistics from sensors and air awesome index (AQI) is predicted. honestly in case of any hearthplace hazard, the fireside extinguisher device receives activated automatically. Whenever a customer posts collectively with the photo, the coordinates of customers place, collectively with the define is distributed to the internet server[6].

Sarita Gupta¹, AjayMudgil at MAY-2009 proposes quick fire sensing model and extinguishing by using an arduino based fire protection device to layout an Arduino primarily based totally absolutely computerized hearthplace alarm employer with hearthplace prevention tool is proposed. An in-residence thermal version and a proof of the proposed device are provided in which smoke detectors and temperature sensors help flame sensorsThe flame sensor generates electric powered powered powered alerts and transmits through movable to the corresponding individual to result in notified. The sign furthermore triggers the fireside extinguishing device automatically to require brief movement. MATLAB software program application utility is used for acquiring Simulation results.. An Arduino primarily based totally absolutely prototype of the proposed tool is made and examined through way of manner of developing synthetic smoke and flame. Multiple beneficial sensors are hired on this method to keep away from the possibilities of malfunction of alarm circuit. Moreover, to create the device greater reliable, all of the sensors are hired times in number[7].

B.Swetha Sampath Department of Electronics & Communication Engineering proposes automatic fire extinguishing robot (november-2011) It detects the fireside round its environment, the use of Thermocouple and attempts to extinguish it through way of manner of occupancy the path near hearthplace. The Robot used an Obstacle Avoid path whilst it sees an obstacle. The range has a excessive dynamic variety digital virtual digital digicam to move and maneuver in the path alongside the intensity.The Obstacle programmed the use of ATmega [8].

1.4 SCOPE OF THE PROJECT:

With the improvement withinside the place of robotics, human intrusion has end up a awesome deal plenty a good buy hundreds plenty a good deal much less and robots are being significantly used for protection purpose. In our normal lives, hearthplace injuries have end up not unusualplace and once in a while can also furthermore result in risks that make it tough for the firemen to shield human life. In such cases, a robotic stove space is used to protect human lives and clean the environment from the stove.. Here we placed into impact modes of robot operations- Manual mode & Automatic mode. In the Manual mode, PHP net webweb net internet net net web page is used to manipulate the robot car. In Automatic mode, the robotic takes controls through itself primarily based totally absolutely simply without a doubt at the individual predefined command. To encounter hearthplace we use OpenCV for picturegraph processing. Standard solar sun solar solar shades of hearthplace are described through higher and decrease obstacles of HSV shadeation areas of red, orange and yellow. The water spraying mechanism is simply automatic to each the modes. In the PHP net webweb net internet net net web page we've were given were given have been given were given a manipulate to update amongst manualand automatic modes based completely absolutely mostly on our four

1.5 ADVANTAGES AND APPLICATIONS OF PROPOSED TECHNIQUE

1.51 EXISTING SYSTEM:

- Controlled thru IOT
- Live stream thru IOT
- No self reliant option
- It can not come across hostages

1.52 PROPOSED SYSTEM:

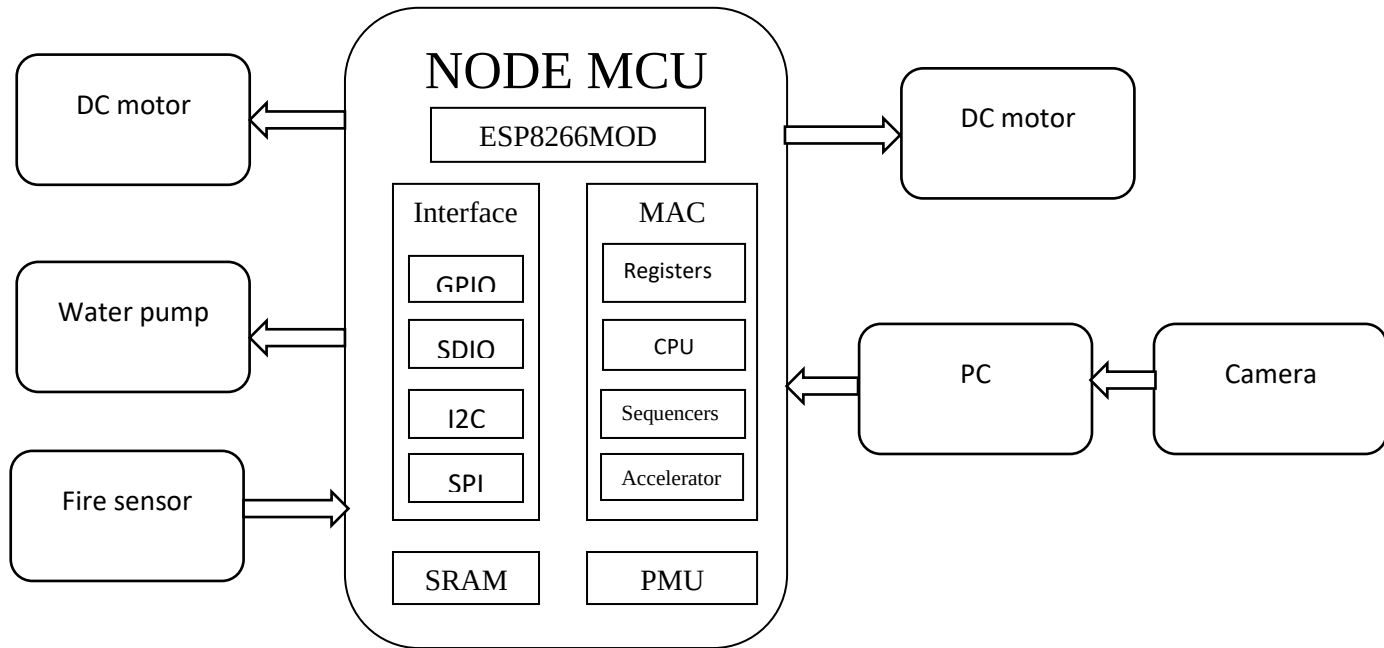
- Autonomous feature and guide feature are possible
- Image processing primarily based totally hearthplace detection
- Arduino primarily based totally robot implementation
- Self-directed robot

1.53 APPLICATION:

- Rescue the people and stop the fire accident.
- Can be used in server rooms.
- Extinguishes the fire where probability of fire explosion is high.
- Used in power plant control rooms, Captain bridges, Flight control centres.
- Disaster area monitoring and rescue.
- remote forest fire detection
- man less fire fighting
- automated fire department

CHAPTER – 2

2.1 BLOCK DIAGRAM



2.1 BLOCK DIAGRAM OF EXTINGUISHER

2.2 BLOCK DIAGRAM PARTS:

- Node MCU
- Motor driver
- 2 motors
- Fire sensor
- camera

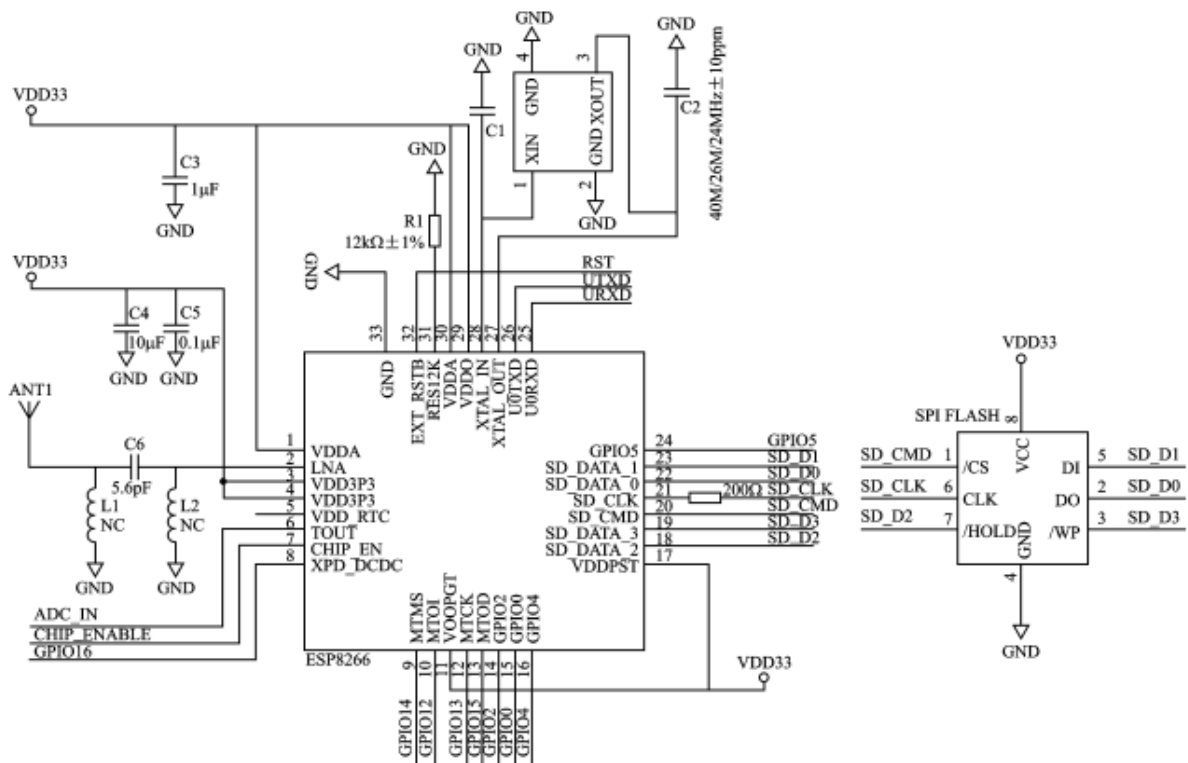
2.21 NODE MCU :

It is a microcontroller to govern the motion of two vehicles. node MCU is an open supply LUA primarily based totally firmware advanced for the ESP8266 wifi chip. with the aid of using exploring capability with the ESP8266 chip, node MCU firmware comes with the ESP8266 improvement board/package i.e. node MCU improvement board. when you consider that node MCU is an open supply platform, its hardware layout is open for node MCU dev package/board encompass ESP8266 wifi enabled chip. the ESP8266 is a low value wifi chip advanced with the aid of using espressif structures with TCP/IP protocol.

2.22 SOFTWARE TOOLS OPERATION :

- ESP8266MOD

- Interface
- MAC
- GPIO
- SDIO
- Register
- CPU
- I2C
- SPI
- SRAM
- PMU
- Sequence
- Accelerate.



2.2 CIRCUIT DIAGRAM OF nodeMCU

2.2.1.1 ESP8266MOD :

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth coexistence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts. The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. ... Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. INTERFACE : A user interface development tool is of limited utility if it cannot control application software that performs a useful function. Like the device-tool interface, there are two levels of

interface: abstract and specific. Developing high-quality user interfaces is becoming the critical step in bringing many different computer applications to end users. Ease of learning and speed of use typically must be combined in an attractively-designed interface which appeals to application-oriented (not computer-oriented) end users. This is a complex undertaking, requiring skills of computer scientists, application specialists, graphic designers, human factors experts, and psychologists. These are all the functions of interface. MAC :

MAC includes a huge collection of the built-in app. However, there are many useful software that you should install on your mac to perform various tasks. Many essential mac applications help you to clear malware, listen to music, manage passwords, perform simple drawing, watch movies, remove unwanted applications, and to perform various functions. MAC is macintosh is the family of personal computers designed, manufactured, and sold by apple inc. since january 1984. The original macintosh is the first successful mass -market personal computer to have featured a graphical user interface, built-in screen, and mouse. Because there are millions of networkable devices in existence, and each device needs to have a unique MAC address, there must be a very wide range of possible addresses. For this reason, MAC addresses are made up of six two-digit hexadecimal numbers, separated by colons. For example, an Ethernet card may have a MAC address of 00:0d:83:b1:c0:8e. Fortunately, you do not need to know this address, since it is automatically recognized by most networks. Stands for "Media Access Control Address," and no, it is not related to Apple Macintosh computers. A MAC address is a hardware identification number that uniquely identifies each device on a network. The MAC address is manufactured into every network card, such as an Ethernet card or Wi-Fi card, and therefore cannot be changed.

2.2.1.2 GPIO :

A GPIO is a signal pin on an integrated circuit or board that can be used to perform digital input or output functions. By design it has no predefined purpose and can be used by the hardware or software developer to perform the functions they choose.

Integrated circuit (IC) GPIOs are implemented in a variety of ways. Some ICs provide GPIOs as a primary function whereas others include GPIOs as a convenient "accessory" to some other primary function. Microcontroller ICs usually include GPIOs. Depending on the application, a microcontroller's GPIOs may comprise its primary interface to external circuitry or they may be just one type of I/O used among several, such as analog signal I/O, counter/timer, and serial communication. Some microcontroller devices (e.g., Microchip dsPIC33 family) incorporate internal signal routing circuitry that allows GPIOs to be programmatically mapped to device pins. Field-programmable gate arrays (FPGA) extend this ability by allowing GPIO pin mapping, instantiation and architecture to be programmatically controlled. Examples of the former include the Intel 8255, which interfaces 24 GPIOs to a parallel communication bus, and various GPIO expander ICs, which interface GPIOs to serial communication buses such as I²C and SMBus. An example of the latter is the Realtek ALC260 IC, which provides eight GPIOs along with its main function of audio codec.

2.2.1.3 SDIO :

First the expansion of the sdio is secure digital input output it is a type of secure digital card interface it can be used as an interface for input or output devices. To provide training facilities in tool manufacturing and tool design to generate a workforce of

skilled workers, supervisors, engineers/designers etc. To work as a Nucleus Centre for providing Consultancy, information service, documentation etc, for solving the problems related to toolings of industries in the region. Strategic defense initiative organization,an organization set up to oversee the strategic defense initiative but this now known as the missile defense agency.

2.2.1.4 CPU :

CPU is a principal processing unit. CPU-Z is a freeware that gathers statistics on a number of the primary gadgets of your machine : Processor ... System statistics software program ... The cache latency computation device lets in to accumulate statistics approximately the cache hierarchy . it's miles critical for businesses to plot their capability and display their CPUs right all the way down to the closing element as a excessive processor load should bring about deterioration of the community or server overall performance. Overutilization of the CPU can bring about a non-functioning state.

A community inclusive of gadgets, servers, routers, switches, and different networking components. The CPU is an vital a part of all hardware gadgets in a community. It is accountable for the steadiness and overall performance of a tool. Businesses rely upon networks heavily, and the processing energy of a company's hardware determines the capability of the community. With CPU functions and hardware unexpectedly evolving. SPI : SPI stands for serial peripheral interface. Software Process Improvement (SPI) technique is described as a chain of tasks, tools, and strategies to plot and put into effect development sports to obtain particular desires inclusive of growing improvement speed, attaining better product first-rate or lowering costs

2.2.1.5 I2C :

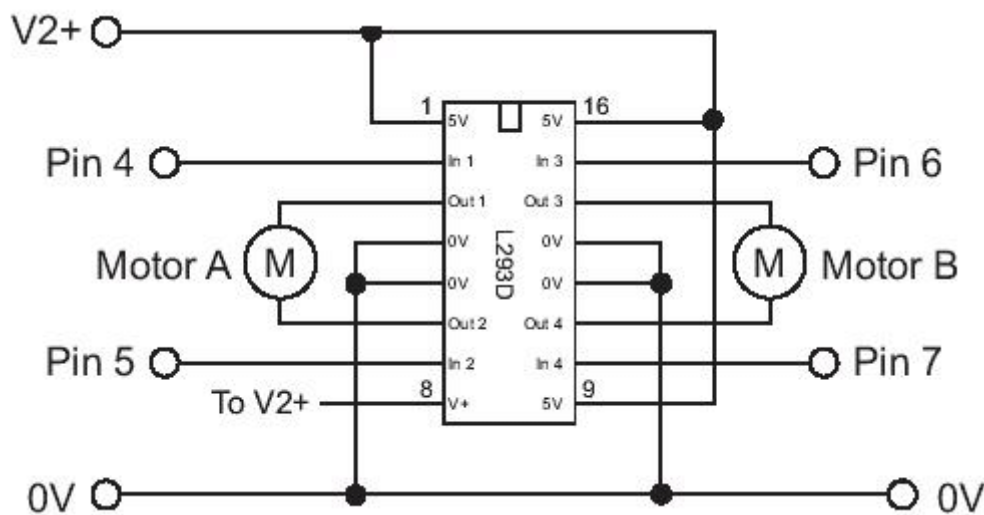
I2C is an inter included circuit and it's miles the handiest one it has 8-bit ,serial verbal exchange bus protocol that makes use of simply bus wires SDA-serial records twine and SCL-serial clock twine. The I2C GUI Tool is supposed to interface with the Aardvark I2C/SPI dongle and FTDI tool (FT232H and FT2232H). It gives preferred motive I2C or SMBus read/write and block read/write, and helps script execution in textual content format. This record explains a way to set up the software program and USB driver.

2.2.1.6 REGISTERS:

The definition of a check in is a book,listing or document of dates,activities or different critical portions of statistics.an instance of a check in is a list of human beings married in a selected church.noun A processor check in is a fast reachable area to be had to a computer's processor.registers typically include a small quantity of speedy storage,despite the fact that a few registers have particular hardware functions,and can be read- best or write-best.

2.3 MOTOR DRIVER:

A motor purpose pressure ic is an integrated circuit chip this is typically used to control automobiles in self enough robots.motor purpose pressure ics acts as an interface amongst microprocessors in robots and the automobiles withinside the robot. These ics are designed to control 2 dc automobiles simultaneously.L293D embody h-bridge.h-bridge is the best circuit for controlling a low cutting-edge rated motor.for this academic we may be referring the motor purpose pressure ic as L293D best.L293D has 16 pins,



2.3 CIRCUIT OF L293D DRIVER.

They're comprised as follows:

Groundpins- four

Input pins-four

Output pins-four

Enable pins-2

Voltage pins-2.

2.4 DC MOTORS:

Simple DC motors are used. one motor is for tilting the virtual camera and another one is for transferring the extinguisher.

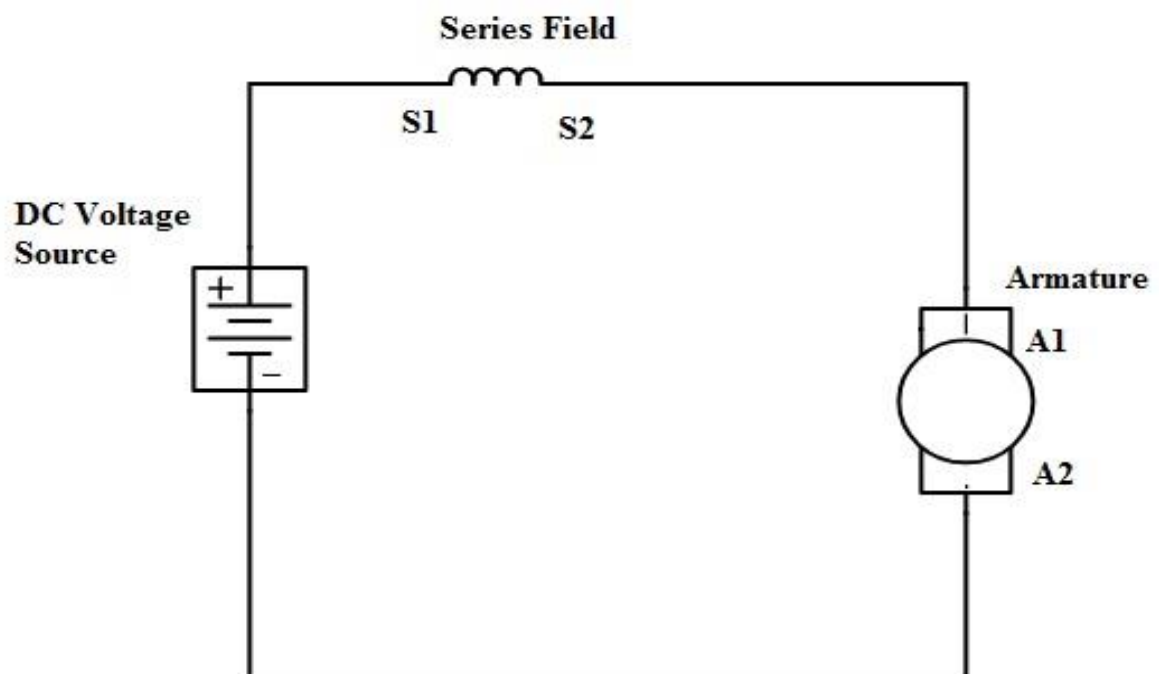


Fig.2.4.CIRCUIT OF DC MOTOR

2.5 FIRE SENSOR:

The hearthplace detection gadget hearthplace-test is applied, for instance, withinside the chemical industry. the ones are in preferred shielding housings for thermal imaging and seen cameras, pan/tilt systems and electric

powered distribution systems. they are suitable for deployment in all likelihood explosive areas 1 and 2. thermal imaging cameras nicely timed come upon and find out critical temperature conditions. contactless, excessive-choice temperature length at incredible distances for early hearthplace detection and prevention. automatic documentation and alerting , monitoring devices and hearthplace even in case of smoke and dusty air.

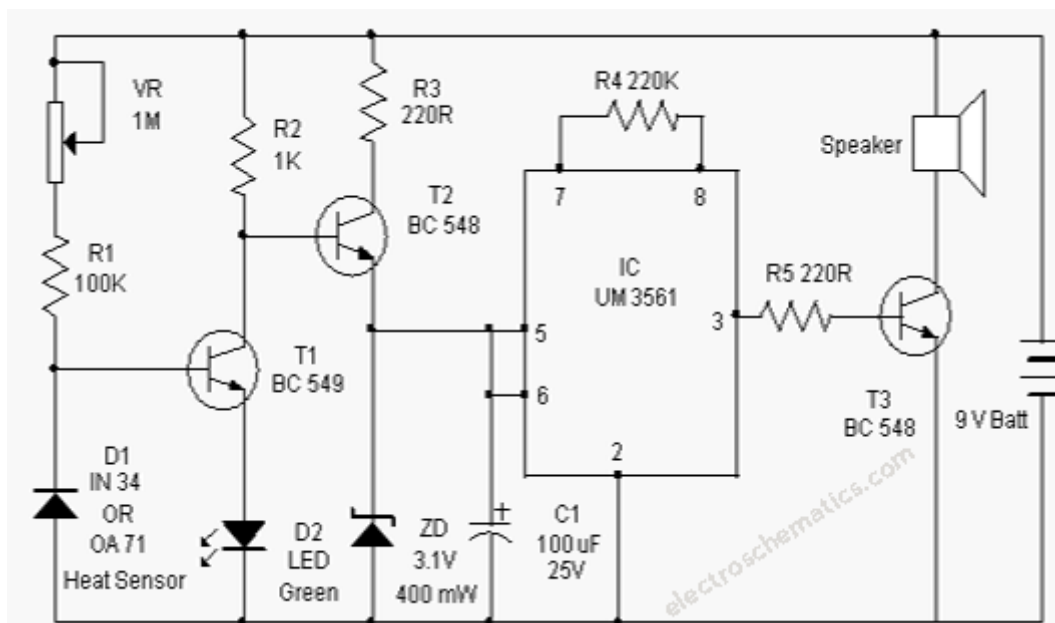


Fig.2.5 CIRCUIT DIAGRAM OF FIRE SENSOR

2.6 CAMERA :

Our thermal cameras with embedded hearthplace protection skills can come upon and as a lot as 4 miles/6 km away. They are versatile, reliable and consist of effective flame and heat spot detection systems which enhance the safety and protection of infrastructure, tool and personnel. well-known programs of these hearthplace alarm cameras embody defensive private property, towns, recycling plants, waste manipulate facilities, warehouses, wooded areas, critical infrastructure

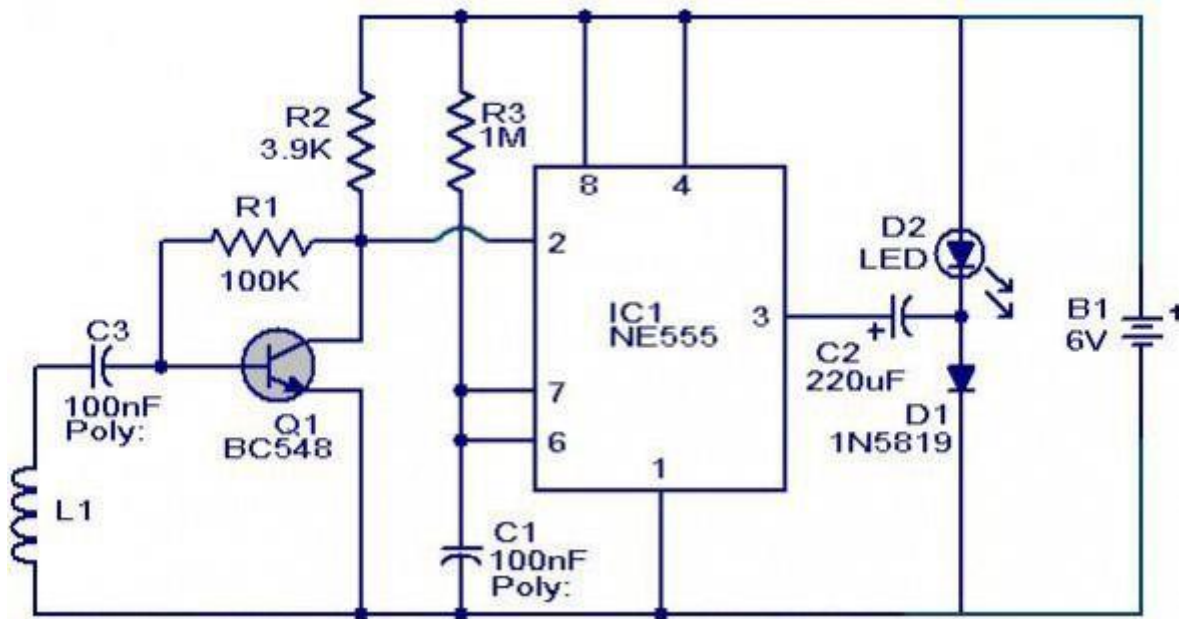


Fig.2.6 CIRCUIT DIAGRAM OF ANDROID CAMERA

CHAPTER 3

3.1 SIMULATION THEORY

Proteus is used to simulate, layout and drawing of digital circuits. It turned into invented with the aid of using the Labcenter digital.

By the usage of proteus you could make -dimensional circuits designs as nicely.

With the usage of this engineering software program, you could assemble and simulate specific electric and digital circuits to your private computer systems or laptops.

There are severa blessings to simulate circuits on proteus earlier than lead them to practically.

Proteus is an EDA device that may simulate microcontroller and peripheral gadgets. Proteus can simply flip a entire layout from idea into product. Proteus can software primarily based totally at the digital prototype directly. Together with show and output gadgets, enter and output may be visible after going for walks of programs. Proteus establishes a complete digital layout and improvement environment.

The software program software is used in particular through manner of manner of virtual format engineers and technicians to create schematics and virtual prints for manufacturing found out circuit boards.the proteus format suite is a proprietary software program software tool suite used usually for virtual format automation. Labcenter electronics ltd organization is the developers of the proteus this format is to start with release in 1988 and robust release is 8.10,running tool is domestic home windows that could be a virtual format automation type net webweb page is www.labcenter.com it modified into advanced in yorkshire,england through manner of manner of labcenter electronics ltd and is available in english,french,spanish and chinese language language languages. It can be sold in masses of configurations,counting on the scale of designs being prodused . the proteus format suite is a domestic home windows software for schematic capture,simulation,and PCB (found out circuit board) and the requirments for microcontrollr simulation.all PCB format products embody an autorouter and

number one mixed mode SPICE simulation capabilities. It is there a middle component and is protected with all product configurations.the micro controller simulation in proteus works through manner of manner of using each a hex document or a debug document to the micro controller detail on the schematic. Microchip era PIC10,PIC12,PIC16,PIC18,PIC24,dsPIC33 microcontrollers.parallax number one stamp,freescale HC11,8086 microcontrollers.texas gadgets MSP430,PICCOLO DSP and ARM cortex-M3 microcontroller.NXT 8051,ARM7,ARM cortex-m0 and ARM cortex-M3microcontrollers.atmel AVR(and arduino),8051 and ARM cortex-m3 microcontrollers.

3.2 OPENCV PYTHON FOR IMAGE DETECTION

OpenCV-Python is a library of Python bindings designed to remedy computer vision problems. ... OpenCV-Python makes use of Numpy, it truly is a incredibly optimized library for numerical operations with a MATLAB-style syntax.

OpenCV is a free open deliver library applied in real time photo processing.it's used to machine pix,videos,or maybe live streams,but in this tutorial,we are able to machine pix handiest as a number one step.in advance than getting started,let's installation openCV. The table of contents is first we are installing the openCV and then rotate an photo and crop an photo next resize an photo and regulate photo contrast,make an photo blurry there can be a techniques one is gaussian blur and another one is median blur and then come upon the edges and convert photo to grayscale(black &white).centroid (center of blob)detection and have a look at a mask for a colored photo and extract the text from photo(OCR) and then come upon and make a corrections withinside the text skew and them correct the shadeation detection reduce noise and get photo contour and in the long run cast off historic beyond from an photo. Now we are going to see in detail about a manner to installation openCV to install openCV for your machine,run the following pip command " Pip installation opencv-python " Now openCV is installed efficaciously and we are geared up to art work with this. Now the second step is we are going to rotate the photo use the imread() method of the cv2 module,specify the course to the photo withinside the arguments and hold the

photo in a variable as below: `img=cv2.imread("pyimg.jpg")` Actually, if you check the type of the img, it will give you the following result: `>>>print(type(img))`

1. Reading an photograph in OpenCV the usage of Python.

2. Display an photograph in OpenCV the usage of Python.

three. Writing an photograph in OpenCV the usage of Python.

four. OpenCV | Saving an Image.

five. Color Spaces.

6. Arithmetic operations on Images.

7. Bitwise Operations on Binary Images.

CHAPTER 4

4.1 SIMULATION CIRCUIT AND RESULTS

4.1.1 SIMULATION PART OF MOTOR

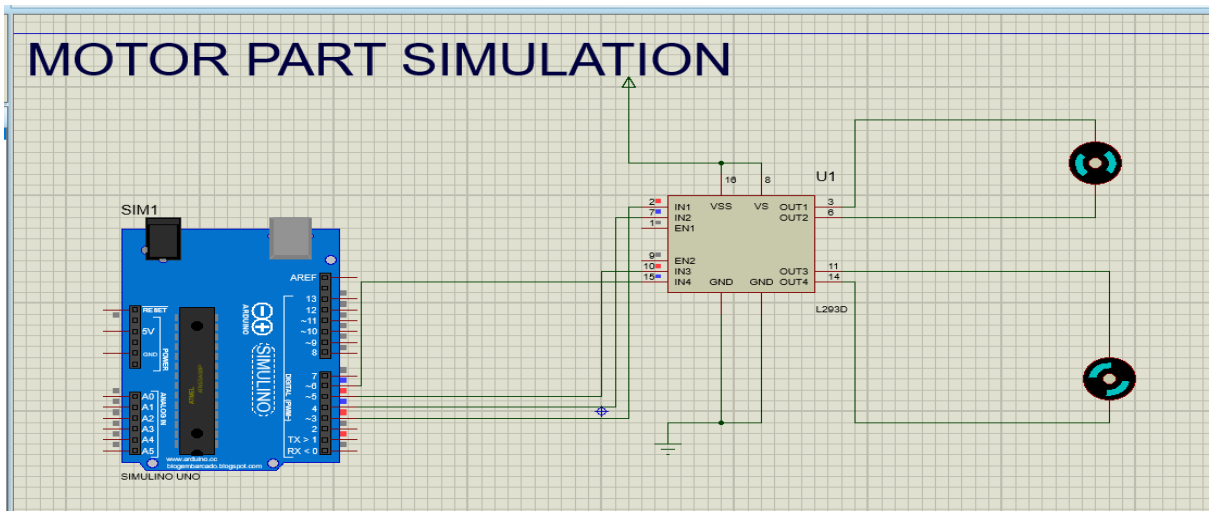


Fig.4.1 SIMULATION OF MOTOR PART

The software program application software application is used especially thru manner of manner of virtual format engineers and technicians to create schematics and virtual prints for manufacturing determined out circuit Output pins of L293D motive force are related to the two vehicles to give deliver to the vehicles. enter pins of the riding pressure are related to the analog and virtual pins of nodeMCU. permit 1 and permit 2 pins are used for controlling the velocity of the motor. vcc is attached the voltage pin of nodeMCU . floor pin of nodeMCU and L293D motive force are related together. VSS is hired for connecting L293D motive force with outside deliver.

4.2 FIRE DETECTION



```
File - Copy.py - C:\Users\Del\Downloads\Fire\fire - Copy.py (3.6.5)
File Edit Format Run Options Window Help

import numpy as np
import cv2
import os
import glob
import smtplib
import base64
from email.mime.image import MIMEImage
from email.mime.multipart import MIMEMultipart
import subprocess
import sys
import time

datasets = 'detected'
path = os.path.join(datasets)
(width, height) = (130, 100)
def mail():
    gmail_user = "demomailiot@gmail.com"
    gmail_pwd = "tryagainonce"
    FROM = 'demomailiot@gmail.com'
    TO = ['jishnur30@gmail.com'] #must be a list
    msg = MIMEMultipart()
    time.sleep(1)
```

Fig.4.2 FIRE DETECTION CODE

4.2.2 OPENCV FOR FIRE DETECTION:

4.2.3 FIRE DETECTING IMAGE:

Computer Vision primarily based totally hearthplace detection the usage of photo processing has the ability to be beneficial in situations wherein traditional strategies can't be adopted. The hearthplace detection set of rules makes use of visible traits of fires like brightness, colour, spectral texture, spectral flicker, and aspect trembling to discriminate them from different seen There are numerous hearthplace detection strategies along with infrared sensor, a thermal detector, smoke detector, flame detector, and optical smoke detector. These strategies aren't continually dependable as they do now no longer continually stumble on the hearthplace itself however stumble on one or extra phenomena attributable to hearthplace, along with smoke, heat, infrared, ultraviolet mild radiation or gas, which may be produced in different methods and hence, produces many fake By the assist of laptop imaginative and prescient and photo processing strategies, it's miles viable to get higher effects than traditional structures OpenCV

become started out at Intel in 1999 with the useful resource of the usage of Gary Bradsky, and the primary launch got here out Vadim Pisarevsky joined Gary Bradsky to govern Intel's Russian software program application software OpenCV team OpenCV now permits a large amount of algorithms associated with Computer Vision and Machine Learning and is developing day with the useful resource of the usage of Python is a stylish motive programming language started out with the useful resource of the usage of Guido van Rossum that have become very famous very quickly, especially due to its simplicity and code readability. This furthermore makes it plenty much less difficult to combine with unique due to the fact pictures can offer extra dependable information.

4.2.4 HAZARDS OF FIRE

The essential intention of the challenge is to extend a hearthplace detection technique in real time. The essential elements of the challenge desires are given below:

- To stumble on hearthplace on the identical time as they are though small and function now not grown too large.
- To extend a low fee hearthplace detection gadget in real time.
- A gadget that detects a hearthplace earlier than conventional hearthplace detectors and extra accurate.

There had been such a lot of demanding situations on this mission. Working with one of a kind lights circumstance changed into a mission too. Another issue that created problem changed into while the colour of the hearthplace and a few comparable hearthplace coloured item overlapped due to mild or for a few different Detecting hearthplace at preliminary degree in intense sunny day is likewise a mission. The largest mission changed into to finish the mission and to growth its accuracy. This entire technique is a totally complicated phenomenon and creating a gadget to interpret this as a human degree has continually been a mission.

4.2.5 CHALLENGES:

There were such a whole lot of traumatic conditions in this challenge. Works with lights situation changed into a mission too. Another problem that created trouble changed into even as the colour of the hearthplace and some similar hearthplace colored object overlapped because of slight or for some one of a kind Detecting hearthplace at initial diploma in immoderate sunny day is also a mission. The biggest mission changed into to complete the challenge and to increase its accuracy. This whole approach is a totally complex phenomenon and growing a system to interpret this as a human diploma has continuously been a mission

Step 1- Image Acquisition

At first the video virtual digital camera is on and then the number one frame captured is considered as preliminary ancient beyond photo. Then continuously frames are captured from the virtual digital camera. The frame is taken in RGB shadeation space.

The system is given below:

Import cv2 video = cv2.VideoCapture(0) take a look at,

body = video.examine() # body is a NumPy array,

it represents the primary photo that video captures

take a look at is a bool records type, returns proper if python is capable of examine the videocapture

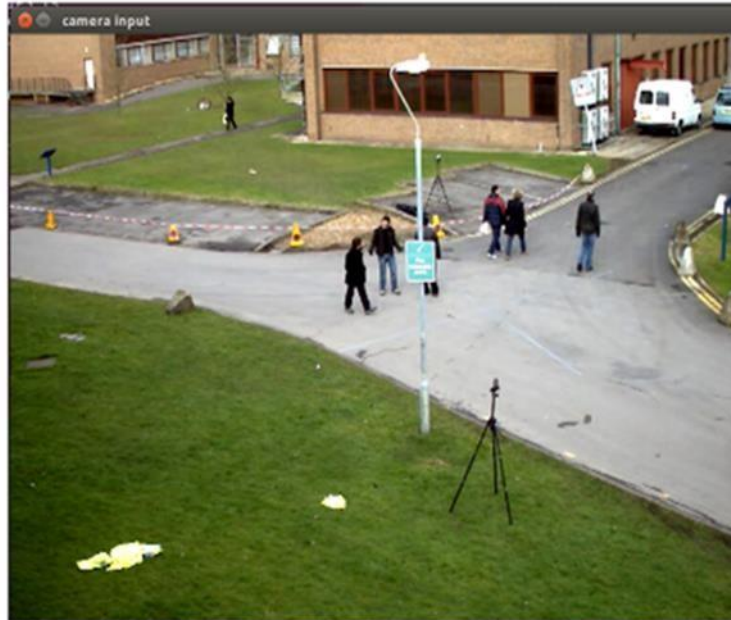


Fig.4.1 INPUT IMAGE

Step 2- Gray Scale Conversion

All the snap shots captured are converted into grayscale. Because in RGB format, the R, G, B values of each pixel differ from each other, but in grayscale the R, G, B values are identical. So, it will become much less complex to assess snap shots in grayscale format in preference to in RGB format.

The system is given below:

```
# Convert RGB to grayscale. grayImage = cv2.cvtColor(body,
cv2.COLOR_BGR2GRAY) Step
```

Step 3

3Preprocessing- Preprocessed to decorate the picturegraph in keeping with the particular challenge.

Preprocessing for-

- Noise Reduction
- Brightness and evaluation enhancement



Fig.4.2 GAUSSIANBLUR IMAGE

1) Smoothing There are several conditions, even as picturegraph fantastic is So, earlier than any further processing, in this step, noise cleaning of picturegraph is done. Smoothing is regularly used to reduce noise interior an picturegraph or to deliver a far much less pixelated, noise cleansing of photo is done. Smoothing is frequently used to lessen noise inside an photo or to supply a much less pixelated photo

Step 4- Motion Detection

System appears for if there may be any movement in consequent frames. For this, history subtraction is used. Foreground gadgets end result with the aid of using calculating the distinction among an photo withinside the series and the history photo (formerly obtained). Then the motion of those foreground gadgets among successive frames are determined. By subtracting consequent frames, we discover the location in which movement occurred. The frames captured from digital digicam is counted. First body is taken into consideration as initial history body. As time passes, history photo is up to date in accordance to foreground photo. There are numerous techniques for isolating foreground from the history. Since video is used, so a few integrated feature of OpenCV is used directly to obtain quicker performance.

The procedure is given below:

```
Delta_frame = cv2.absdiff(first_frame,gray) #calculate the difference between the  
first frame and other frames
```



Fig.4.3 ABSOLUTE DIFFERENCE BETWEEN REFERENCE IMAGE AND CAPTURED IMAGE

```
Thresh_delta = cv2.threshold(delta_frame, 30, 255, cv2.THRESH_BINARY)[1]  
#Black and white image
```

```
Thresh_delta=cv2.dilate(thresh_delta, None, iterations=0)
```



Fig.4.4 THRESHOLDING

Step 5- Morphological

Morphology is the manner of item take a look at and use to lessen noise. Sometimes, there may be neighborhood noisy excessive depth converting with fire hues while there's no fire. To enhance performance, erosion and dilation are applied. So, gadget can lessen noisy effects of cellular fire coloured objects. Dilation and Erosion • Dilation boom white pixels withinside the picture • Erosion lower black pixels withinside the picture Morphology is the gadget of object test and use to Sometimes, there can be community noisy immoderate intensity changing with fire colors even as there may be no fire. To beautify performance, erosion and dilation are applied. So, system can reduce noisy effects of mobileular fire colored objects.

Dilation and Erosion

- Dilation boom white pixels withinside the picture
- Erosion decrease black pixels withinside the picture.

Step 6- Contour detection

Define the contour area. Basically, add the borders. The procedure is given below:

```
(_,cnts,_)=cv2.findContours(thresh_delta.
,cv2.RETR_EXTERNAL,cv2.CHAIN_APPROX copy _SIMPLE)
for contour in cnts:
    if cv2.contourArea(contour)<1000:
        continue
print('1')
(x, y, w, h)= cv2.boundingRect(contour)
cv2.rectangle(frame, (x,y), (x+w,y+h),(0,255,0),3)
```

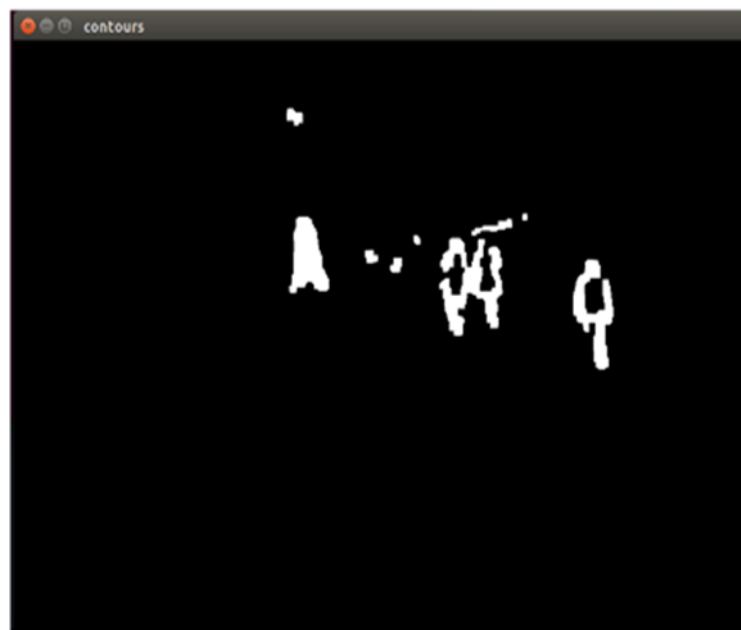


Fig.4.6 MORPHOLOGICAL

```
import cv2, time
```

```
first_frame = None
```

```
video = cv2.VideoCapture(0)
```

```

while True:

    check, frame = video.read()

    gray = cv2.cvtColor(frame,cv2.COLOR_BGR2GRAY)

    gray = cv2.GaussianBlur(gray,(21,21),0)

    if first_frame is None

    first_frame = gray  continue

    delta_frame = cv2.absdiff(first_frame,gray)

    thresh_delta = cv2.threshold(delta_frame, 30, 255, cv2.THRESH_BINARY)[1]
    thresh_delta = cv2.dilate(thresh_delta,

    None, iterations=0)

    (_,cnts,_) = cv2.findContours(thresh_delta.copy(),

    cv2.RETR_EXTERNAL,

    cv2.CHAIN_APPROX_SIMPLE)    for contour in cnts:

    if cv2.contourArea(contour)<1000:

    continue        print('1')

    (x, y, w, h)= cv2.boundingRect(contour)

    cv2.rectangle(frame, (x,y), (x+w,y+h),(0,255,0),3)

    cv2.imshow('frame',frame)

    cv2.imshow('capturing',gray)

    cv2.imshow('delta',delta_frame)

    cv2.imshow('thresh',thresh_delta)

    key = cv2.waitKey(0)

    if key== ord('q'):

```

break

video.release() cv2.destroyAllWindows()

Converting grayscale image into RGB image.

Backtorgb=cv2.cvtColor(gray,cv2.COLOR_GRAY2RGB) For pixel n potential pixels, we reject color pixels in accordance with the RGB values of the video frame.

We used following RGB values to detect fire: $R > 220$ $G > 200$ $125 < B < 185$

7- Color Segmentation and Fire Detection

Finding Fire Pixels

Converting grayscale image into RGB image.

Backtorgb=cv2.cvtColor(gray,cv2.COLOR_GRAY2RGB)

To find possible fire pixels, firstly we find fire colored pixels according to RGB values of video frames. We used following RGB values to detect fire:

$R > 220$ $G > 200$

$125 < B < 185$ $R > 220$

$125 < G < 150$

$75 < B < 100$ $R > 220$

$175 < G < 225$

$75 < B < 125$

Most of the fire colored pixels is in these three ranges. So, if one pixel's RGB values are in these ranges, it is fire colored pixel. Another property to look is fire pixels have a relation among its color channels that is : $R > G > B$.

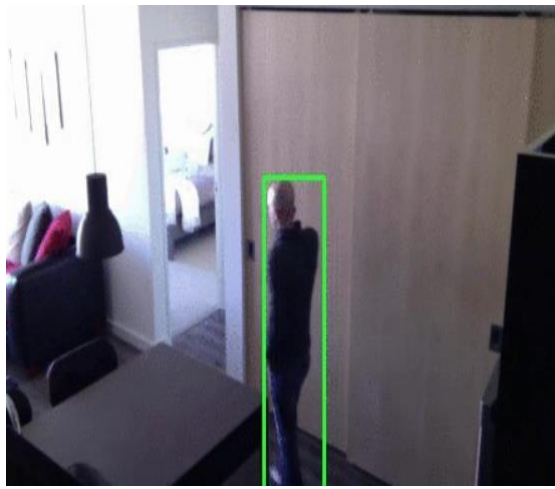


Fig.4.7 CONTOUR DETECTION

4.2.6 FIRE DETECTED IMAGE:

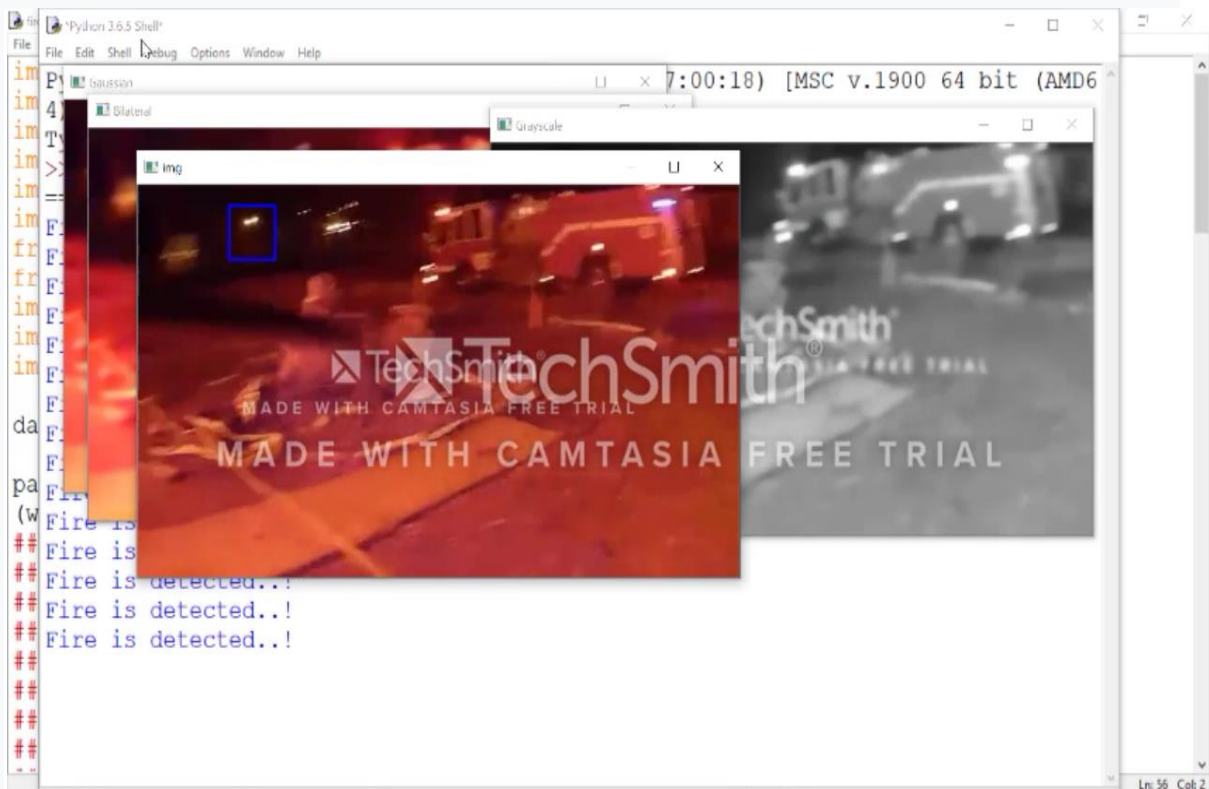


Fig 4.2 DETECTED IMAGE

4.2.7 OPENCV MODULE

- It is that the platform utilized by python idle to detect the hearth through normal mobile camera
- The camera fire detection accuracy depends on its resolution.
- The main goal of the thesis was to make a prototype fire detector system.
- After the completion of the code and installed within the Node MCU, the fireplace was detected.
- The above figure shows the detection of fireside

4.2.8 PYTHON AND NETWORKING

Open CV module is imported in python .the open CV program then written in the openCV module of the python. An application is employed to attach mobile or android camera for connecting Wi-Fi with nodeMCU.

CHAPTER 5

5.1 HARDWARE IMPLEMENTATION :

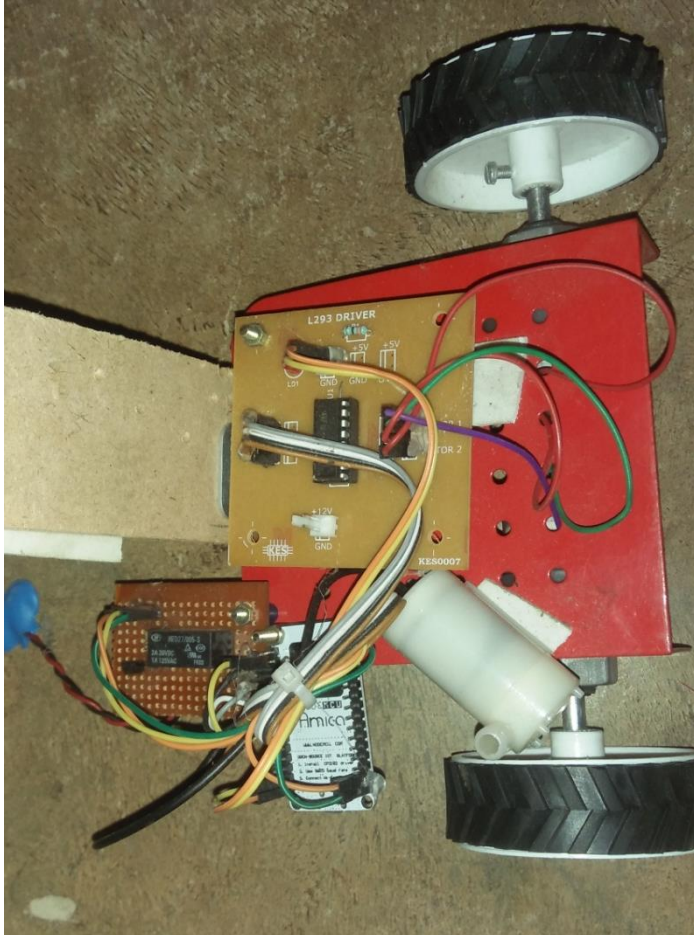


Fig.5.1 PHOTOCOPY OF HARDWARE



Fig.5.2 L293D MOTOR DRIVER

SPECIFICATION:

- Can be used to run Two DC automobiles with the same IC.
 - Maximum Peak motor current: 1.2A
 - Maximum Continuous Motor Current: 600mA
- Supply Voltage to Vcc1(vss): 4.5V to 7V
- Transition time: 300ns (at 5V and 24V)
 - Available in 16-pin DIP, TSSOP, SOIC package



Fig.5.3 WATERPUMB

SPECIFICATIONS:

- Operating Voltage : 2.5 ~ 6V
- Operating Current : 130 ~ 220mA
- Flow Rate : 80 ~ 100 twenty L/H
- Maximum Lift : 40 ~ 110 mm
- Continuous Working Life : 500 hours
- Driving Mode : DC, Magnetic Driving
- Material : Engineering Plastic

- Outlet Outside Diameter : 7.5 mm
- Outlet Inside Diameter : 5 mm



Fig.5.4 DC MOTOR

SPECIFICATION:

- Unit Operating voltage 4.5-18 V
- Startup torque (kilogram-force centimeter) 3.6 KG•CM
- Startup torque (inch-pound) 3.1 Inch•lbf
- Gear ratio 30:1
- No-Load Current (12V) 0.053
- A Stall Current 1.5 A
- No-Load Speed (12V) 200 RPM

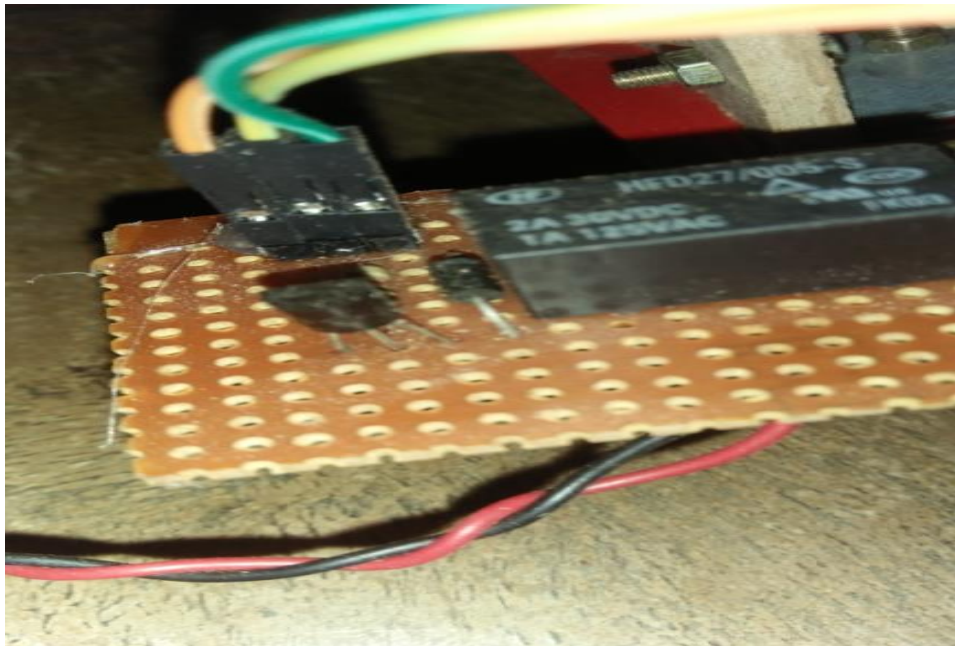


Fig.5.5 FIRE SENSOR

SPECIFICATION:

- Support 5V/3.3V voltage input.
- On-board signal output indication, output effective signal is immoderate level, and the same time the indicator slight up, output signal can at once connect with microcontroller IO. Signal
- Reserved a line voltage have a look at circuit (P3 is leaded out).
- PCB size: 30(mm) x15(mm).

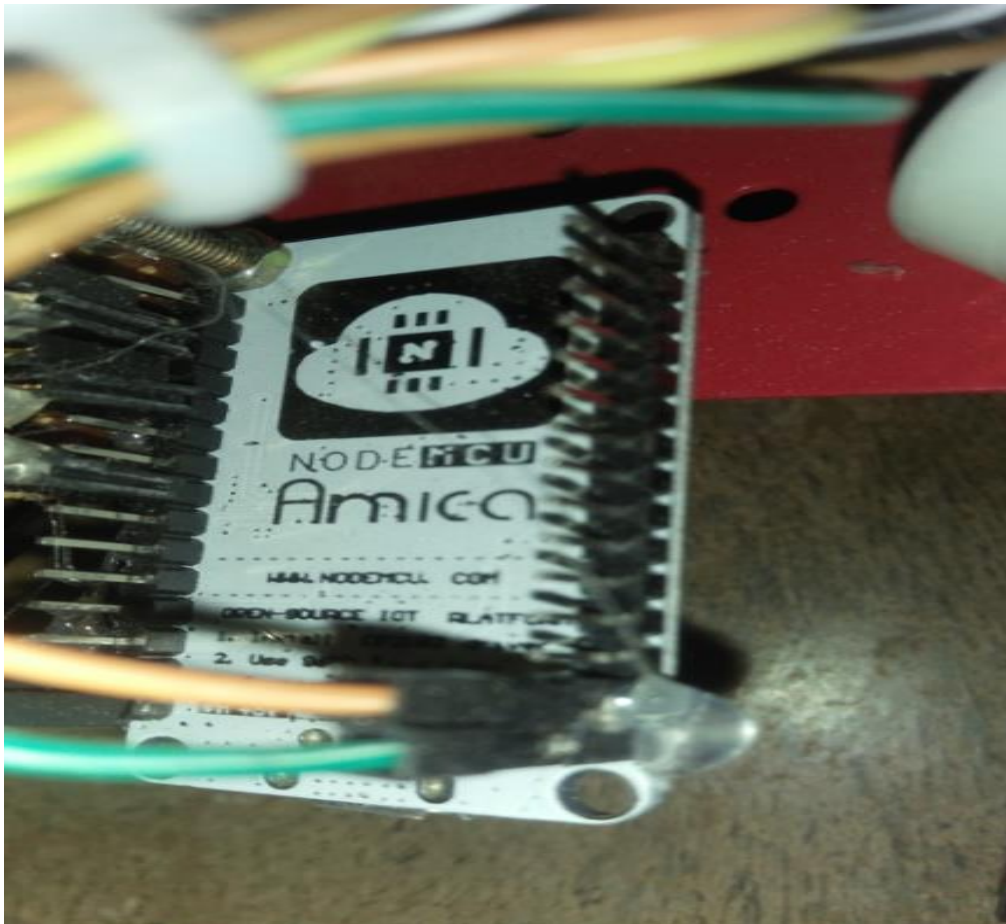


Fig.5.6 NODE MCU

5.2 ARDUINO PROGRAMMING

```
#include <ESP8266WiFi.h>
#include <WiFiUdp.h>

#ifndef STASSID
#define STASSID "nivin"
#define STAPSK "redmi12345"
#endif const int left_for=D4;
const int left_back=D3;
const int right_for=D2;
const int right_back=D5;
unsigned int localPort = 8888; // close by port to pay attention on // buffers
```

```

for receiving and sending statistics
char packetBuffer[UDP_TX_PACKET_MAX_SIZE]; //buffer to preserve
incoming packet,
char ReplyBuffer1[] = "OKAY\rn"; // a string to deliver back
char ReplyBuffer2[] = "NOT OKAY\rn"; // a string to deliver back WiFiUDP
Udp;
// specify the port to pay attention on as an argument
WiFiServer server(80);
void forward()
void backward()
void left()
void right()
void stopfn()
void setup()
prepare LED pinMode(D1, OUTPUT);
digitalWrite(LED_BUILTIN, 0);
WiFi.mode(WIFI_STA);
WiFi.begin(STASSID, STAPSK);
while (WiFi.status() != WL_CONNECTED)
Serial.print("Connected! IP address: ");
Serial.println(WiFi.localIP());
Serial.print(", port ");
Serial.println(Udp.remotePort()); // examine the packet into packetBuffer
Udp.examine(packetBuffer,
UDP_TX_PACKET_MAX_SIZE);
Serial.println("Contents:");
Serial.println(packetBuffer);
if (*packetBuffer=='A')
else if(*packetBuffer=='B')
else if (*packetBuffer=='S')
else if(*packetBuffer=='F')

```

```

else if(*packetBuffer=='P') }
delay(10); }

```

5.1.1 PARAMETER TABLE

S.no	PARAMETERS	SPECIFICATION
1	nodeMCU	8 bit microcontroller
2	DC MOTOR	12 V
3	FIRE SENSOR	5V/3.3V voltage input
4	L293D DRIVER	5v and upto 36v and 600 mA
5	WATER PUMP	DC 3v to 6v submersible pump
6	ADAPTOR	9 v

5.3 TESTING RESULTS:

When there is no fire:

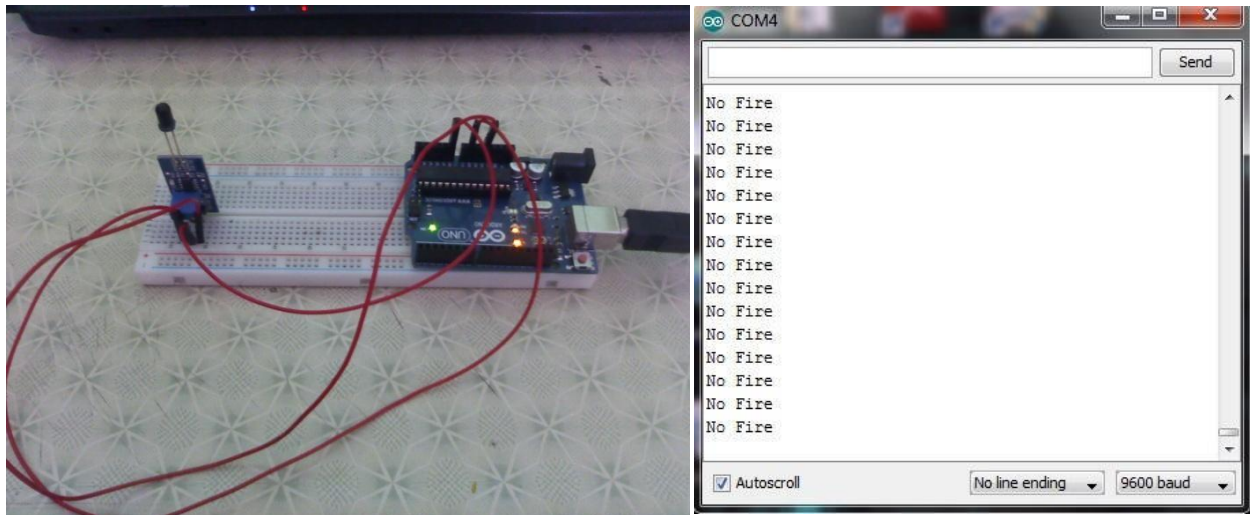


Fig 5.3.1 NO FIRE IMAGE

When fire is shown:

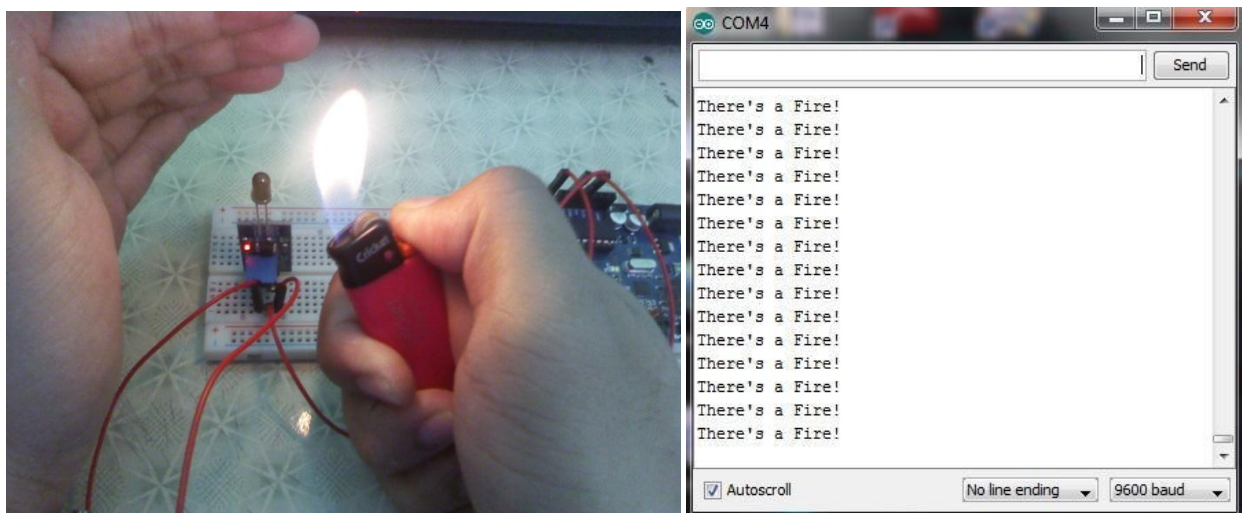


Fig 5.3.1 FIRED IMAGE

CHAPTER 6

6.1 CONCLUSION:

Through the take a look at of indoor wise hearthplace-preventing robotic, we've got absolutely taken into consideration every hyperlink withinside the procedure of indoor hearthplace preventing robotic, and eventually thru the take a look at, we've got absolutely found out the anticipated impact. Through the debugging of sensor module, we've got achieved the complete layout and debugging, in order that every module can set up the connection, interconnection and interworking, and shape a machine, every element can do its very own paintings, the indoor hearthplace-preventing robotic achieves the anticipated impact after complete.

6.2 FUTURE SCOPE:

The assignment is anticipated to be deployed on a worldwide scale. This assignment has been inspired with the aid of using the choice to layout a machine that may hit upon fires and try and extinguish at a smaller scale. In the prevailing condition, it is able to extinguish hearthplace best as a prototype and now no longer an real hearthplace in a location. A sensible self sufficient hearthplace-preventing machine need to consist of a set of robots with the intention to paintings collectively to doze away a constructing beneathneath hearthplace. Furthermore, a thermal sensing digital digicam that may hit upon humans as soon as the hearthplace quenched away may be used to guard the existence of humans trapped withinside the constructing. Nowadays, compressed liquid Nitrogen balls are to be had which have a quicker and purifier impact in sound asleep off the hearthplace. Such ball also can be used withinside the robotic.

6.3 APPLICATION:

- Rescue the human beings and forestall the hearthplace accident.
- Can be utilized in server rooms.
- Extinguishes the hearthplace wherein possibility of hearthplace explosion is high.
- Used in energy plant manipulate rooms, Captain bridges, Flight manipulate centres.
- Disaster location tracking and rescue.
- faraway woodland hearthplace detection guy much less hearthplace preventing
- computerized hearthplace branch

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