iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.51747

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Fabrication of Mini Fire Fighting Robot

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Abstract: ***Fire Incident is a disaster that can potentially cause the loss of life, property damage and permanent disability to the affected victim. The Victim of Fire Incident can also suffer from prolonged psychological and trauma. Fire fighters are primarily tasked to handle fire incidents, but they are often exposed to higher risks when extinguishing fire, especially in hazardous environments such as in nuclear power plant, petroleum refineries and gas tanks. They are also faced with other difficulties, particularly if fire occurs in narrow and restricted places, as it is necessary to explore the ruins of buildings and obstacles to extinguish the fire and save the victim.***
With high barriers and risks in fire extinguishment operations, technological innovations can be utilized to assist firefighting. Therefore, this paper presents the design of a firefighting robot dubbed that can extinguish fire without the need for fire fighters to be exposed to unnecessary danger. It is designed to be compact in size than other conventional fire-fighting robot to ease small location entry for deeper reach of extinguishing fire in narrow space. It is also equipped with an ultrasonic sensor to avoid it from hitting any obstacle and surrounding objects, while a flame sensor is attached for fire detection. This resulted in It demonstrating capabilities of identifying fire locations automatically and ability to extinguish fire remotely at distance
Keywords: Firefighting robot; compact size robot; ultrasonic sensor; flame sensor; remote control

I. INTRODUCTION

Firefighting is the act of extinguishing destructive fires. A firefighter must be able to stop the fire quickly and safely extinguish the fire, preventing further damage and rescue victims to a safer location from the hazard. Technology has finally bridged the gap between Firefighting and machines allowing for a more efficient and effective method of firefighting. Robots were designed to find a fire before it rages out of control. The robots could one day work with fire fighters in reducing the risk of injury to victims. Our team was always more interested in security-related projects. We determined that our idea would be security-related, but we also wanted to create something unique, both in terms of the market and for a social cause. As a result, we devised the concept of a fire-fighting robot.

One of the most crucial factors in a fire tragedy is the number of lives lost in the process of saving another's life. Because of explosive materials, smoke, and high temperatures, it is sometimes hard for firefighting workers to reach the scene of a fire. Many disastrous outcomes can be avoided if the fire is detected quickly. A single spark can start a huge conflagration. Because of an inadequate fire management system, not only industrial workers' lives are in danger, but also the lives of domestic workers. Many lives can be lost in a fire, and many more can be permanently injured. However, by employing correct firefighting techniques, this can be prevented. IoT technology is used to create a fire-fighting robot. We plan to construct a Fire Extinguishing Robot that can detect and move a little flame to extinguish it. With the use of flame sensors, it will automatically identify a fire. It navigates itself to the fire source and extinguishes the fire using the built-in fire extinguishing system once it recognizes the location of the fire breakout.

It employs three flame sensors for fire detection. One for each direction: left, forward, and right. When a fire is detected, the fire extinguishing system will be engaged. When the water pump detects a fire, it will begin ejecting water. The primary function of this system is to provide fire surveillance in order to prevent severe fire accidents and reduce human life loss. progress to location-dependent services and requests in wireless arrangements endures the progress of extra precise and reliable positioning and pursuing systems. The main and only work is to deploy the robot in a fire prone area and the robot will automatically work once it detects a fire breakout. This prototype helps in Rescue operations during fire accidents where the entry of service man is very difficult in the fire prone area. There are several existing types of vehicles for firefighting at home and extinguishing forest fires. Our proposed robot is designed to be able to work on its own or be controlled remotely. By using such robots, fire identification and rescue activities can be done with higher security without placing fire fighters at high risk and dangerous conditions. In other words, robots can reduce the need for fire fighters to get into dangerous situations.

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
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II. LITERATURE REVIEW

Development of Mini Fire Fighting Robot In today's era firefighting is an dangerous issue. Many authors are working on different techniques for firefighting.

1) Author Ratnesh Malik et al. has developed an approach towards firefighting robot. The robot is designed and constructed which is able to extinguish fire. The robot is fully autonomous. It implements the concept likes environmental sensing and awareness, proportional motor control. The robot processes information from its sensors and hardware elements. Ultraviolet, Infrared and visible light are used to detect the components of environment. The robot is capable of fighting tunnel fire, industry fire and military applications are designed and built. Ultraviolet sensors are used to detect fire. Once fire is detected, robot sounds an alarm. Then the robot activates an electronic valve which release sprinkles of water on the flame. Detailed concept of robot is explained which automatically detects fire and extinguishes it in short time by the use of sensors, microcontroller etc. This robot is used in places where human lives are at high risk.

2) Author Kristi Kokihi et al. has developed intelligent firefighting tank robot. Tank robot is made from acrylic, plastic, aluminium and iron. Robot components are two servo motors, two DC motors, ultrasonic sensor, compass sensors, flame detector, thermal array sensor, white detector (IR and photo transistor), sound activation circuit and micro switch sensor. The objective is to search certain area, find and extinguish the flame for different flame positions, room configuration with disturbance. Robot is activated through DTMF transmitter and receiver.

3) Control of An Autonomous Industrial Fire Fighting Mobile Robot is developed by H.P. Singh et al. The paper describes the construction and design of mobile firefighting robot. The system contains two optically isolated D.C. motors. Robot performs analog to digital conversion of the data provided by infrared sensors. Five infrared sensors are used. Two sensors control the motion of the robots and three are for flame detection. The extinguisher comprises of D.C water pump and a water container. The basic theme of the paper is to sense the flames of fire and extinguish it. For this infrared sensor is used as input sensor which senses the infrared rays coming out of the fire. The microcontroller controls the extinguishing system.

4) Wireless firefighting robot is developed by Swati Deshmukh et al. It comprises of machine which has ability to detect fire and extinguish it. The firefighting robot can move in both forward and reverse direction and can turned in left and right directions. Thus, fire fighter can operate the robot over a long distance and there is no need for human near the area on fire. Light dependent resistors are used for detection of fire. These resistors are highly sensitive devices and are capable of detecting very small fire. The robot provides security at home, buildings, factory and laboratory. It is an intelligent multisensory based security system which contains firefighting system in daily life.

5) Cell phone-controlled robot with fire detection sensors developed by Lashay Arora consist of mobile phone which controls a robot by making a call to the mobile phone which is attached to the robot. During the call activation period, if any button is pressed on the phone, the tone corresponding to the button pressed is heard at the other end of the call that is placed on the robot. The robot perceives Dual-Tone Multiple-Frequency (DTMF) tone with the help of phone mounted on the robot. The received code is processed by the microcontroller and then the robot performs actions accordingly. In the proposed system DTMF technology is used to position the shaft of motor at a required point with different sensors, each performing its own task. Rugged, Simple and cost-effective system is proposed here.

6) Android Phone controlled Robot Using Bluetooth is developed by Arpit Sharma et al. Various techniques of Human Machine interaction using gestures are presented. Gestures are captured by using the accelerometer. The paper analyses the motion technology to capture gestures using an android smart phone which has inbuilt accelerometer and Bluetooth module to control kinetics of the robot. The microcontroller controls the signals of the Bluetooth module. Features like user friendly interface, lightweight and portability OS based smart phone has overtaken the sophistication of technologies like programmable glove, static cameras etc making them obsolete.

7) Author Saravanan P has designed and developed an Integrated Semi-Autonomous Fire Fighting Mobile robot. The System controls four D.C. motors powered by Atmega2560 and controlled autonomously by navigation system. Navigation system comprises of integrated ultrasonic sensors and infrared sensors. The robot is fitted with wireless camera which captures the video and transmits it to the base station. The fire detection comprises of LDR and temperature sensor. If there is a fire the sensor detects it and the robot will be moved to the source and extinguishes it. The extinguishing system consists of a BLDC motor with water container. The SABOT can be operated manually for extreme conditions. It comprises of a GUI support through which robot can be controlled from the base station.

8) Intelligent Fire Extinguisher System is developed by Poonam Son sale et al. The paper proposes of an adaptive fusion algorithm for fire detection. It uses a smoke sensor, flame sensor, temperature sensor for fire detection. It contains intelligent multisensory based security system that contains a firefighting system in daily life. The security system can detect abnormal and dangerous situation and notify. Intelligent buildings are expected to be safer convenient and efficient living environments for society. The purpose of Intelligent Fire Extinguisher System is to extinguish flame in a certain amount of time. The system detects the fire location and extinguish fire by using sprinklers. As being Intelligent System, it cuts off the electricity of area where fire has been caught and starts the sprinklers only of that area.

9) Remote Controlled Fire Fighting Robot developed by Phyu Wai Aung describes the functions of remote-control firefighting robot. It contains two main parts that is transmitter and receiver in which two sets of RF modules are used. One RF module is used to transmit the data to the motor driver and another RF module is used to know the condition on fire. Microcontroller PIC16F887 is used operate the whole system of the firefighting robot. The motors are driven by the L298 and ULN2003 drivers in this system. The operator controls the robot by using wireless camera mounted on the robot. If the temperature of fire sight is above 40 degrees Celsius, the alarm will be ringing so that operator can control the firefighting robot and avoid the damage of heat.

III. METHODOLOGY

A. Project Overview

The project is designed to develop a firefighting robot using Arduino Uno. The robotic vehicle is loaded with water pumps which is controlled by servos.

An AT Mega 328 microcontroller is used for the desired operation. At the transmitting end using commands are sent to the receiver to control the movement of the robot either to move forward, and left or right etc. At the receiving end two motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the one to position the robot. The ultrasonic sensor adequate range with obstacle detection, while the receiver driver module used to drive DC motors via motor driver IC for necessary work.

A water tank along with a water pump is mounted on the robot body and its operation is carried out from the microcontroller output through appropriate command from the transmitting end. The whole operation is controlled by an AT mega 328 microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors, One IR flame sensors are fixed on robot chassis to sense the fire and to reach the destination to put off the fire.

B. Components Overview

This system uses the following components.

1) Microcontroller can be described as a computer embedded on a rather small circuit board. To describe the function of a microcontroller more precisely it is a single chip that can perform various calculations and tasks and send/receive signals from other devices via the available pins. Precisely what tasks and communication with the world it does, is what is governed by what instructions we give to the Microcontroller. It is this job of telling the chip what to do, is what we refer to as programming on it. However, the microcontroller by itself cannot accomplish much, it needs several external inputs, power, for one, a steady clock signal, for another. Also, the job of programming must be accomplished by an external circuit. So typically, a microcontroller is used along with a circuit which provides these things to it; this combination is called a microcontroller board. The Arduino Uno that you have received is one such microcontroller board. The actual microcontroller at its heart is the chip called Atmega328. The advantages that Arduino offers over other microcontroller boards are largely in terms of reliability of the circuit hardware as well as the ease of programming and using it.

2) Power Supply 7805 is a voltage regulation IC which is used to supply 5V Direct current to the microcontroller.

3) Motor Driver IC L293D is a dual H-bridge motor driver integrated circuit (IC). They are used to control the 4-motor used in project. There are 2 motor driver IC used in the project one to control front motor and other for rear motors.

4) Computer Interface Finally, this project uses an IDE compiler for interfacing the Arduino with a PC. This interface is used to setup and compile Arduino.

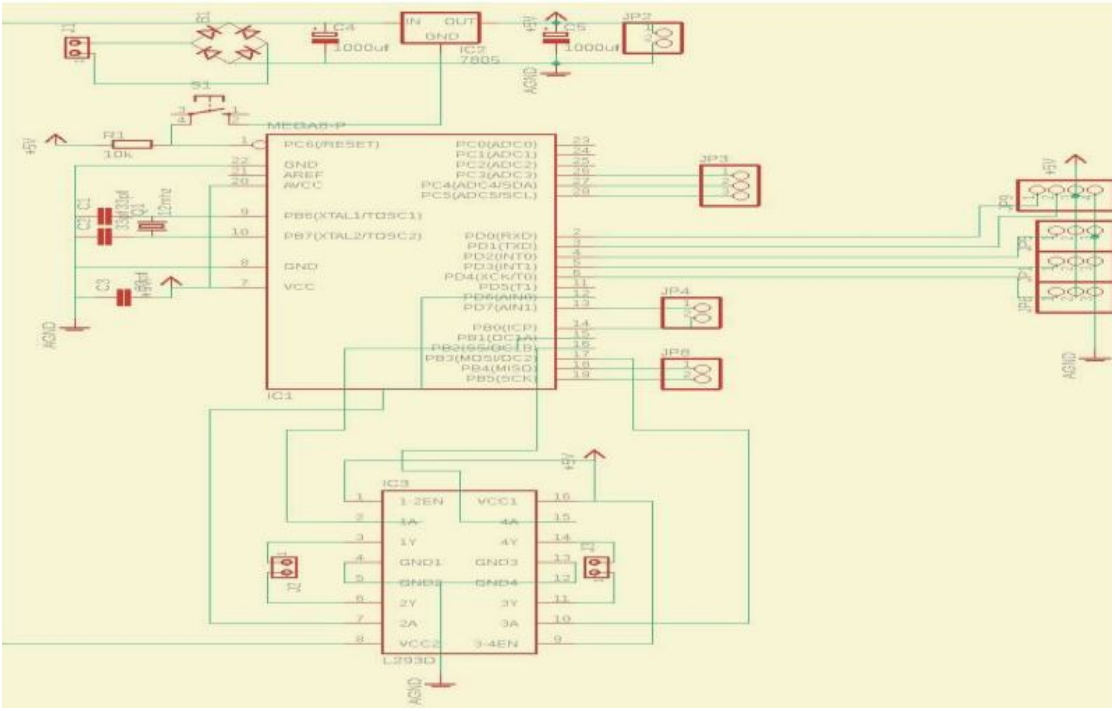

Fig 1: Circuit Diagram of the System

As you can see these sensors have an IR Receiver (Photodiode) which is used to detect the fire. How is this possible? When fire burns it emits a small amount of Infra-red light, this light will be received by the IR receiver on the sensor module. Then we use an Op-Amp to check for change in voltage across the IR Receiver, so that if a fire is detected the output pin will give 0V(LOW) and if the is no fire the output pin will be 5V(HIGH). So, we place three such sensors in three directions of the robot to sense on which direction the fire is burning. We detect the direction of the fire we can use the motors to move near the fire by driving our motors through the L293D module. When near a fire we must put it out using water. Using a small container, we can carry water, a 5V pump is also placed in the container and the whole container is placed on top of a servo motor so that we can control the direction in which the water has to be sprayed.

IV. SYSTEM REQUIREMENT SPECIFICATION

A. Hardware Requirements

L293D Driver module The Motor Driver is a module for motors that allows you to control the working speed and direction of two motors simultaneously. This Motor Driver is designed and developed based on L293D IC. L293D is a 16 Pin Motor Driver IC. This is designed to provide bidirectional drive currents at voltages from 5 V to 36 V. L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state. ¬ Features of L293D driver module Hardware features. Can be used to run Two DC motors with the same IC. Speed and Direction control is possible. Motor voltage Vcc2 (Vs): 4.5V to 36V. Maximum Peak motor current: 1.2A. Maximum Continuous Motor Current: 600mA. Supply Voltage to Vcc1(vs.): 4.5V to 7V. Transition time: 300ns (at 5Vand 24V). Automatic Thermal shutdown is available. Available in 16-pin DIP, TSSOP, SOIC packages ¬ Applications. Used to drive high current Motors using Digital Circuits. Can be used to drive Stepper motors. High current LED's can be driven. Relay Driver module (Latching Relay is possible). Pin description:

The L293D driver module has 16pins. They are as follows:
ENABLE: When enable is pulled low, the module is disabled which means the module will not turn on and it fails to drive motors. When enable is left open or connected to 3.3V, the module is enabled i.e., the module remains on and driving of motors also takes place.
VCC: Supply voltage 3.3v to 5v
GND: Ground pin. ¬ Flame Sensor Module A flame sensor module that consists of a flame sensor (IR receiver), resistor, capacitor, potentiometer, and comparator LM393 in an integrated circuit. It can detect infrared light with a wavelength ranging from 700nm to 1000nm.The far-infrared flame probe converts the light detected in the form of infrared light into current changes. Sensitivity is adjusted through the onboard variable resistor with a detection angle of 60 degrees. Working voltage is between 3.3v and 5.2v DC, with a digital output to indicate the presence of a signal. Sensing is conditioned by an LM393 comparator.

Figure 2 : Flame Sensor

MICROCONTROLLER ATMEGA 328 The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte oriented 2-wire serial interface, SPI serial port, 6- channel 10-bit A/D converter (8-channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughputs approaching 1 MIPS. 3.2.1 Applications Today the ATmega328 is commonly used in many projects and autonomous systems where a simple, low-powered, low-cost microcontroller is needed. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno and Arduino Nano models. Features

- 28-pin AVR Microcontroller Flash Program Memory: 32 Kbytes
- EEPROM Data Memory: 1 Kbytes
- SRAM Data Memory: 2 Kbytes
- I/O Pins: 23
- Timers: Two 8-bit / One 16-bit
- A/D Converter: 10-bit Six Channel
- PWM: Six Channels
- RTC: Yes, with Separate Oscillator
- MSSP: SPI and I²C Master and Slave Support
- USART: Yes
- External Oscillator: up to 20MHz The Atmega328 is a very popular microcontroller chip produced by Atmel. It is an 8-bit microcontroller that has 32K of flash memory, 1K of EEPROM, and 2K of internal SRAM. The Atmega328 is one of the microcontroller chips that are used with the popular Arduino Due Milanovic boards. The Arduino Due Milanovic board comes with either 1 of 2 microcontroller chips, the Atmega168 or the Atmega328. Of these 2, the Atmega328 is the upgraded, more advanced chip. Unlike the Atmega168 which has 16K of flash program memory and 512 bytes of internal SRAM, the Atmega328 has 32K of flash program memory and 2K of Internal SRAM. The Atmega328 has 28 pins, It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins. These I/O pins account for 20 of the pins.

Figure 3 : Arduino UNO

V. SOFTWARE REQUIREMENTS

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. ¬ Difference between C and Embedded C Though C and embedded C appear different and are used in different contexts, they have more similarities than the differences. Most of the constructs are same; the difference lies in their applications. C is used for desktop computers, while embedded C is for microcontroller-based applications. C takes more resources of a desktop PC like memory, OS, etc. while programming on desktop systems what embedded C cannot. Embedded C has to use the limited resources (RAM, ROM, I/O's) on an embedded processor. Thus, program code must fit into the available program memory. If code exceeds the limit, the system is likely to crash. Compilers for C (ANSI C) typically generate OS dependent executable files. Embedded C requires compilers to create files to be downloaded to the microcontrollers/microprocessors where it needs to run. Embedded compilers give access to all resources which is not provided in compilers for desktop computer applications. Embedded systems often have the real-time constraints, which is usually not there with desktop computer applications. Embedded systems often do not have a console, which is available in case of desktop applications. The C programming language is perhaps the most popular programming language for programming embedded systems. C continues to be a very popular language for microcontroller developers/programmers due to the code efficiency and reduced overhead and development time. C offers low-level control and is considered more readable than assembly language which is a little difficult to understand. Assembly language requires more code writing, whereas C is easy to understand and requires less coding. Plus, using C increases portability since C code can be compiled for different types of processors. We can program microcontrollers using Atmel Atmega328, AVR or PIC. Here by developing the programs as per the electronic hardware using Atmel Atmega328 micro controller. For the operations like: blink led, increment decrement counters, token displays etc. Most C programmers are spoiled because they program in environments where not only there is a standard library implementation, but there are frequently a few other libraries available for use. The cold fact is, that in embedded systems, there rarely are many of the libraries that programmers have grown used to, but occasionally an embedded system might not have a complete standard library, if there is a standard library at all. Few embedded systems have the capability for dynamic linking, so if standard library functions are to be available at all, they often need to be directly linked into the executable. Oftentimes, because of space concerns, it is not possible to link in an entire library file, and programmers are often forced to "brew their own" standard c library implementations if they want to use them at all. While some libraries are bulky and not well suited for use on microcontrollers, many development systems still include the standard libraries which are the most common for C programmers. C remains a very popular language for micro-controller developers due to the code efficiency and reduced overhead and development time. C offers low-level control and is considered more readable than assembly. Many free C compilers are available for a wide variety of development platforms. The compilers are part of an IDEs with ICD support, breakpoints, single-stepping and an assembly window. The performance of C compilers has improved considerably in recent years, and they are claimed to be as good as assembly, depending on who you ask. Most tools now offer options for customizing the compiler optimization. Additionally, using C increases portability since C code can be compiled for different types of processors. 3.10.3 Software The software used by Arduino is Arduino IDE. The Arduino IDE is a cross platform application written in Java and is derived from the IDE for the Processing programming language and the Wiring project. It is designed to introduce programming to artists and other newcomers unfamiliar with software development.

It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit make files or run programs on a command line interface. Although building on command-line is possible if required with some third-party tools such as Uno. The Arduino IDE comes with a C/C++ library called "Wiring" (from the project of the same name), which makes many common input/outputs operations much easier. Arduino programs are written in C/C++, although users only need define two functions to make a runnable program:

Setup () – a function run once at the start of a program that can initialize settings.

loop () – a function called repeatedly until the board powers off A typical first program for a microcontroller simply blinks an LED on and off. In the Arduino environment, the user might write a program like this: #define LED_PIN 13 void setup () {Pin Mode (LED_PIN, OUTPUT) ;// enable pin 13 for digital output} void loop () {digital Write (LED_PIN, HIGH) ;// turn on the LED delay (1000) ;// wait one second (1000 milliseconds).

```
const int analogInPin = A5;  // Analog input pin that the potentiometer is attached to
int sensorValue = 0;  // value read from the pot
int outputValue = 0;  // value output to the PWM (analog out)
// Black Line Follower
int motor1_input1=6;
int motor1_input2=9;
// motor two
//Left motor
int motor2_input1=10;
int motor2_input2=11;
int Buzzer_pin=7;
int Relay_pin=4;

String voice;
void setup()
{
  Serial.begin(9600);
  pinMode(motor1_input1,OUTPUT);
  pinMode(motor1_input2,OUTPUT);
  pinMode(motor2_input1,OUTPUT);
  pinMode(motor2_input2,OUTPUT);

  pinMode(Buzzer_pin,OUTPUT);
```

```
  pinMode(motor1_input1,OUTPUT);
  pinMode(motor1_input2,OUTPUT);
  pinMode(motor2_input1,OUTPUT);
  pinMode(motor2_input2,OUTPUT);

  pinMode(Buzzer_pin,OUTPUT);
  pinMode(Relay_pin,OUTPUT);

  digitalWrite(motor1_input1,LOW);
  digitalWrite(motor1_input2,LOW);
  digitalWrite(motor2_input1,LOW);
  digitalWrite(motor2_input2,LOW);
  digitalWrite(Buzzer_pin,LOW);
  digitalWrite(Relay_pin,HIGH);

}
void loop()
{
  // read the analog in value:
  sensorValue = analogRead(analogInPin);
  // map it to the range of the analog out:
  outputValue = map(sensorValue, 0, 1023, 0, 255);
```

```
   {
    digitalWrite(motor1_input1, LOW);
    digitalWrite(motor1_input2, HIGH);
    digitalWrite(motor2_input1, LOW);
    digitalWrite(motor2_input2, HIGH);
    }
    if(voice==""backward")
    {
    digitalWrite(motor1_input1, HIGH);
    digitalWrite(motor1_input2, LOW);
    digitalWrite(motor2_input1, HIGH);
    digitalWrite(motor2_input2, LOW);
    }
  if (voice==""left")
  {
    digitalWrite(motor1_input1, HIGH);
    digitalWrite(motor1_input2, LOW);
    digitalWrite(motor2_input1, LOW);
    digitalWrite(motor2_input2, HIGH);
    }
      if (voice==""right")
  {
```

Figure 4: Snapshot of Arduino IDE

For the above code to work correctly, the positive side of the LED must be connected to pin 13 and the negative side of the LED must be connected to ground. The above code would not be seen by a standard C++ compiler as a valid program, so when the user clicks the "Upload to I/O board" button in the IDE, a copy of the code is written to a temporary file with an extra include header at the top and a very simple main () function at the bottom, to make it a valid C++ program. The Arduino IDE uses the GNU tool chain and AVR Link to compile programs and uses AVR dude to upload programs to the board.

VI. RESULTS

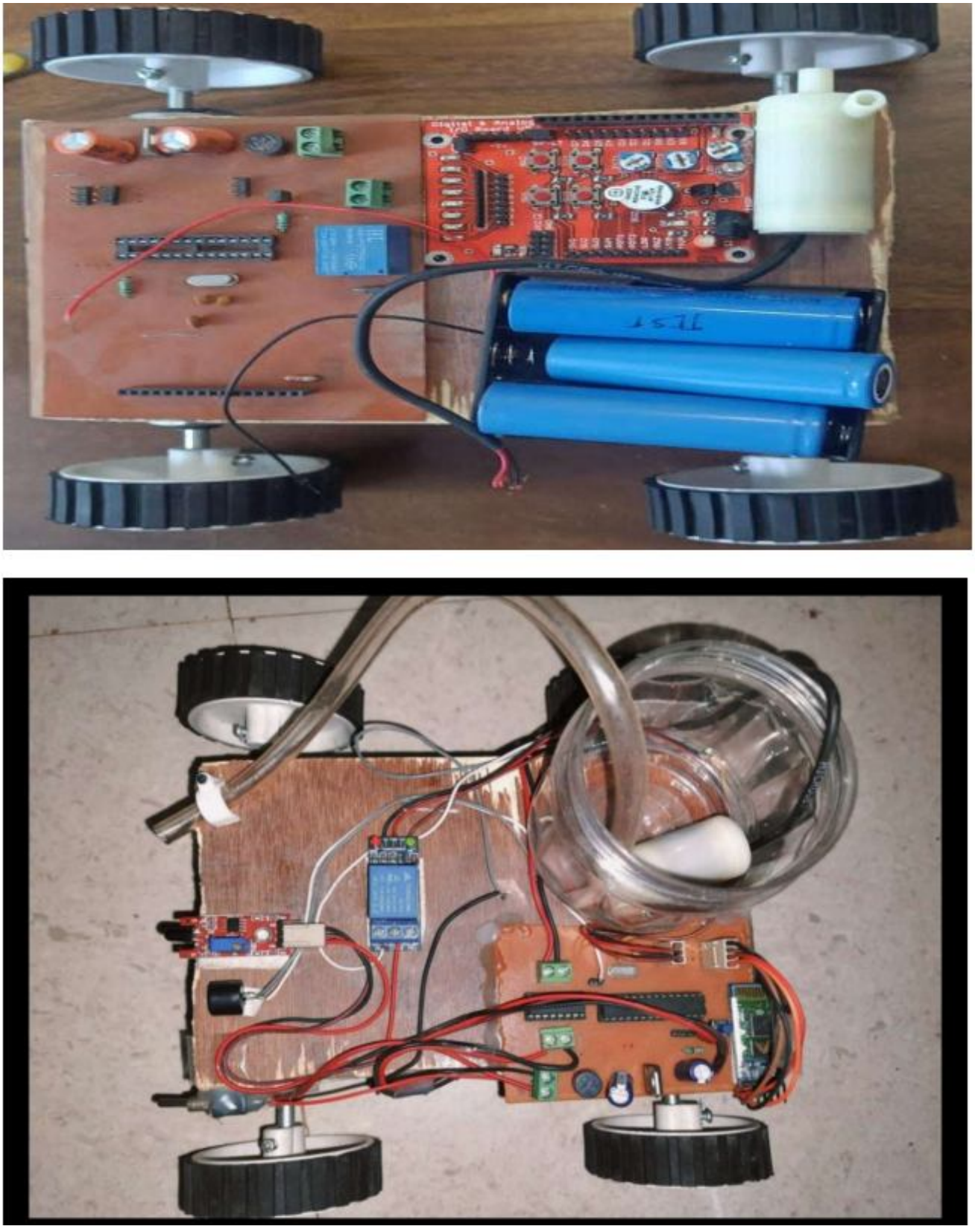

Figure 5: Final Result

VII. ADVANTAGES AND APPLICATIONS

A. *Advantages*

1) Prevention from dangerous incidents.
2) Minimization of o ecological consequences
3) Financial loss can be prevented.
4) A threat to a human life can be minimized.
5) No supervision is required to control robot.

B. *Disadvantages*

1) It is applicable only for shorter distances.
2) Doesn't predict nor interfere with operator's thoughts.
3) Cannot force directly the operator to work.

C. *Applications*

1) Can be used in extinguishing fire where probability of explosion is high. For e.g., Hotel kitchens, LPG/CNG gas stores, etc.
2) Can be used in Server rooms for immediate action in case of fire.
3) Every working environment requiring permanent operator's attention, At power plant control rooms.
4) Can be used in search and rescue operation.
5) Can Used in domestic cold storage places.

VIII. CONCLUSION

Fire causes tremendous damage and loss of human life and property. It is sometimes impossible for the fire fighter personnel to access the sight of fire because of explosive materials, smoke and high temperature. Through this we can conclude that robots can be placed where human lives are at risk. The robot can operate in an environment which is out of human reach in a very short time. In such environments, firefighting robots can be useful for extinguishing fire. These robots should be controlled by remote operators who are located far away from the fire site using remote communication systems. The robot accurately and efficiently finds the fire within minimum time after the fire is detected. In future work Project aims to promote technology innovation to achieve a reliable and efficient outcome. Mobile robot that can move through a model structure, find fire and extinguish it. The movement of the robot is controlled by the sensors which are fixed on the mobile platform. It is to provide security for the home, laboratory, office, factory and building is important to human life. We develop an intelligent multisensory based security system that contains a firefighting system in our daily life. We design the fire detection system using sensors in the system, and program the fire detection and fighting procedure using sensor-based method. This project describes a real time firefighting robot which moves in a constant speed, identify the fire and then extinguish it with the help of pumping mechanism. It has advantageous features such as ability to detect location of fire automatically besides having a compact body and lightweight structure. The robot can be used at a place that has a small entrance or in small spaces because it has a compact structure. The system can potentially be useful to accompany fire fighters and prevent an outbreak. From the experimental results, the robot can sense smoke and fire accurately in a short time. Fire causes tremendous damage and loss of human life and property. It is sometimes impossible for the fire fighter personnel to access the sight of fire because of explosive materials, smoke, and high temperature. Through this we can conclude that robot can be placed where human lives are at risk. The robot can operate in an environment which is out of human reach in very short time. In such environments, firefighting robots can be useful for extinguishing fire. These robots should be controlled by remote operators who are located far away from the fire site using remote communication systems. The robot accurately and efficiently finds the fire within minimum time after the fire is detected. In future work Project aims to promote technology innovation to achieve a reliable and efficient outcome. Mobile robot that can move through a model structure, find fire and extinguish it. The movement of the robot is controlled by the sensors which are fixed on the mobile platform. It is to provide security for the home, laboratory, office, factory and building is important to human life. We develop an intelligent multisensory based security system that contains a firefighting system in our daily life. We design the fire detection system using sensors in the system, and program the fire detection and fighting procedure using sensor-based method. The prototype of the fire fighter robot was efficiently designed. This prototype has facilities to be integrated with many sensors making it moves forward. The toolkit detects the infrared light emitted by the fire with photo diode and sends signal to controller. We intend to extend this work to provide a keypad programmed to allow manipulation of robot to move desired direction with help of motor driver module and extinguish the flames using water tank which is rotated at 180 degrees with help of servo for faster result. This future work will also explore the use of a long-distance sensor with suitable hardware to get more better and faster results addition to the characters.

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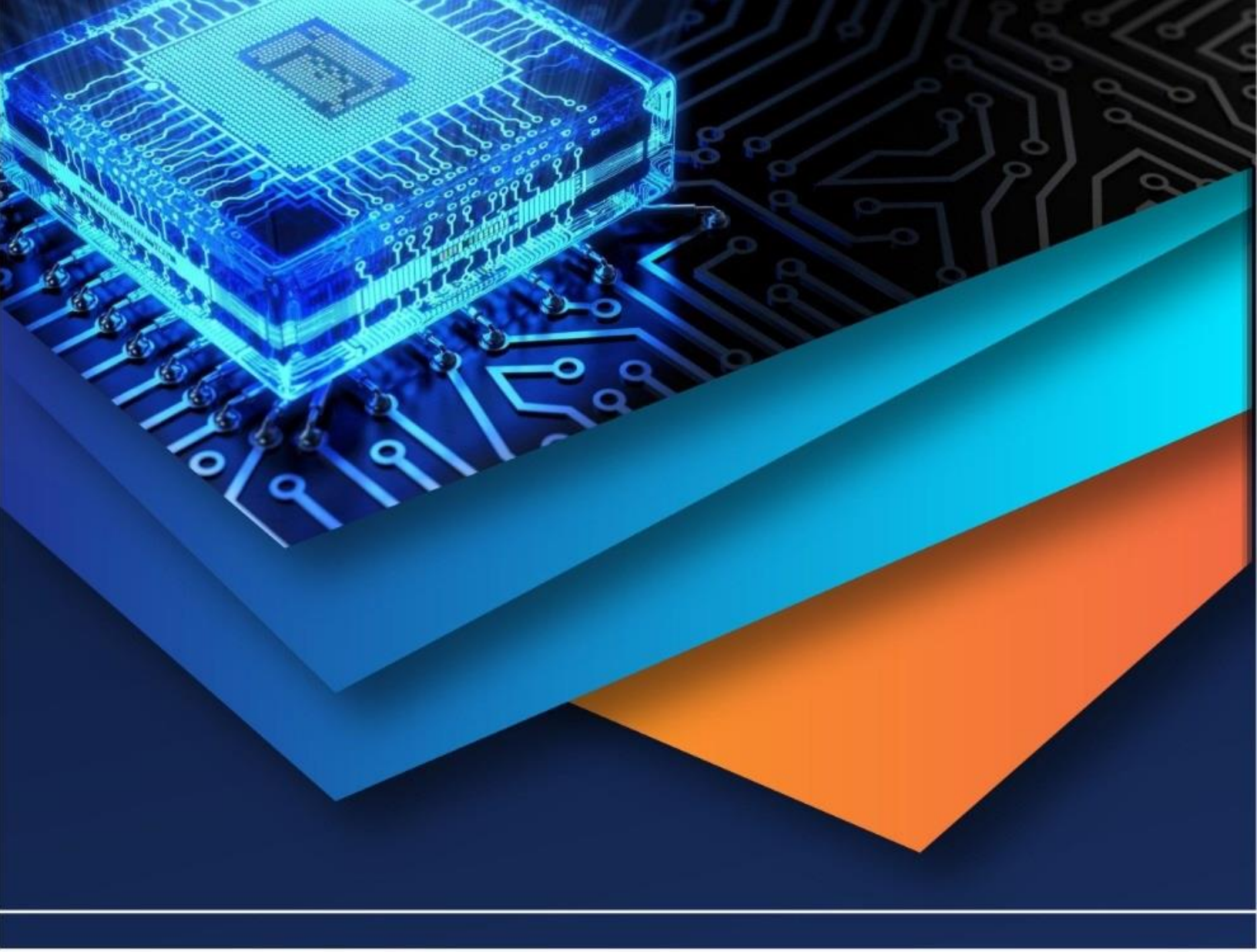

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