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Fire Fighter Robot

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ABSTRACT: Fire accidents pose a significant threat to life and property. In such scenarios, autonomous robots can play a crucial role in fire suppression and rescue operations. This project aims to design and implement a Fire Fighter Robot capable of detecting and extinguishing fires in indoor environments.

The Fire Fighter Robot incorporates various sensors for fire detection, such as temperature sensors and flame detectors, enabling it to locate fire sources accurately. Upon detecting a fire, the robot autonomously navigates through the environment using motor control algorithms and obstacle avoidance mechanisms.

Major fire accidents do occur in industries like nuclear power plants, petroleum refineries, gas tanks, chemical factories and other large scale fire industries resulting in quite serious consequences. Thousands of people have lost their lives in such mishaps. Therefore, this project is enhanced to control fire through a robotic vehicle.

Furthermore, the Fire Fighter Robot is equipped with a fire suppression system, which includes a water pump and nozzle for spraying water or fire-retardant substances onto the fire. The robot's actions can be controlled remotely via Bluetooth communication, allowing operators to maneuver the robot from a safe distance.

The implementation of the Fire Fighter Robot involves hardware integration, software development for sensor interfacing and control algorithms, as well as testing in simulated fire scenarios. The results demonstrate the robot's effectiveness in detecting and suppressing fires autonomously, as well as its remote control capabilities via Bluetooth, thereby contributing to fire emergency management and mitigation efforts.

KEYWORDS: Fire Detection, Operation Visualization, Fire Extinguishtion, Bluetooth Control.

I. INTRODUCTION

Fires are among the most important form of problems. Robot industry has a lot of work in this area. So today robot is more commonly used to reduce the human efforts. The need of Fire extinguisher Robot that can detect and extinguish a fire on its own. Robotics is also called as gift of electronics. It reduces the human efforts. The Fire Fighter Robot is designed to search for a fire in the house or industry for extinguish the fire. 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. Arduino board acts as the brain of whole circuitry. This prototype helps in Rescue operations during fire accidents where the entry of service man is very difficult in the fire prone area. 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.

We can also control this robot by smartphone via Bluetooth. One camera module is also used in this project so through this we can also see the whole live operation of our Fire Fighter Robot in our mobile phone/Laptop via Wi-Fi. We can also click and save the photos/videos by this module. Title and Water level of tank will also display on LCD display.

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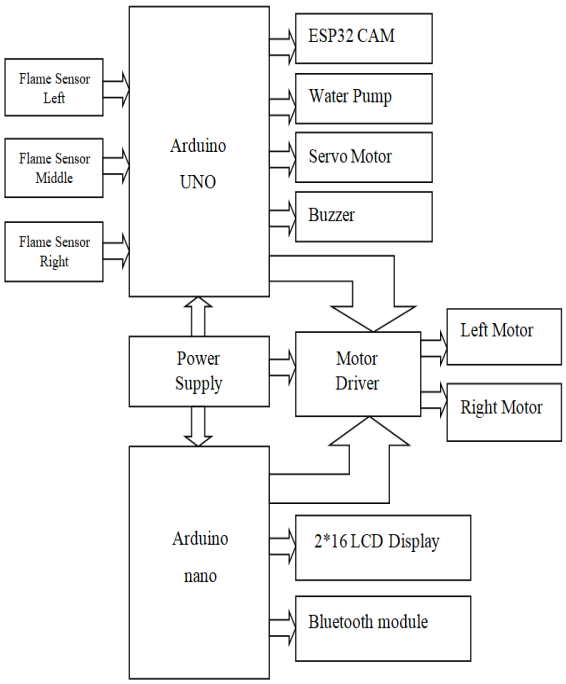
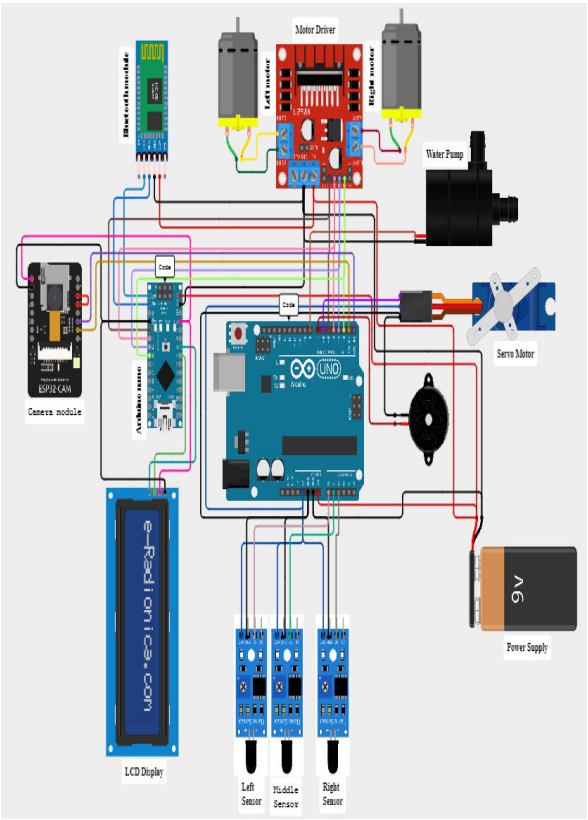
II. BLOCK DIAGRAM



III. CIRCUIT DIAGRAM



IV. WORKING OF COMPONENTS

- **Arduino Boards-** In this project Arduino board acts as the brain of whole Circuitry.
- **Power Supply-** Single power supply is used for whole components.

- **Flame Sensor-** In this project three flame sensors are used for detect the fire.
- **Motor Driver-** Motor driver is used to give sufficient amount of current to the motor.
- **DC Motor-** It converts the electrical energy into rotational energy to rotate the wheel.
- **Water Pump-** Water pump is used to pump the water on the fire.
- **Servo Motor-** Servo motor is used to give the direction of water to extinguish the fire.
- **Bluetooth Module-** It is used to operate the robot by our Phone/Laptop.
- **LCD Display-** LCD display is used to display the title and water level of water in tank.
- **Buzzer-** Buzzer is used to indicate the fire is detected.
- **Camera Module-** It is used to see the live streaming of whole process in our Phone/Laptop via Wi-Fi.

V. ADVANTAGES

- It reduces human efforts.
- It can work in critical situation.
- It is capable to detect and extinguish the fire.
- Each components can be replace easily.
- Camera facility is also available.
- Bluetooth facility is also provided.
- Eco friendly.

VI. APPLICATIONS

- Homes.
- Offices.
- Industries.
- In Rescue operation.
- Schools/Colleges, etc.

VII. EXPERIMENTAL RESULT

Initialization of Fire Fighter Robot

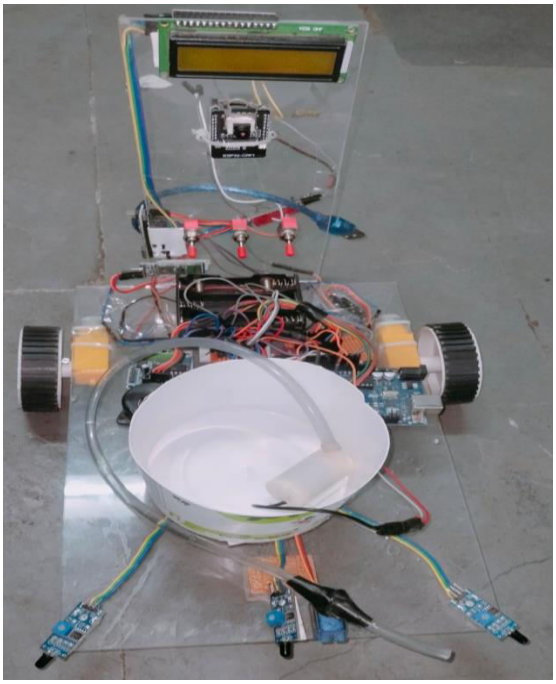


Fig. 1- Initialization

Detection of fire by robot

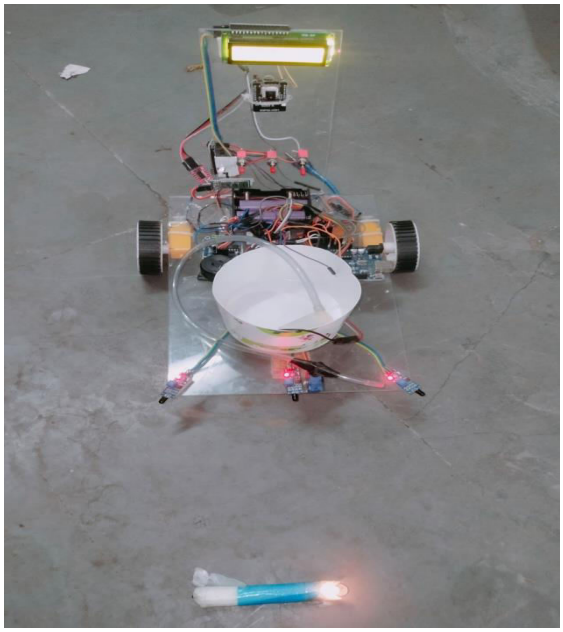


Fig. 2- Fire detection

Movement of robot towards fire detected object

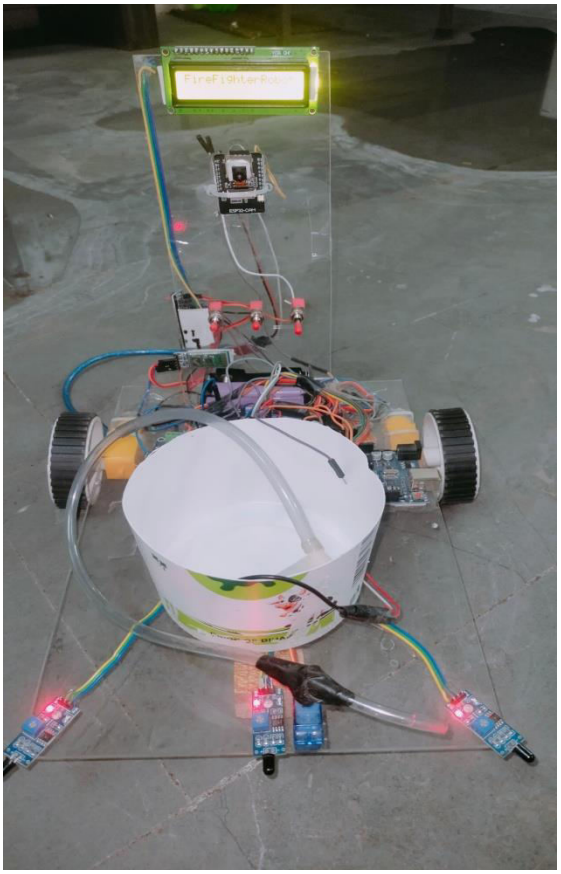


Fig. 3- Robot moves near to object

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VIII. CONCLUSION

I have successfully developed the Fire Fighter Robot which is capable to detect the fire automatically and goes that place and extinguish the fire. We can also see the live streaming through Wi-Fi. We can also control this robot by using our smartphone.

FUTURE SCOPE

Now a days Technologies are growing very fast. So upcoming after few years we can use more advanced sensors to increase the efficiency of Fire Fighter Robot.
We can also use Artificial Intelligence (AI) and Machine Learning which will help to make decision easily.

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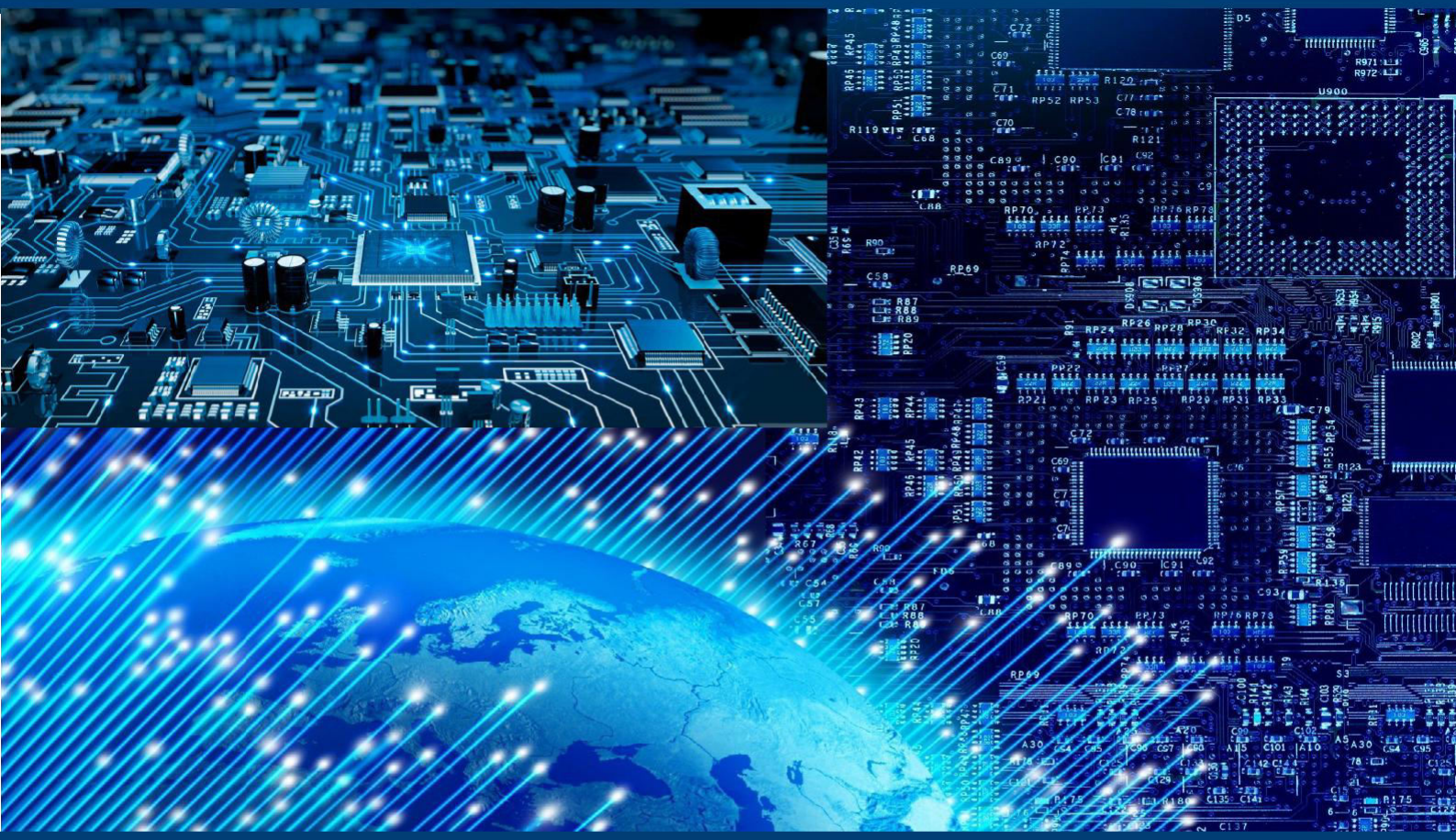

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