Fire Detection and Direction Control of Fire Fighting Robot

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**Abstract:** Detecting fire and igniting it really is a risky job which endangers a fire-fighter's life. There are numerous fire incidents all around the world where fire-fighters each year have to risk their life during the line of responsibility. The Artificial Intelligence study and engineering is contributed significantly to Robotics. Robots have been deployed in diverse industries such as mining, construction, drugs, etc. Robotics are also used to help fire fighters in carrying out this fire prevention and thereby mitigate the risk of loss of human life. For extreme environment conditions fire fighters has been designed. After locating the fire source can entirely control the situation of area by the internet. It has a system that will control and operate through the wireless system. The fire exposure platform is built using fire-fighter robot mounted sensors. It idea aims to stimulate awareness as well as advancement in the robotics world when striving for a realistic and feasible approach to save life and reduce the possibility of harm to assets.

**Keywords:** Fire fighter, robot, control, detection.

1. **Introduction**

With the growth of technologies automation process or system is motivated by the people. The automation system reliable and supports the mission. Recently, there has been a great deal of danger for staff in the fire extinguishing market. The fire-fighting robots has been used to protect fire-extinguishing staff from the danger of burning and inhaling poisonous gases and volatile materials, especially in restricted and constricted areas. These robots contribute to the protection of the lives of staff in the fire extinguishing industry. In science or business, a robot machine is an electromechanical mechanism used to automate human job or to execute the functions assigned to it. Often it may communicate with its surroundings and visually imitate a human being or perform its activities in a human manner [1-3].

The more advanced and individualised computer, in general, is likely to be known as a robot unit. Today, in the field of modern engineering, robotics has experienced its biggest achievement. Robot legs or artificial hands are more mobile and can move in any given place on the assembly line, the robot leg can move very rapidly to perform routine activities such as welding with painting [4-6]. When the robot encounters a fire, it extinguishes the fire by using a pump motor attached to a tank of water mounted on its frame. If a buzzer sounds when it detects the signal, is intimate the event of a fire crash by the buzzer tone.

Fire protection is a serious problem in today's era. Many authors are working on the various fire fighting techniques.
2. Proposed Work
The robot will identify the location and calms down the fire and by using the application we can monitor the robot for different places where the fire accidents take place. Sensors mounted on the robot is used to monitor the areas where fire explosion takes place and to sense the fire at the site of disaster [7-9]. If the fire is detected the robot will pump the water. It will reduce the human risk and where there is no scope to human to enter and calms down the fire there this robot will go and work.

This paper primary objectives are
- To detect the fire in the disaster area.
- Reduces the effect of human labour and the level of destruction.
- Automatically calms down the fire using the water.

3. Implementation
Fig 1 explains the input is taken by the fire sensor that will sense the fire depending upon the density of the fire then the buzzer will turn ON robot will go near to the flame then the water motor will ON that will pumps the water and calms down the flame.

If the fire is not detected by the robot then we have to detect the fire accident place and need to operate the robot by using application the robot will move in 360 degrees, it will be stopped once the place is detected then the buzzer will turn ON and then water motor will be ON and that pumps the water and calms down the fire disaster area. Buzzer wills ON if the robot will detect the fire because it indicates that this area is under danger and makes the people there alert.

![Block diagram of fire fighting Robot](image)

**Figure.1** Block diagram of fire fighting Robot

*Node MCU*: Node MCU is a software and engineering kit that is open source for prototyping or designing IoT products. It includes Wi-Fi SoC firmware running on the ESP8266 and hardware based on the ESP-12 frame. The firmware uses a Lua scripting software.

*Fire Sensor*: A fire sensor is programmed to sense and respond to the presence of a fire or blaze, enabling identification of fires. Perceived blaze has responds depend on the mechanism and installation, which may include an alarm sound, shutting off a fuel line, and triggering a fire control system. Their purpose, and can be used in applications such as industrial furnaces, is to ensure that the furnace is functioning in right way; in such situations, no further action is taken besides notifying the operator or control device. Thanks to the methods it uses to detect the flame, a flame detector can also respond faster and more accurately than a smoke or heat detector.

*Buzzer*: A buzzer or beeper is a electronic, electromechanical or piezoelectric (short piezo) audio signaling system. Typical applications of buzzers and beepers include warning systems, clocks and user feedback validation such as a button or keystroke on the keyboard.
Driver Circuit: L293D is a traditional engine driver or engine control IC that allows DC motor to drive in any direction. L293D is a 16 pin IC that can simultaneously control a group of two DC motors in either direction. Which means you can power two DC motors with one single L293D IC. Integrated circuit (IC) dual H-bridge Motor Controller.

Water Motor: A pump motor is a fluid-moving DC-motor. A DC motor converts electric power from direct current to mechanical power. When a current carrying conductor is placed in a magnetic field, the DC or direct current motor works on the principal, experiencing a torque and a tendency to move [10-11].

3.1 Flow Chart

![Flow chart of proposed system](image)

**Figure. 2** Flow chart of proposed system

The Fig.2. shows that the fire detection by the Robot and executing the operation to resolve the situation, and explained if robot not detected the fire, then we should detect the fire place then operate the robot through app until fire detects then operate the same way.

3.2 Schematic Diagram: Fig. 3 Schematic Diagram shows the Fire Sensing and Control Robot where the connections. The Hardware Components used are Fire Sensor, Node MCU, L293D Driver IC, Water Motor.

![Schematic Diagram](image)

**Figure. 3** Schematic Diagram
4. Result

![Image](image.png)

**Figure. 4** Working of fire robot

Robot can be moved by itself or it can be operated by the application. As input it takes fire and output will be pumping of the water and also it makes the buzzer sound which will makes us alert. As a resultant the Robot is identifying the flame it calms down the fire shown in fig.4.

5. Conclusion

In this initiative, we intend to reduce the impact of fire incidents that normally originate from a small blaze, thereby saving lives and resources for people. The robot can detect fire and hit it successfully without having to crash into an obstacle. This robot is helpful in those areas where natural calamity and bomb explosions occur.

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