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# Fire Fighting Robot Using Arduino with SMS and **Call Alert System**

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**Abstract**: A fire extinguishing robot has been proposed and constructed in this study work, which identifies the fire location and extinguishes the fire using sprinklers after initiating the water pump. For effective fire detection, this robot has three flame sensors. This suggested form of Arduino based Autonomous Fire Extinguishing Robot detects the presence of fire and extinguishes it without the need for human intervention. It has gear motors and a motor driver that regulate the robot's motions when it senses a fire and starts the water pump to extinguish it. This miniature robot is equipped with a water ejector that can squirt water over the flames. A servo motor can be used to move the water ejector pipe in the direction necessary. An Arduino Uno microcontroller is in charge of the entire setup. This robot will move to the fire source when the flame sensor detected the fire and it will send message to any phone of the GSM network through the modem connected to the programmable device. This robot also programmed to stop before the robot hit the flame. This robot also can extinguish fire at 45 Degree for upper side and 45 Degree for lower side. This robot implicated the function of finger to clip the fire extinguisher clipper.

Keywords: Arduino Uno, DC Submersible pump, Flame sensors, L293D motor driver, Servo motor

### I. INTRODUCTION

The Arduino-based Fire Fighting Robot with SMS Alert System is a robotic system designed to detect and extinguish fires in indoor environments. The robot uses flame sensors to detect the presence of a fire. Once a fire is detected, the robot moves towards the source of the fire and sprays water to extinguish the flames. The robot is equipped with a GSM module that can send SMS messages to alert the user when a fire is detected. This allows for prompt action to be taken to minimize damage and save lives. The components of the robot include an Arduino board, motor drivers, sensors, and a GSM module. The software code is written in the Arduino IDE and control the motors, reads sensor data, and communicates with the GSM module. The robot is tested and debugged to ensure that it functions correctly and safely in different scenarios. Overall, the Arduino-based Fire Fighting Robot with SMS Alert provides a reliable and efficient solution for fire detection and suppression with the added benefit of remote communication and control. The development of advanced technologies has significantly contributed to enhancing the efficiency and effectiveness of various industries. One such industry that has greatly benefited from technological advancements is fire safety and emergency response. The introduction of Fire Fighting robots equipped with SMS and call alert systems has revolutionized the way we combat fires and protect lives and property. Fire Fighting robots are autonomous or remotely operated machines designed specifically to navigate through hazardous environments and extinguish fires. These robots are equipped with a range of Flame sensors, IR Temperature Sensor (MLX09614), and firefighting equipment, making them highly capable in responding to fire emergencies. One of the key features of these robots is the integration of SMS and call alert systems.

#### **Objectives:**

To detect fires and extinguish them while sending an SMS alert to a specified phone number. To detect fires, the robot uses flame sensors. These sensors are equipped with an Infrared Receiver (Photodiode) designed to identify the presence of a fire. This robot is developed to help firefighters in their duty. This robot can move in forward, backward, left, right and can stop also. It reduces human efforts and protect their property. Robot detects fire and extinguishes the

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fire with the help of sprinkler pump. Robots are being considered both as a fire watch as well as an assistant to firefighters. In these roles, the robots are being designed for detecting fires, sizing up the hazards in side a structure, locating and suppressing fires, and search-and-rescue.

#### **II. LITERATURE SURVEY**

A literature survey on Fire Fighting Robots using Arduino with Call and SMS Alert System would involve reviewing and summarizing key studies, prototypes, and developments related to the design and implementation of autonomous or semi-autonomous robots for fire fighting tasks, integrating Arduino microcontrollers, and providing communication features like call and SMS alerts for safety and reporting. Below is a structured approach to this literature survey:

- Fire Fighting Robots: These robots are designed to autonomously detect and extinguish fires, reducing the risk to human firefighters and improving safety in hazardous environments.
- Arduino-based Fire Fighting Robots: Arduino platforms are popular in robotics due to their simplicity, accessibility, and extensive libraries that allow for rapid prototyping.
- **Call and SMS Alert System:** Adding communication systems (SMS, Call Alerts) to fire fighting robots enhances safety by notifying concerned personnel or authorities about the situation in real-time.

#### **III. METHODOLOGY**

The main brain of this project is Arduino, button sense fire we use the fire sensor module (flame sensor). When fire burns it emits a small amount of Infrared light, this light will be received by the IR receiver on the sensor module. So, we place three such sensors in the direction of the robot to sense in which direction the fire is burning. When the Arduino detects a fire, it will activate the water pump, causing water to flow through the sprinkler system and suppress the fire. To monitor and be informed of the situation even in remote situations, the robotcombines an SMS functionality. The Arduino will be equipped with a GSM module that allows sending andreceiving SMS messages. In case of a fire, the Arduino will send an emergency SMS to a predefined contact or afire department, informing them about the fire incident at the its location.



Fig 1. Block diagram of Fire Fighting Robot

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#### IV. RESULTS AND DISCUSSION

In this project, we will learn how to build a simple robot using Arduino that could move towards the fire and pump out water around it to put down the fire. It is a very simple robot that would teach us the underlying concept of robotics; you would be able to build more sophisticated robots once you understand the following basics. So let's get started. This advanced fire fighting robotic system independently detects and extinguishes fire. In the age of technology, the world is slowly turning towards the automated system and self-traveling vehicles, fire fighters are constantly at risk of losing their life. Fire spreads rapidly if it is not controlled. In case of a gas leak a get here even may bean explosion. So, in order to over come this issue, and safe guard lives of our heroes, our system comes to the rescue.



Fig 2. System architecture of Fire Fighting Robot

Application of Fire Fighting Robot

- Fire detection: Arduino-based robots can detect fire using sensors and algorithms. The Firefighting Robot is a compact and portable emergency responder robot that assists firemen in fighting high-rise fires, especially in highly dangerous environments where it is not safe for people to enter.
- Distance measurement: The robot can measure its distance from the fire source while moving towards it.
- Fire extinguishing: The robot can automatically extinguish fires using a water pump, water ejector, or spray mechanism.

#### Discussion of Fire Fighting Robot Using SMS and Call Alert System

#### 1. Fire detection:

Sensors: The robot will use fire detection sensors like flame sensors or smoke sensors (MQ2, MQ135) to detect the presence of fire.

Response: Once a fire is detected, the robot will immediately trigger its firefighting mechanism.

#### 2. Movement :

Obstacle Avoidance: The robot can use ultrasonic or infrared sensors to navigate around obstacles while moving towards the fire source.

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Autonomous Navigation: The robot will autonomously move towards the location of the fire based on sensor inputs and extinguish it.Fig. 1 A sample line graph using colors which contrast well both on screen and on a black-and-white hardcopy.

## V. CONCLUSION

The Arduino based Fire Fighting Robot with SMS and Call Alert System is a game-changer for fire safety in indoor spaces. The robot has achieved its objectives. In suitable conditions, the robot works quite efficiently, but it has a few limitations. Implementing ultrasonic sensor gas sensors, Led displays, and smoke sensors, the robot can be made more ready to deal with complex practical situations. The movement of this robot vehicle is controlled by MCU as per the program. This robot is help full in those areas where natural calamity and bomb explosions where occurred The Fire Fighting Robot using Arduino with SMS and Call Alert System demonstrates a practical and effective solution for detecting and extinguishing fires in hazardous environments. By integrating sensors for flame and smoke detection, along with a water-spraying Mechanism, the robot can autonomously identify and respond to fire incidents. Additionally, the incorporation of GSM technology ensures real-time Communication by sending SMS alerts and initiating calls to notify users promptly of any fire hazards. This system not only enhances safety but also Minimizes the risk to human life during fire emergencies.

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