

# Implementation of Fire Fighting Robot which can be controlled by various means like Android application, Remote and Voice inputs.

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**Abstract - Fire fighting is always a risk mission. To facilitate fire-extinguishing operations, autonomous robots have been developed in recent days. In this document, we propose a self-sufficient fire-fighting robot that uses a modular design concept to implement fire detection, route management and shutdown functions. Robot operation is supervised and controlled by the Arduino UNO microcontroller. Detects obstacles using ultrasonic sensors. It is also implemented with three temperature sensors that help us achieve the temperature of the environment. The communication between the mobile phone and the robot will take place via Bluetooth, which will have a GUI to control the movement of the robot. The Android-controlled robot can easily be used in everyday life, such as in homes, markets, companies, etc. The project will help generate interests and innovations in the field of robotics while work is being done to find a practical and economical solution to save lives and mitigate the risk of property damage.**

**Index Terms—Sensor, Robot, Temperature, Smartphone, Arduino.**

## INTRODUCTION

The main inspiration that set us on the road to do this project was saving the innocent lives of the fire fighters. it is a dangerous job that puts the life of a fire fighter at risk. many fire accidents which fire fighter had to lose their lives in the line each year throughout the world. From the different papers reviewed, certain patterns started to appear that helped understand different sections of the robot. In 2013 a computer Vision based approach for Detection of Fire and Direction Control was introduced which played a huge hand in operating a robot over a computer. Computer vision is used to detect the presence of fire initially which is followed by necessary pixel mapping for the robot's direction control.

If an automated system is made to patrol the perimeter for fire accidents, then we can have an early warning system.

This will be very effective in a fire accident in industries and residential areas where the fire possibilities are high. Our robot has 2 modes in manual mode in which it can be controlled by an android application. We can send commands to robot

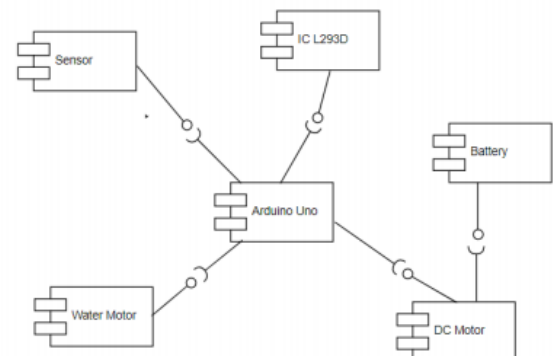
through Bluetooth module which is mounted on robot itself. Smart phones have facility of Bluetooth, through that Bluetooth we can control the movement of firefighting robot. In auto mode it can navigate using ultrasonic sensor avoiding any obstacles and locate fire with the temperature sensors mounted in front.

We have organized the Fire Fighting Robot to keep from fire shaky accidents. The robotized vehicle is stacked with water tank which sprinkles water on fire. An arduino is used to control needed operation. The robot must flee normally, avoiding obstacles and meanwhile find and track the flame and smother them. To achieve the best execution with a convincing utilization, we have taken a deliberate arrangement strategy, where the robot is isolated into different rational modules reliant on convenience.

### A. Problem statement

Implementation of Fire Fighting Robot which can be controlled by various means like Android application, Remote and Voice inputs.

### B. Architecture Diagram

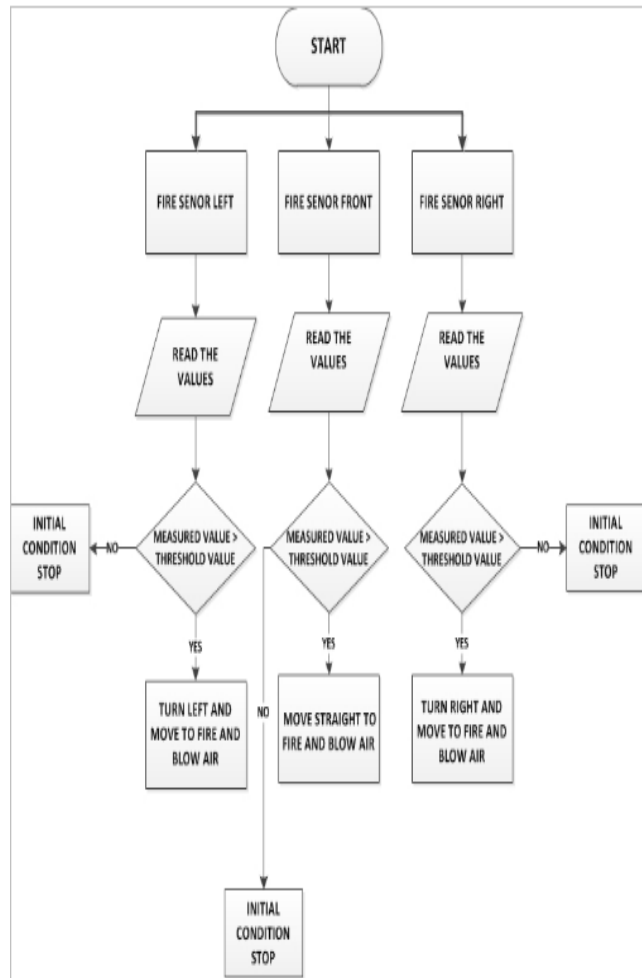


**Fig. Architecture Diagram**

An architecture diagram is a graphical representation of a set of concepts, that are part of an architecture, including their principles, elements and components.

**C. Flow Chart**

This is the basic flow chart which explains us how the process Works out by comparing the conditions as needed as act accordingly.

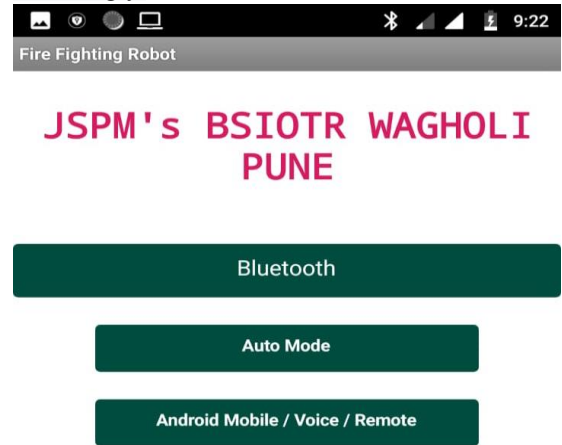


**Fig. Flow Chart**

**D. Working modes of robot.**

The proposed fire-fighting robot has three flame detectors in which two of these are long-range sensors and the other is a short-range sensor. The robot also has a Bluetooth obstacle detector and a surveillance camera. The Arduino UNO microcontroller, which is the processing and control unit of the robot, receives the inputs from the sensors and actuates the robot

accordingly.

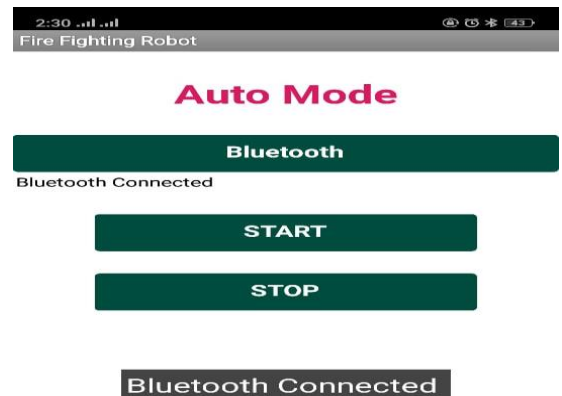


**Fig. Main Menu**

The robot works in two modes (A) Automated mode and (B) Manual mode.

**Automated Mode –**

In automatic mode, the robot is fully automated to look for the presence of any flames and obstacles in the vicinity. The robot moves and looks for the signs of the flame. If there is an obstacle in the path of the robot, it will deviate to the right until the obstacle is out of its trajectory. This is done using an ultrasonic sensor connected to the robot. The robot will look for flames using the three flame sensors positioned in front of the robot. When a fire is detected in the long-range flame sensor (sensors with a field of 400 mm) [9] positioned on both ends of the robot, the robot will rotate in the direction of the flame and progresses until the value reaches the level shorter. . The flame sensor (central sensor with a radius of 200 mm) is lower than the interruption value. When the value of the central flame sensor is lower than the threshold value, the robot will stop and the pumping action will start. Once the pumping action has started, the pump motor will be activated and the water sprayed. This is done until the flame is bought up to ground level. The robot will continue to move in search of a possible fire.



**Fig. Automated Mode**





**Fig. Ultrasonic Sensor HC-SR04**

This is the basic flow chart which explains us how the process works out by comparing the conditions as needed as act accordingly.

## F. Results

The Fire-Fighting robot is capable of detecting flames and extinguishing them successfully. The motor controller and Arduino code work together to control the movement of the robot with obstacle avoidance. It can detect the flame more effectively in the buildings and fixed lighting conditions. The robot is designed for the indoor application. Since the ambient daylight varies throughout the day, a dynamic threshold value is necessary to compensate for the change in ambient light.



**Fig. Robot**

## G. Conclusion

A dual mode firefighting robot which works in both automated and manual mode is presented in this paper. Arduino UNO is used as the processing and control unit of the robot using Bluetooth sensor. The hardware of dual mode robot is implemented and tested successfully.

## H. Acknowledgment

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