

AUTOMATIC VOICE CONTROLLED FIRE EXTINGUISHING ROBOT

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Abstract : Fire-fighting is a prominent yet hazardous occupation. A fire-fighter must be able to get to a fire place quickly and safely extinguish the fire, inhibiting the further damage and reduce fire casualties. Technology has helped in connecting machines and the occupation of fire fighting, allowing them to work in a effective way. Robots designed to detect fire, before it goes out of control, could work with fire fighters greatly decreasing the chance of injury to victims and with least risky human intervention. The project aims at designing an intelligent live video streaming voice operated fire extinguishing robotic vehicle which can be controlled, that alerts the people if there is any fire detected and sends the live location as well as the image of a fire effected area to the nearby fire station in order to cut down the impact that may cause due to catching fire in large areas.

Keywords: Fire Fighting, Reduce damage, Decrease casualties, Live Video Streaming, Voice operated, Wireless robot, Live location.

I. INTRODUCTION

According to India Risk Survey (ISR) 2018, fire outbreak is the third biggest risk to business community and operations. In ISR 2016, fire outbreak was ranked eighth biggest risk to businesses. Fire fighters face risky situations when extinguishing fire and rescuing victims, it is there responsibility as a fire fighter. In contrast, a robot is controlled from a distance, which means that fire fighting and rescue activities could be executed without putting fire fighters life at stake by using robotic technology instead. To put it briefly, robot avoids the fire fighters in getting into dangerous situations. The robot we have come up with provides fire security by alerting on fire detection. The Robot is controlled by giving voice commands using a mobile application which uses voice to text conversion method. Therefore, proposed model is needed to reduce all the damage caused by fire disaster.

II. RELATED WORKS

Dr. Subash Chandra Bose, Dr. Marzougui Mehrez, Dr. Ahmed Said Badawy, Dr. Wade Ghribi, Mr. Harun Bangali and Mr. Asif Basha [1] In most of the Industries fire sensing is very essential to prevent heavy losses. Robots with this type of embedded systems can save life of engineers in industrial sites with dangerous conditions. Therefore here they have chosen cyber-security robot for this particular application.

Rangan M K , Rakesh S M , Sandeep G S P and C Sharmila Suttur [2] Fire fighting robot which uses a modular design concept to implement Fire detection, Path directing and Extinguishing operations. It provides a computer vision based algorithm for fire detection and for directing the robot towards the detected fire, thereby overcoming the above limitations. Color segmentation is used in initial detection.

Madhavi Pednekar, Joel Amanna, Jino John , Abhishesh Singh and Suresh Prajapati [3] Demonstrates the research and implementation of Voice Controlled Intelligent Fire Extinguishing Robotic Vehicle. The vehicle is controlled through User Voice Command. This Robotic vehicle can be used in Rescue operations during fire accidents where the possibility for service men to enter the fire prone areas is very less.

B. Swetha and Sampath [4] Automatic Fire Extinguisher Robot is a Hardware based model used to automatically extinguish the fire during fire accidents. A Robot has been developed which features to move in the direction with respect to the fire intensity. The Robot shield is coated with calcium silicate boards that are capable of withstanding very high temperatures.

Srishti Khare [5] Provides robot that navigates using IR transmitter and receiver sensors. The fire is sensed using a thermistor based circuit and gas sensor. The fire is then extinguished by sprinkling water over the affected area. The proposed robot is capable of controlling fire, avoiding obstacles during movement and understanding the meaning of speech commands.

III. METHODOLOGY

Stage 1: Converting Speech commands to Text Commands.

There are various software's available for converting speech command to text commands like MATLAB, Visual Basics, Google Assistance etc. After researching we found that Google Assistant will be compatible and user friendly for converting speech to text commands in our project and we used this in our project.

Stage 2: Interfacing the Bluetooth with the robot, and the controller interacting with the robot wirelessly.

Since we are using wireless communication in our project, we have decided to use the Bluetooth module. And we are also using live streaming of the robot where the controller can view the video where the robot is moving. Here, we are using two Bluetooth modules one for transmission and other for receiver, an ASCII code which will be generated by Google Assistant is given to the Bluetooth transmitter module and that transmitted code is received by the Bluetooth receiver module. The Bluetooth transmitter module is used for wireless transmission of message signals if the robot is to be used in a remote place away from the communication with the user.

Stage 3: Controlling of the working the Robot.

When the fire detected by the robot, it automatically stops and buzzer sounds and the fire alert is sent to the fire authority where they can view the location and the image of the fire accident place. The water gets sprinkled till the fire is extinguished.

IV. PROPOSED WORK

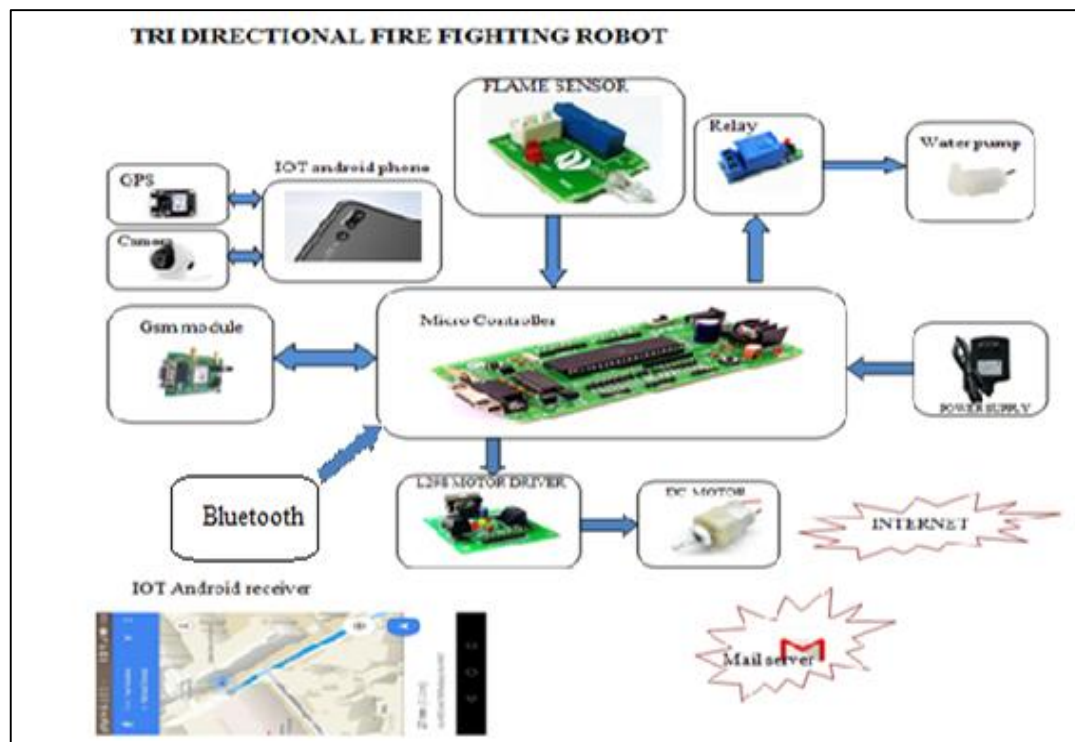


Figure 1: System Architecture

Figure 1 depicts the system architecture of the proposed system. The robot is live streaming where the controller can control the movement of the robot by giving the voice commands through a mobile application which is connected with the robot through the Bluetooth module and the voice is converted to text commands and the robot is controlled. Here we have used a P89V51RD2 microcontroller since it uses only 5V power supply and coding is easy. Bluetooth 5.0 version is used since it is the latest version and used for the communication between the robot and the application. The L298 motor drivers are used to as an interface between the motor and the control circuit. Since the control circuit outputs 5V which is not sufficient to drive the motor, in order to make 12V, we use the motor drivers. Relay which acts as a switch between the microcontroller and the water pump. We use the android phone which consists of the GPS and Camera which is used for live streaming and tracking the location of the fire accident. Four DC motors are used to drive the wheels of the robot. When the flame sensor detects the fire, the buzzer sound to alert the people and the robot automatically stops and a water pump is used to sprinkle water until the fire is extinguished. Meanwhile the fire alert is sent to the fire authority where the fire authority has the application to view the location and photos which is sent through the GSM module placed on the robot.

V. SYSTEM DESIGN

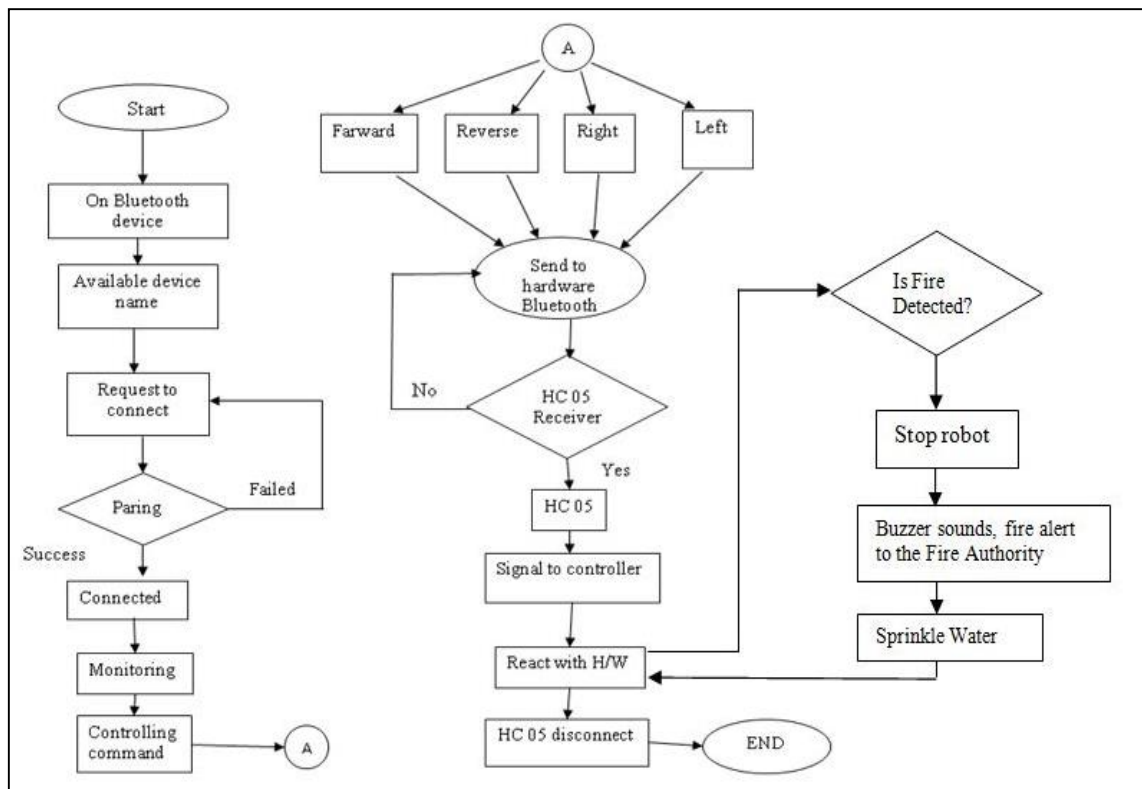


Figure 2: Dataflow diagram

Figure 2 depicts the dataflow/flowchart of the proposed system. The system flows by adding the Bluetooth device placed on the robot to control the robot which is done through and Android Application. To do that, we have to On the Bluetooth device, then in the Android Application, we have to see the available devices name for the connection and the request is sent to connect to the Bluetooth device placed on the robot. When the request is accepted, it will start pairing, and if it fails, it goes back to the request to connection. After the device is paired, then the device is paired.

After connecting, we can monitor the robot by giving the voice commands like left, right, forward, reverse and these commands are sent to the hardware Bluetooth where the speech is converted to text command which is further sent to the HC 05 Bluetooth receiver. If the commands receives are failed, then it goes back to the commands to be sent for the hardware receiver. If commands received by HC 05 receiver, it sends to the HC 05 Bluetooth module where the commands are sent as signals to the robot controller.

These signals are reacted by the hardware (robot). When the fire is detected, the robot automatically stops and the buzzer sounds and the fire alert is sent to the nearby fire authority and sprinkle the water till the fire is extinguished. The fire authority can view the location and the image where the fire accident is occurred.

Then the fire is extinguished and the robot can by again monitored and controlled and can be taken out from the fire accident place and the Bluetooth can be disconnected. This ends the function of the robot.

VI. RESULTS

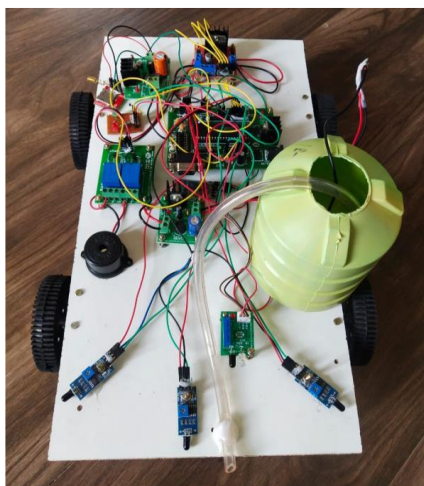


Fig 3: The model for the proposed system

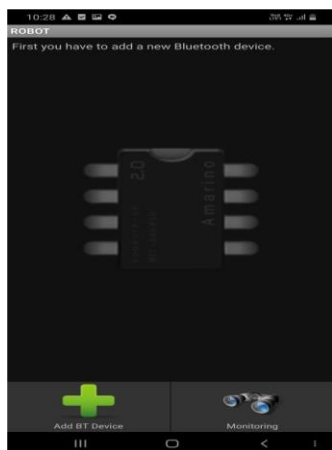


Fig 4: The android application used for moment of robot
 This is a mobile application which is used for controlling the moments of the robot, here the voice commands will be inputted which will be converted to text commands and will drive the robot.

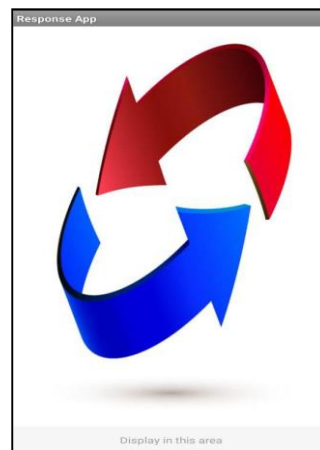


Fig 5: Response app
 This is a application which will be mounted on the robot and using this application images as well as the live location of the fire accident place will be sent to the fire authority's mail id on request from them.

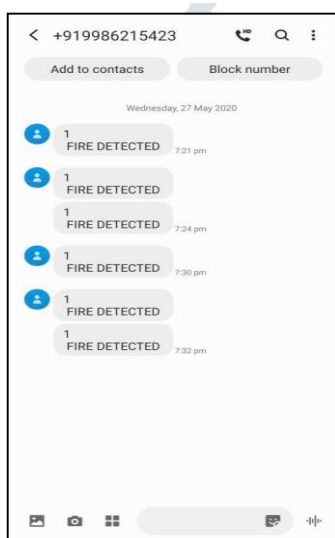


Fig 6: Fire alert message
 On detection of fire by the robot an alert message will be send to the fire authority along with a loud voice alert.



Fig 7: Application used by the fire authority
 This is the application used by fire authority to request for a photo and the live location of the fire incident place.

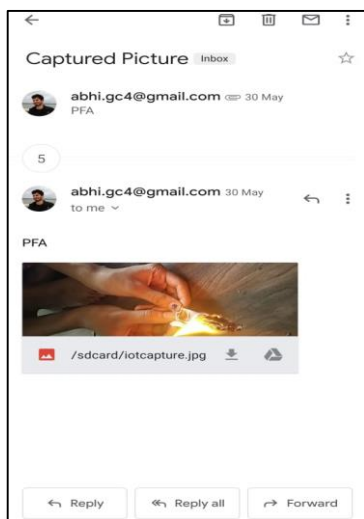


Fig 8: Captured fire accident image
 The image captured by the response app will be sent to the mail id of the fire authority.

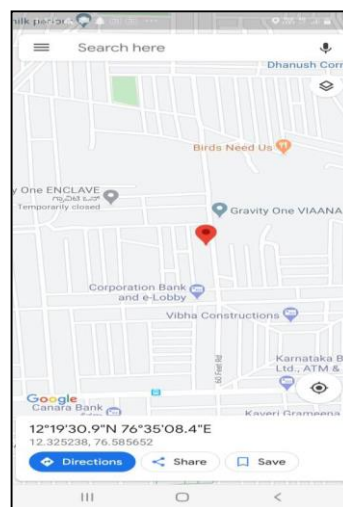


Fig 9: Location details sent to the fire authority
 Clicking on the location from the fire authority, a live location of the fire accident is sent.

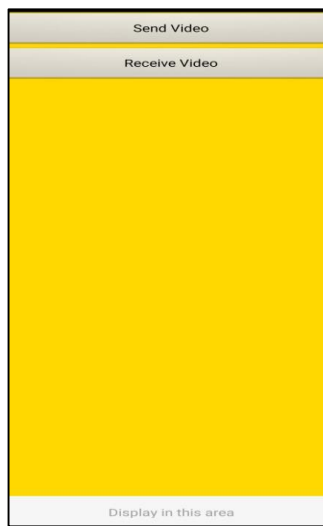


Fig 10: Live video streaming application

This is an application used for sending live video streaming the fire accident place to the controller.

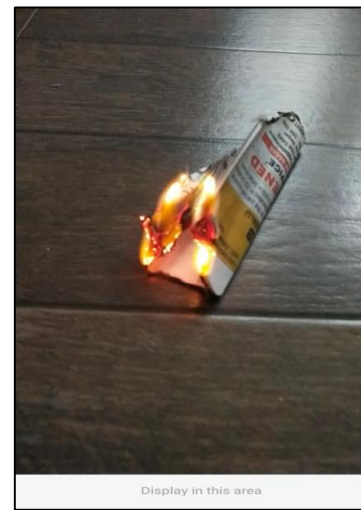


Fig 11: Live video viewed by the controller

This is how the video is viewed by the controller which is broadcasted by the robot and the controller drives the robot by viewing this.

VII. CONCLUSION

We have overcome the disadvantage in the present system by providing a live video streaming application with a speech recognition module. The proposed model could be deployed in the most common places where fire incidents can happen like industries, apartments etc. The main controller of the fire fighting robot is microprocessor. We have programmed using embedded C language to control the movement of robot, and we have used java programming language for development of applications like video streaming and for tracking of location. When the Flame sensor detects the fire the buzzer is activated and a voice alert is sent to the fire authority. The fire authority also receives the image of the fire place and also the live location.

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