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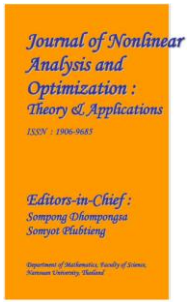

AUTOMATIC FIRE-FIGHTING ROBOTIC VEHICLE WITH SMS ALERT AND MANUAL CONTROLLING MODE

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ABSTRACT

This project focuses on the development of a Fire-fighting Robot. The primary objective is to create a robotic system capable of detecting and extinguishing fires in confined spaces, reducing human intervention in dangerous environments. The robot integrates sensors, such as temperature detectors, to identify fire sources and assess the severity of the situation. This proposed model of a Fire Extinguishing Robot using a GSM Module is used to detect the presence of fire and reduce the fire. This proposed system mainly consists of two modes, we can operate it in both manual and automatic mode. It contains DC Motors and a Relay to control the movement of a robot. This model robot has a water ejector which is capable of ejecting water at the fire breakout place. This robot has an additional feature of sending an SMS alert to the fire station department. This robot can be moved in the required direction by controlling it with a mobile. In the event of a fire, the robot activates a built-in fire suppression mechanism, which could include a water spraying system. Communication modules enable remote monitoring and control, allowing operators to guide the robot or receive real-time data about the fire situation. Thus, the project aims to enhance the efficiency of fire-fighting operations and mitigate potential risks by automation of the process.

Keywords: Obstacle detection, Sensor, Wi-Fi, Defensiveposture, IOT.

INTRODUCTION:

Fire incidents in homes and businesses are becoming more common these days. It raises the risk to human life as well as the amount of damage that fire can do. To stop small-scale fire incidents from happening in a residence or to put out such a fire hazard, an automatic fire fighting vehicle could be a simple answer. However, as the automatic fire fighting vehicle is only meant to manage the fire within that specific residence, it cannot control the supporting causes for the fire once it has spread throughout the entire complex. Therefore, it cannot put out the fire on the entire structure. To contain the fire throughout the complex in such a scenario, a fire extinguisher truck is required.

The goal of the suggested system is to create a guided vehicle that can be deployed in a home or business setting and inform the user in the event of a fire. With the assistance of a cell phone, the user can steer this vehicle to the precise spot where the fire mishap is happening and then use the

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same device to spray water to put out the fire. The built vehicle can be seen on a mobile phone screen from a distance, guiding its motion. This allows the user to interact with the vehicle and put out the fire efficiently. By organizing, analyzing, and processing data, the guided vehicle's IoT (Internet of Things) integration enables the user to make the best decisions in real-time.

In this manner, the damage that a fire can inflict before the fire brigade arrives can be significantly decreased, and the chance that the brigade will become involved can also be lowered. However, those who dedicate their life to putting out fires are known as fire extinguishing teams. Thus, the goal of this research is to reduce human intervention in order to prevent fire incidents.

LITERATURE SURVEY

Human-Robot Interaction in Firefighting is a challenge in designing intuitive interfaces and communication protocols for seamless collaboration between firefighters and robots [1]. Issues related to trust, situational awareness, and user acceptance of firefighting robotic systems need to be addressed [2].

Bio-inspired Locomotion Mechanisms for Firefighting Robotsis Inspired by nature, to explores bio-inspired locomotion mechanisms, such as legged locomotion and snake-like crawling, for firefighting robots [3]. Discusses the advantages of these mechanisms in traversing challenging terrains and navigating through cluttered environments during firefighting missions [4].

Sensing Technologies for Fire Detection in Firefighting Robotinvestigates various sensing technologies employed in firefighting robots for fire detection, including thermal imaging, gas sensors, and vision-based methods. It evaluates their performance in terms of sensitivity, reliability, and suitability for different fire scenarios [5].

Numerous studies emphasize the importance of autonomous firefightingsolutions in improving efficiency and safety during emergency situations [6].Highlighting the utilization of advanced sensors for fire detection, coupled with autonomous navigation algorithms for effective deployment of robotic vehicles in hazardous environments. Additionally, the integration of SMS alert systems enables timely communication of fire incidents to designated authorities and stakeholders, facilitating rapid response and coordination efforts[7].

EXISTING METHOD

The Existing model is able to detect presence of fire using flame sensor and moves the robot to fire accident location.

It contains gear motors and motor driver to control the movement of robot.

When it detects fire, it communicates with microcontroller (Arduino UNO) and the robot will move towards the fire affected area.

The fire extinguisher is mounted on the robotic vehicle which is then controlled over the wireless communication so that it extinguishes the fire automatically.

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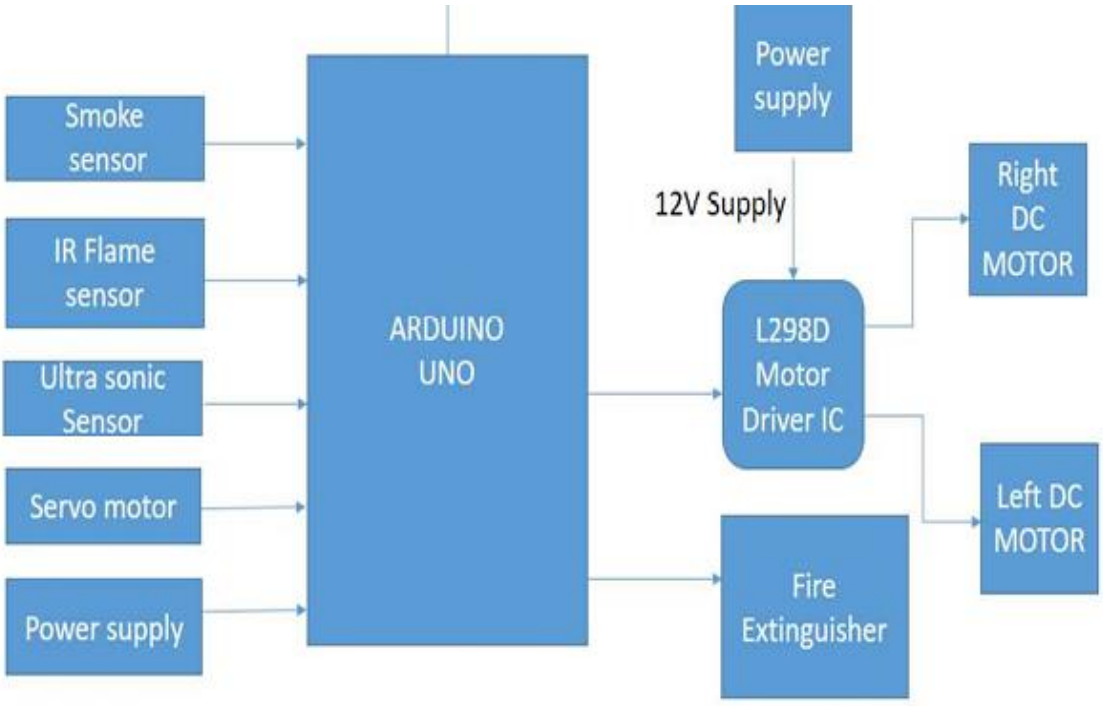

FIG.1: EXISTING SYSTEM BLOCK DIAGRAM

PROPOSED METHOD

Designing an automatic fire-fighting robotic vehicle with SMS alert and manual mode operation involves integrating various components and functionalities to ensure effective firefighting capabilities along with user control and communication features.

The camera is installed on the robot and is connected to the registered phone number. The robot can operate manually if required to enhance its output. By utilizing a GSM module, along with components like a temperature sensor, camera, motor drivers, and a water spray, the robot provides an efficient solution for fire safety.

This advanced solution enables autonomous fire detection and suppression while providing real-time alerts via SMS. Operators can take manual control when necessary, and the integrated camera offers remote monitoring for enhanced situational awareness during firefighting operations.

Equipped with SMS alert capability and a camera system, it enhances firefighting efficiency and situational awareness.

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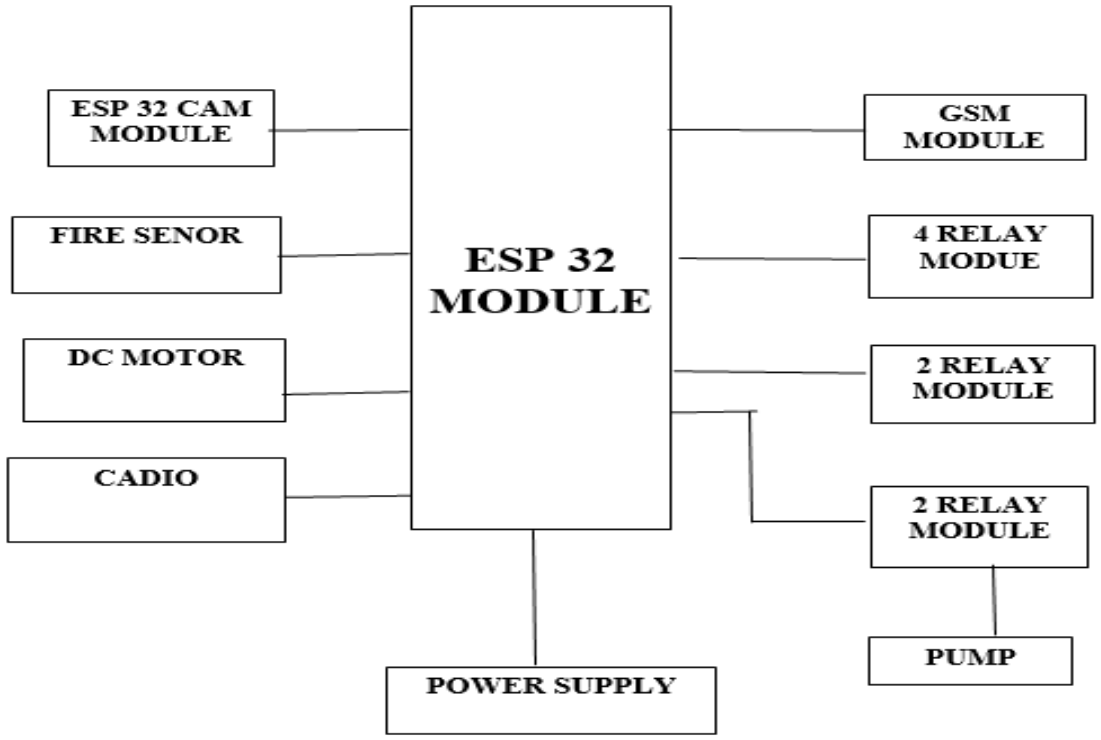

FIG.2: BLOCK DIAGRAM FOR PROPOSED SYSTEM

Block diagram description:

Fire Detection System:

- Sensors such as temperature sensors, are used to detect the presence of fire.
- When fire is detected, the system activates the firefighting mechanism.

Automatic Firefighting Mechanism:

- This includes components such as water tanks, pumps, and nozzles.
- When activated, the system sprays water or fire-retardant chemicals to extinguish the fire.

SMS Alert System:

- Upon fire detection, the system sends an SMS alert to predefined phone numbers.
- It uses a GSM module to send text messages.

Manual Controlling Mode:

- Allows manual control of the robotic vehicle by an operator.
- This can be done via a remote-control unit or a dedicated control panel.

Camera System:

- A camera is mounted on the robotic vehicle to provide live video feed of the fire scene.
- The camera feed can be accessed remotely for real-time monitoring and decision-making.

Power Supply:

- Provides power to all components of the system, including motors, sensors, and communication modules.
- May include rechargeable batteries or an external power source.

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Overall, this system provides an efficient and effective means of reducing fires, combining automatic functionality with human oversight and intervention capabilities

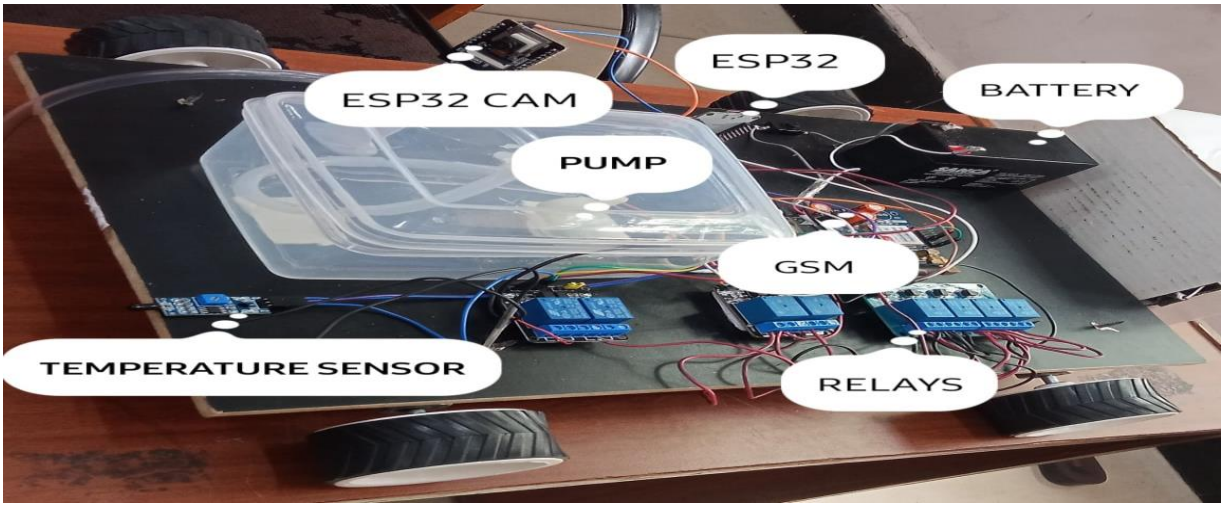

FIG.3: ROBOTIC VEHICLE

RESULT ANALYSIS

The automatic fire-fighting robotic vehicle with SMS alert and manual control mode is an advanced solution to reduce fires. With its sensors, it can detect fires, while the SMS alert system notifies people about the situation.

MANUAL CONTROLLING: The manual control mode allows for remote operation, giving firefighters more flexibility. The integration of a camera into the automatic fire-fighting robotic vehicle. By using cadio app the directions are given to the robotic vehicle.

SMS ALERT: Alongside SMS alert and manual controlling modes, marks a significant advancement in fire emergency response systems. When a fire is detected then SMS should be sent to the registered numbers.

EXTINGUISHING FIRE: The fire should be extinguished when the fire is detected, by using the water pump the fire is reduced.

By combining automatic navigation with real-time visual monitoring capabilities, this system not only detects and suppresses fires promptly but also provides crucial situational awareness to people. Overall, a fire-fighting robot that can be controlled from some distance has been successfully developed. It has advantageous features such as ability to detect location of fire automatically besides having a compact body and lightweight structure.

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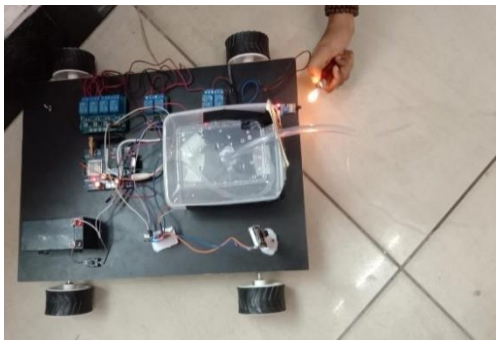

FIG.4: EXTINGUISHING FIRE

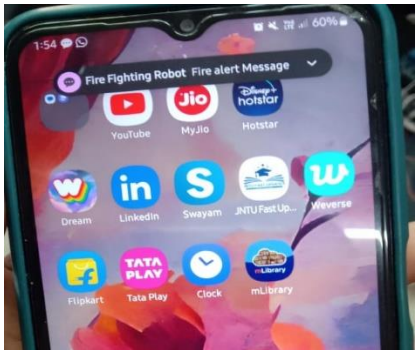

FIG.5:SMS ALERT ABOUT FIRE

FIG.6: MANUAL CONTROLLING

CONCLUSION

The development of an Automatic Fire-Fighting Robotic Vehicle with SMS Alert and Manual Controlling Mode represents a significant advancement in fire-fighting technology. This innovative solution integrates robotics, remote communication, and manual control capabilities to enhance fire response efficiency and effectiveness.

Overall, the Automatic Fire-Fighting Robotic Vehicle with SMS Alert and Manual Controlling Mode presents a comprehensive solution to mitigate fire risks effectively. Its integration of advanced technologies not only improves response times and accuracy but also enhances safety for both responders and civilians. As fire incidents continue to pose significant threats to communities, the development and implementation of such innovative solutions are crucial steps towards bolstering our collective fire-fighting capabilities and safeguarding lives and property

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