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AUTOMATED FIRE FIGHITING ROBERT SYSTEM

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ABSTRACT—

An automated firefighting robot system is intended to effectively detect and put out fires. The robot can locate fire sources, evaluate risks, and apply extinguishing agents thanks to its sophisticated sensors, AI-powered navigation, and fire suppression systems. By functioning in hazardous settings like residential neighbour hoods, industrial sites, and emergency situations, it improves safety. The system guarantees efficient fire management, cuts down on response time, and lowers human risk. It is a dependable and creative solution for disaster prevention and emergency response operations because of its autonomous mobility and real-time data processing, which enable it to adjust to different fire scenarios.

Keywords : Automation, Fire Detection, Sensors, Emergency Response, Fire Suppression, Mobility, Safety, Industrial Application, Real Time Processing.

I . Introduction

An automated fire fighting robot system, which can identify, assess, and put out fires. These robots effectively navigate dangerous environments, locating fire sources and deploying suppression mechanisms by utilizing sophisticated sensors, artificial intelligence, and autonomous mobility. By lowering human exposure to hazardous situations, guaranteeing prompt emergency response, and enhancing fire management in commercial, residential, and industrial settings, they improve safety. Firefighting robots, outfitted with adaptive algorithms and real-time data processing, offer a dependable, effective, and intelligent method of disaster prevention. An important step toward more intelligent emergency solutions is their incorporation into contemporary safety procedures.

II. Literature survey

Developments in fire detection, suppression, and autonomous navigation technologies are examined in a literature review on automated fire fighting robot systems. Research emphasizes the use of autonomous mobility, thermal and smoke sensors, and artificial intelligence to improve the effectiveness of fire response. Water, foam, and gas-based extinguishers are among the suppression techniques that researchers have studied and modified for robotic deployment. To enhance emergency response, contemporary methods emphasize adaptive decision-making and real-time data analysis. Reviews of the literature also go over applications in commercial, residential, and industrial settings, highlighting how automation can reduce human risk and enhance fire safety measures. These discoveries support continued advancements in robotic fire fighting.

III. EXISTING SYSTEM

An innovative firefighting robot system transforms fire response operations by combining automation, artificial intelligence, and cutting-edge sensors. It uses smoke sensors and thermal imaging to detect fires while navigating dangerous environments on its own. The system is outfitted with gas-based extinguishers, foam, or water-based adaptive suppression mechanisms to guarantee effective fire control. Fast decision-making, shorter reaction times, and increased safety are made possible by real-time data processing. It reduces human risk while enhancing disaster management and is intended for use in commercial, residential, and industrial settings. This game-changing system redefines firefighting efficiency by fusing state-of-the-art technology with quick intervention, offering a more intelligent and dependable emergency response option.

IV. PROPOSED SYSTEM

The suggested automated firefighting robot system combines adaptive suppression, autonomous mobility, and AI-driven fire detection. It quickly detects fire threats and applies extinguishing agents thanks to its thermal sensors and real-time analysis capabilities. This system, which is intended for both residential and commercial use, improves safety, reduces human risk, and guarantees effective emergency response.

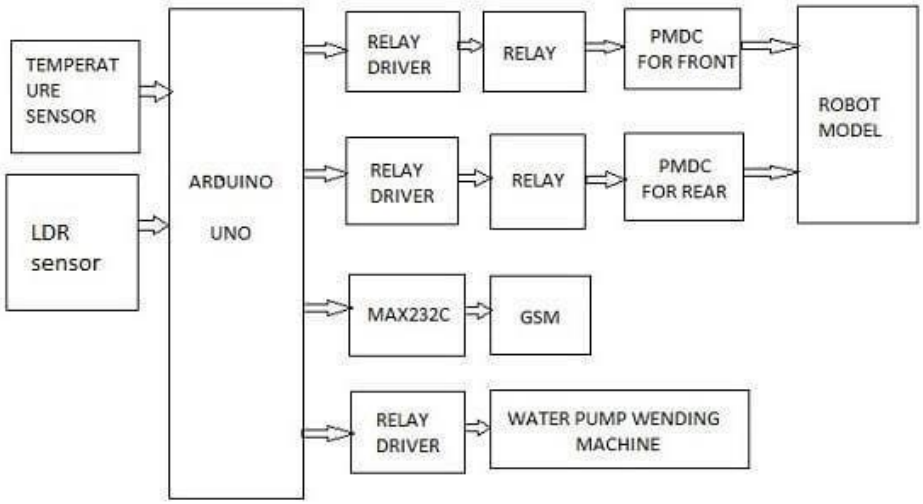


Fig.1 Block diagram

A.COMPONENTS USED

1. Temperature Sensor : A temperature sensor detects changes in ambient temperature and provides real-time data for monitoring and control. Common sensors include *DHT11* and *DS18B20*, which convert temperature variations into electrical signals. These sensors are essential for applications like fan speed regulation, environmental monitoring, and industrial temperature control.

2. Relay Driver : A relay driver is responsible for activating a relay when an external signal is received. It provides *isolation* between control circuits and high-power devices. *ULN2003* is a popular relay driver that ensures smooth switching of appliances without direct electrical interference.

3. Relay : A relay is an electromechanical switch used to control high-power devices such as motors, fans, and pumps. It operates by switching circuits *ON* or *OFF* based on control signals from microcontrollers. *Solid-state relays (SSR)* offer more efficient and noiseless operation compared to mechanical ones.

4. GSM Module : A *GSM module* enables wireless communication via cellular networks. Modules like *SIM800L* allow remote control, SMS-based notifications, and IoT device connectivity. These modules are crucial for IoT applications requiring *long-distance monitoring*.

5. Water Pump in Vending Machine : The *water pump* in vending machines ensures precise dispensing of liquids. Controlled by relays and microcontrollers, it automates the delivery of *water or beverages* while maintaining efficiency and accuracy.

6. 8 SWITCH MCB : For effective power distribution and circuit protection, an 8-switch MCB (Miniature Circuit Breaker) panel is used. Its eight separate switches enable control over various circuits while guarding against short circuits and overloads. It improves electrical setups' safety, dependability, and usability and is frequently utilized in homes and businesses.

7. Smoke Sensor : For effective power distribution and circuit protection, and the
8-switch MCB (Miniature Circuit Breaker) panel is used. Its eight separate switches enable control over various circuits while guarding against short circuits and overloads. It improves electrical setups' safety, dependability, and usability and is frequently utilized in homes and businesses.

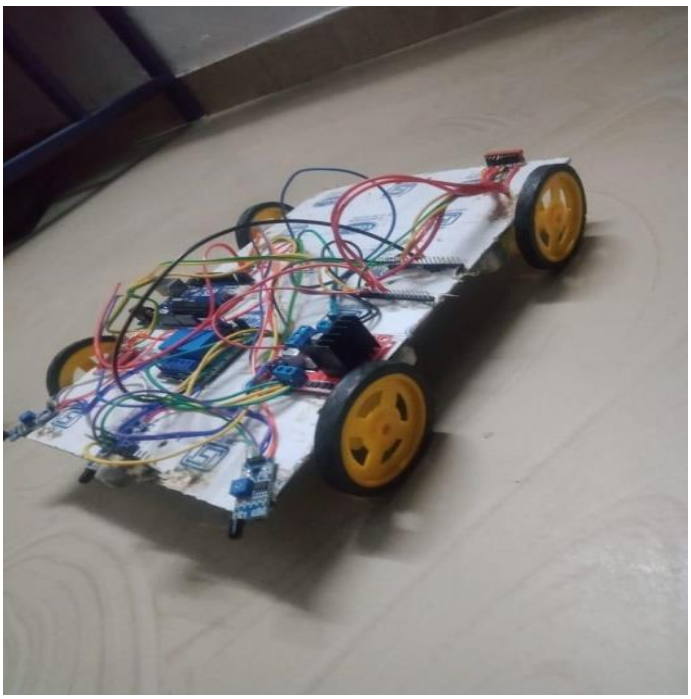
VI. RESULT AND CONCLUSION

RESULT :

The automated firefighting robot system efficiently detects fire hazards using smoke sensors and responds by activating water sprayers or CO_2 extinguishers. It moves toward impacted areas on its own, avoiding obstructions and guaranteeing prompt fire suppression. By minimizing human intervention, the system lowers risks in dangerous situations. The robot is a dependable fire emergency solution because of its real-time monitoring and alerts, which improve safety.

CONCLUSION:

For early fire detection and suppression, the automated firefighting robot system is a very successful solution. It lowers risks in hazardous situations by ensuring quick response to fire hazards without the need for human intervention through the use of smoke sensors, actuators, and automated navigation. The system is perfect for commercial, residential, and industrial settings because it quickly detects and puts out flames, increasing safety. Its decision-making abilities can be improved by upcoming developments in AI, IoT, and machine learning, which will optimize fire safety measures. This robot can become a vital disaster management tool by incorporating smart technology, preventing operational delays and safeguarding people and property.



Result 1

VI . REFERENCE

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