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IOT BASED FIRE FIGHTING ROBOT

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ABSTRACT

These days, fire mishaps are common, and it doesn't matter whether people are involved or not. Victims of fires may suffer irreparable harm, including death, destruction of property, and impairment of bodily functions. When putting out fires, firefighters face increased dangers; this is particularly true in potentially dangerous settings like nuclear power plants, oil refineries, petrol tanks, etc. Additionally, firefighters have additional challenges, particularly in confined spaces, where they must go through building rubble and overcome barriers in order to put out the fire and rescue the sufferer. When firefighting operations are fraught with peril, the fire brigade may rely on innovation for assistance. In the event that the robot senses fire, it will communicate with the nodeMCU, which will then start the water pump, update the data on the blynk server, and operate the robot. It aids firemen in putting out the blaze. Plus, it will carry out its activity in areas that are inaccessible to firemen. Doing so will prevent more harm and preserve the lives of firemen.

INTRODUCTION

In order to put out fires and preserve lives, firefighters must be experienced and trained to enter dangerous places. This is a risky and difficult work. To improve the security and effectiveness of firefighting operations, firefighting robotic vehicles have emerged as a potential alternative thanks to recent breakthroughs in robotics technology. Unmanned vehicles that are outfitted with sensors and firefighting gear may enter risky settings and carry out duties that would be too dangerous or complex for human firefighters. These vehicles are called firefighting robotic vehicles. These robotic devices may be operated remotely and are frequently furnished with firefighting tools. The ability of robotic firefighting vehicles to enter dangerous settings without

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endangering the lives of human firefighters lowers the possibility of injury or death. This is one of the key benefits of these vehicles. Robotic systems can also work continuously for extended periods of time without stopping or resting, which is useful in circumstances where time is of the importance. To sum up, robotic firefighting vehicles provide a viable way to improve the security and effectiveness of firefighting operations. These systems are anticipated to grow increasingly complex, adaptable, and efficient in solving the issues encountered by firemen in hazardous areas as robotics technology continues to progress.

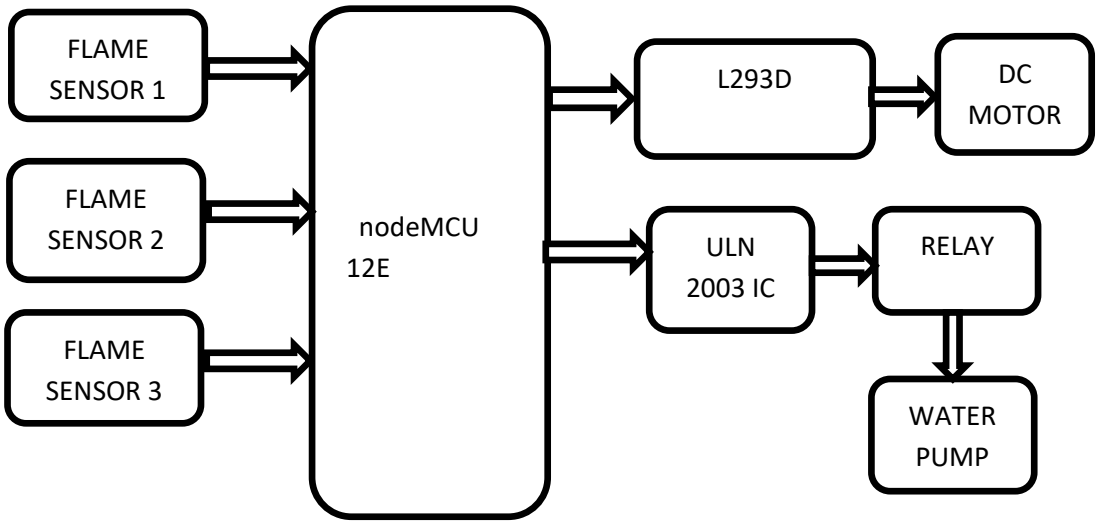

Figure.1 Block diagram

OBJECTIVE OF THE PROJECT

The objective of this project is to mitigate the risks associated with fire incidents by deploying an innovative solution that utilizes robotics and IoT technology to assist firefighters in extinguishing fires. With fire accidents becoming increasingly common, whether caused by human intervention or natural factors, it is imperative to enhance the capabilities of firefighting teams while reducing their exposure to dangerous environments.

Specifically, the project aims to achieve the following objectives:

Develop a robotic system capable of detecting fires autonomously in various environments, including hazardous locations such as nuclear power plants, petroleum refineries, and gas tanks.

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Integrate IoT technology, specifically nodeMCU and Blynk server, to enable real-time communication and data updates when a fire is detected. This includes transmitting fire alerts to firefighting teams and controlling the robotic system remotely.

Implement functionality within the robotic system to navigate and maneuver through small, cramped areas and obstacles commonly encountered during firefighting operations. This includes exploring building ruins and overcoming high barriers to access fire-affected areas.

Enable the robotic system to initiate firefighting measures autonomously upon detecting a fire, including activating a water pump to extinguish the flames effectively.

Enhance the safety of firefighters by deploying the robotic system in scenarios where human intervention is limited or poses significant risks. This includes situations where access is restricted or the environment is too hazardous for human entry.

Minimize property damage and loss of life by providing timely and efficient firefighting support through the use of innovative robotics technology.

LITERATURE SURVEY

1.Introduction to IoT in Fire Fighting:

Start by understanding the application of IoT in fire fighting and the need for advanced technologies to improve response time and safety.

Explore literature that introduces the concept of IoT-based fire fighting robots and their potential to assist firefighters in hazardous environments.

2. Design and Architecture of IoT-Based Fire Fighting Robots:

Investigate research papers and articles that discuss the design principles and architecture of IoT-based fire fighting robots.

Look for studies that describe the integration of sensors, actuators, microcontrollers, communication modules, and AI algorithms to enable autonomous operation and real-time data transmission.

3. Sensor Technologies for Fire Detection and Monitoring:

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Review literature on the sensor technologies used in IoT-based fire fighting robots for fire detection and environmental monitoring.

Explore studies that discuss the deployment of sensors such as thermal imaging cameras, gas sensors, smoke detectors, and temperature sensors to detect and assess fire hazards.

4. Autonomous Navigation and Mapping:

Examine research papers and articles that explore autonomous navigation and mapping techniques for fire fighting robots.

Look for studies that discuss the use of SLAM (Simultaneous Localization and Mapping) algorithms, LiDAR sensors, and computer vision systems to enable robots to navigate complex environments and create 3D maps of fire scenes.

5. Fire Suppression Mechanisms:

Investigate literature on the mechanisms used by IoT-based fire fighting robots to suppress fires.

Explore studies that discuss the deployment of water cannons, foam sprayers, extinguishing agents, and other suppression methods controlled remotely or autonomously by the robot.

PROPOSED SYSTEM

This project differs from existing firefighting solutions by combining robotics, IoT technology, and autonomous capabilities to detect and extinguish fires in hazardous environments. Unlike traditional methods reliant on manual intervention, this system operates independently, minimizing risks to firefighters and enhancing efficiency in firefighting operations, especially in inaccessible or dangerous areas

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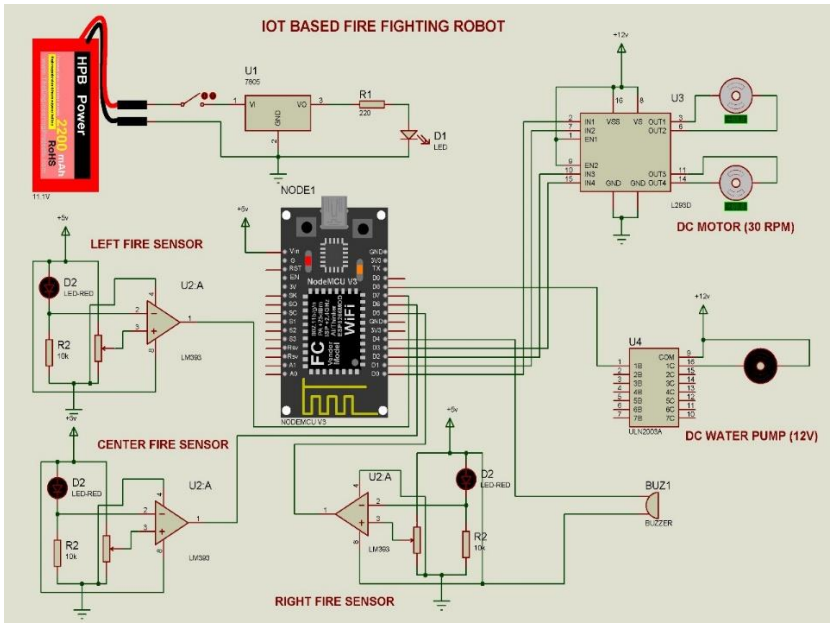

Figure.2 Schematic Diagram

RESULTS

Figure.3 Components

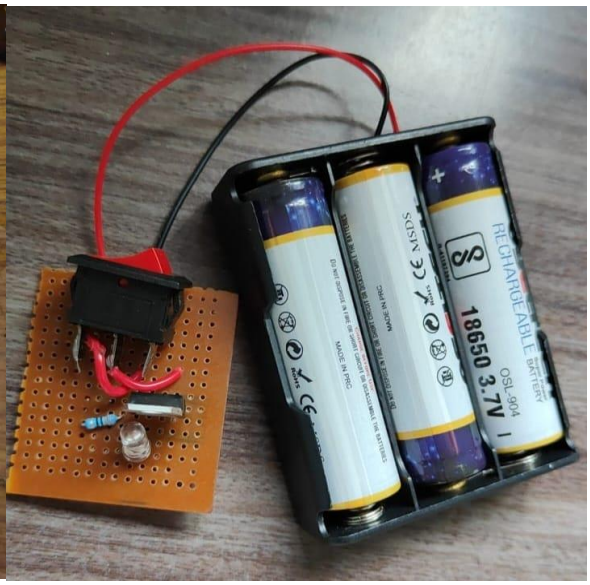

Figure.4 Power Supply

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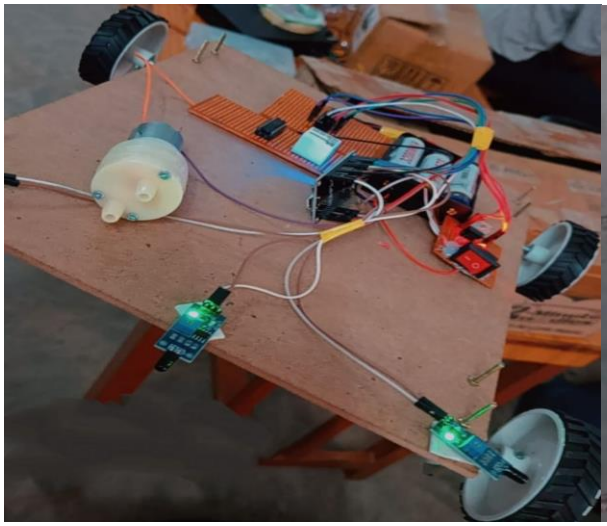

Figure.5 Robotic design

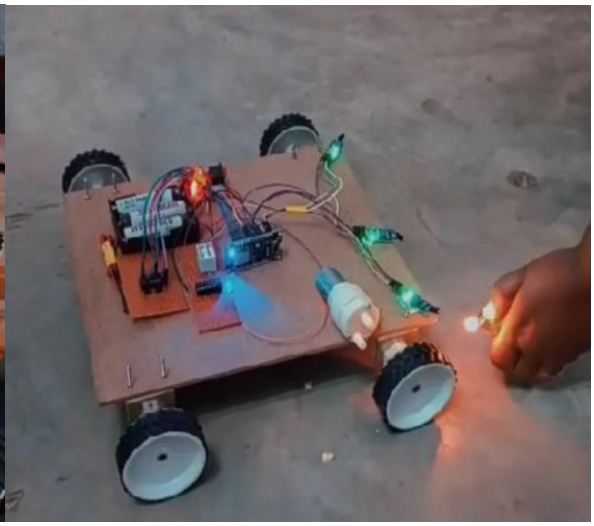

Figure.6 Practical working

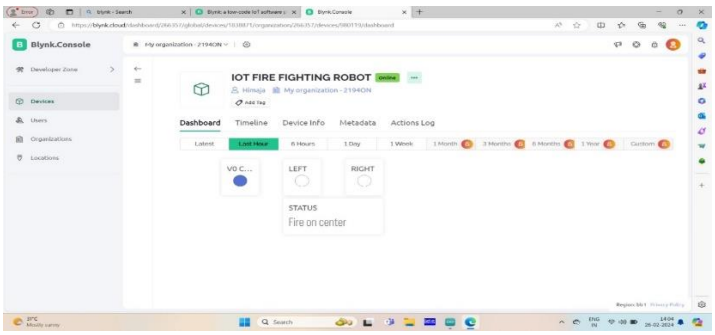

Figure.7 Status Fire on center

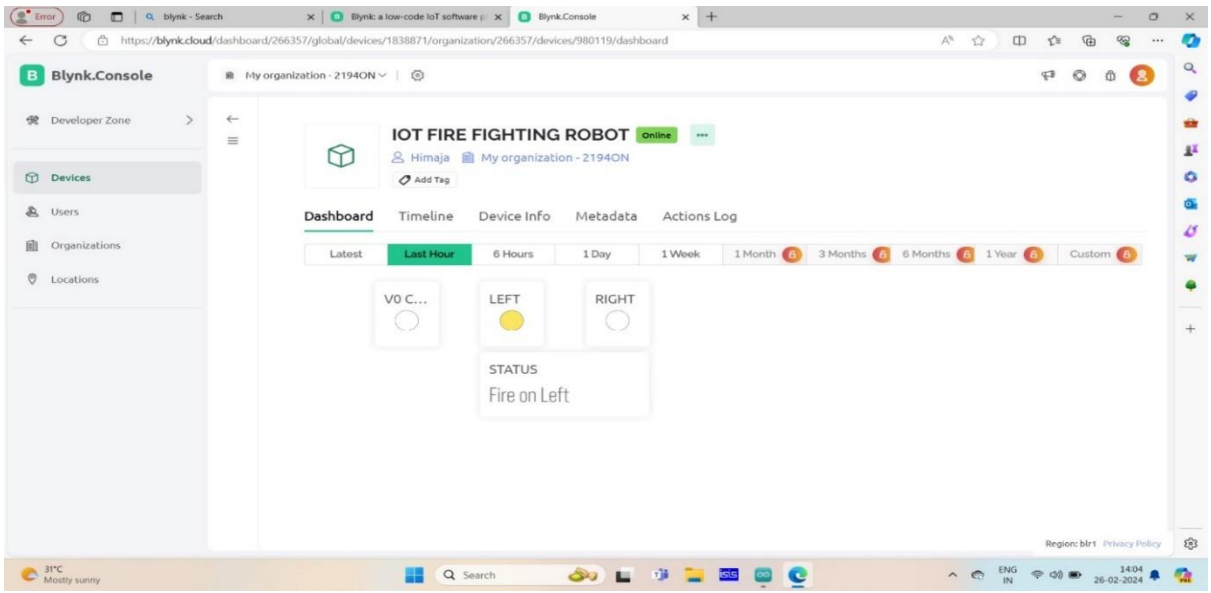

Figure.8 Status Fire on Left

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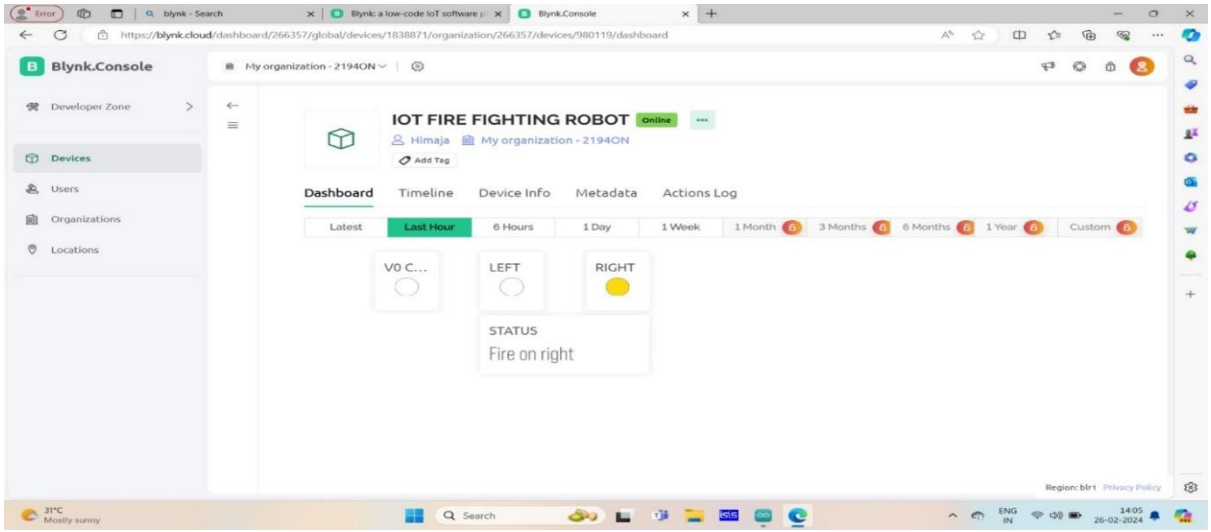

Figure.9 Status Fire on Right

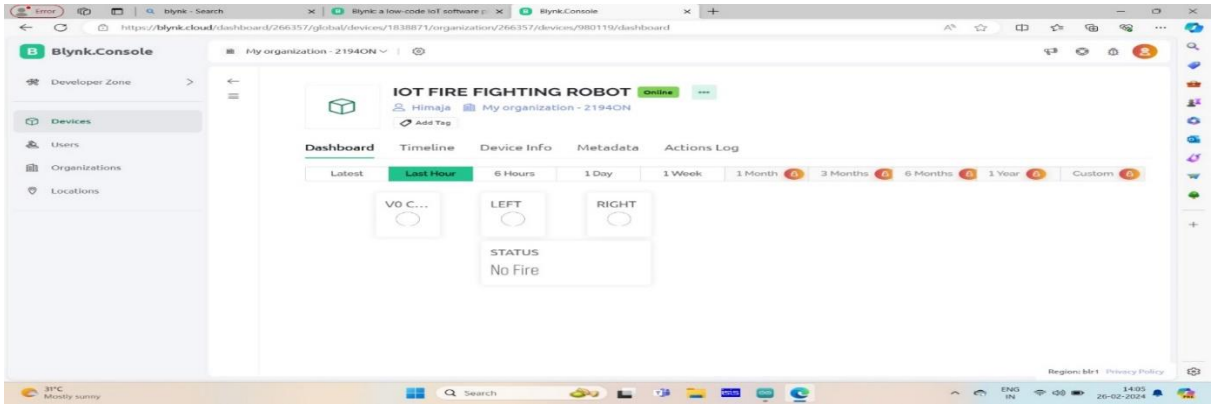

Figure 7.8 Status No fire

CONCLUSION

Ultimately, our firefighting truck has taken a giant leap ahead in terms of capabilities thanks to the integration of modern technologies like the nodeMCU, flame sensor, DC water pump, and the Blynk server. Our vehicle provides improved reactivity and efficiency in firefighting by using the Internet of Things (IoT) and real-time data transfer. You may remotely operate and monitor the vehicle's capabilities thanks to the nodeMCU's smooth communication and control. By detecting fires early, a flame sensor improves safety and allows for effective risk mitigation via fast response. In addition, a DC water pump is built in to make sure there's always water for fighting fires, and data can be sent to the Blynk server for full analysis and strategy optimisation.

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