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A Review on Fire Fighting Robot

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Abstract - *Firefighting has been a traditionally dangerous occupation, and a lack of technological innovation has resulted in many and many losses. In addition, current fire-fighting techniques are ineffective and ineffective, relying too much on people who, no matter how well trained, can make mistakes. The use of robots instead of humans to deal with fire hazards is a recent trend that has attracted attention. This is because they can be used in a situation that is too dangerous for anyone to get involved in. A fire can start in a factory or in a remote area for a variety of reasons. Leaks in electricity, for example, can cause serious damage to the cotton industry, the textile industry, and the petrol industry. In addition, it is a very serious condition, leading to significant financial losses and the destruction of nearby communities. Robots are a viable option to protect human life, prosperity, and the environment. The goal is to create a FIRE FIGHTING ROBOT utilizing an embedded system. It will be created and manufactured a robot capable of battling a simulated home fire. It must be able to travel a modelled floor layout automatically while aggressively scanning for a flame. Under addition, the robot may function asa path guider in regular circumstances and as a fire extinguisher in an emergency. The project will serve to create interest and creativity in the domains of roboticswhile working toward a practical and attainable result to save lives and reduce property danger.*

***Key Words**: Arduino, Flame Sensor, Ultra Sonic Sensor, L293Motor Driver.*

1. INTRODUCTION

A robot is a machine that performs tasks normally assigned to humans or machines and is charged with a series of repetitive or dynamic behaviors. Numerous studies have shown that robots can be effective in medical, rehabilitation, rescue, and industrial settings. Robots have been used in many industries over the years. Industrial robots are manipulators with several functions. is intended to perform a wide range of functions on specific objects, partitions, gadgets, or devices using a variety of system functions. According to the Fourth Industrial Revolution (4IR), there is a need for a single system that can operate, connect, and integrate multiple types and specifications of robots. Machine learning has also aroused interest in robots, yet accounting for only a small part of the current growth of robots. A recent robot development project has integrated machine learning algorithms to increase robot intelligence. This will improve industry productivity while reducing costs as well electronic waste in the long run.It is suggested that a fire engine be developed. The main role of this robot is to transform it into a self-help vehicle that can search and extinguish fire. There are various vehicles available to fight domestic and forest fires. Our proposed robot is designed to be either automatic or remote controlled. Using such robots, fire detection and rescue operations can be performed with better security and without compromising the safety of firefighters. Using such robots, fire detection and rescue operations can be performed with great security, without putting firefighters at risk. To put it another way, robots can reduce the need for firefighters to get into potentially dangerous situations. In addition, the size of a small robot and independent controls allow it to be used in the event of a fire in tight and tight spaces with dangerous areas, such as tunnels or nuclear power plants.

2. LITERATURE REVIEW

Among those involved in the project were Hossain, Md Anowar, Himaddri Shakhar Roy, and others. [1] The Automatic Fire Extinguisher Robot is a hardware-based device designed to move in the direction of fire power. The robot's shield is made of calcium silicate boards that can withstand temperatures up to 300 ° C. The ends of the thermocouple are heated to a reduced temperature when the robot begins to respond to fire. The robot is used in rescue efforts during a fire when there is little chance that the military will be able to reach the affected areas. This Robot has the advantage of being able to OPEN automatically as it detects the surrounding fire, uses a thermocouple, attempts to extinguish the fire by moving through the fire. As a backup to Thermocouple, a temperature sensor is used. To pump water, IC741 is used both as an amplifier and a simulator, in combination with a thermocouple and a water pump. Robotic movement is expected using a barrier and a sensor. The image is captured and processed with the help of MATLAB.

Hemalatha K N [2], Pramod B N IoT-based robot is designed to support firefighters in critical situations. A fire sensor is used to detect the presence of a fireplace. The presence of flammable gases is detected by a gas sensor. Human presence is verified by the Passive Infrared Sensor. Temperature sensor transmits temperature and humidity.

The main advantage of this project is that the robot can operate on both manual and independent control systems. An IoT-based communication system is used to monitor the affected area via Wi-Fi, and detailed functions of each module are also discussed. All data is transferred to a cloud server for further analysis. Based on its performance, it has been thoroughly tested. In an emergency, do your best to put out the fire.

Sreesruthi, Ramasubramanian, Senthil Arumugam Muthukumaraswamy,[3] et al., the ability to provide, and a single Android phone The server is designed to manage the robot on a web page and is able to monitor different web server settings. The video streaming robot will continue to take pictures with the Android phone camera. The temperature sensor will be used by a temperature monitor to monitor the temperature. In addition to rising temperatures, fires are detected using a smoke sensor. The IR sensor detects obstacles in the path of the robot. All data from the robot is delivered to the Android phone via a Bluetooth module connected to the controller, and later to a web server via remote control via a web browser. Adjustable firefighting system with small controller introduced. Test results have shown that a small controller may be the most reliable tool for controlling an institutional device.

Mittal, Shiva, Manish Kumar Rana, and others. [4] A fire engine was created to help firefighters in real-time emergencies. The robot can extinguish the flames with water and carbon dioxide sprays and protect itself from heat using fog sprays. The study culminated in the successful development of a robot that can function as a fire extinguisher and remotely control a wireless communication channel. For guidance, the robot has a lot of control, control, and weight with a lot of torque. Several tests were performed to test the mechanical design and adequacy and performance of the robotic software. Our robot has responded as predicted in all experimental cases, demonstrating its ability to handle real world conditions successfully. Cease Fire has tanks that pump water and CO2 into it and spray it into the fire. The remote control uses a transceiver that provides the maximum distance gain of up to 1.8 km with the appropriate note. The fire engine is designed to help firefighters reduce their risk of fire. It sends it to a fire extinguisher remote control, which may use an internal camera to monitor the situation. The robot's volume can be used by firefighters to communicate with victims trapped inside fire-damaged buildings. In the meantime, experiments were performed using deliberately generated flames, and the robot performed exactly as predicted. An effective robot response during fire simulations demonstrates its ability to perform with the same precision of real-world conditions.

[5] P. Anantha, Raj, and M. Srivani If the firefighting step is taken quickly, most fires do not cause significant damage. This article proposes to integrate an

independent fire extinguishing robot into a standard fire protection system Internet of Things (IoT) to perform a pre-fire extinguishing action. In the event of a fire, the IoT system sends an alert message to the fire

department and tells the moving robot to intervene. A fire robot uses a layout algorithm to get to the fireplace, performs firefighting tasks, and transmits the video feed to the fire station to the control center. A fire-fighting robot cooperates with fire by detecting, extinguishing, and alerting. The robot also connects to the outside world via live video and map view via Bluetooth. The disadvantage of this project is that the robot does not behave intelligently after reaching a certain destination. Incorporating computer vision and machine learning into robot intelligence will help identify the main fireplace. The main objective of this project is to improve the Internet of Things Robots that can take early action in the event of an industrial fire, thus avoiding major damage. Special machine learning and computer vision components, as well as additional sensors, may be added in the future to increase system efficiency. Fire alarm systems will be very helpful in improving the efficiency of the IoRT system.

Sampath, B. Swetha, [6] Fire-fighting robots are used in indoor areas to detect and extinguish fires. Fire sensors are currently used to detect fire in fire extinguishing robots. By using artificial intelligence techniques, fire can be detected over a wide range. Haar Cascade Classifier is a machine learning algorithm originally used for object detection. Transfer learning from a pre-trained YOLOv3 model was then used to train the fire detection model to improve accuracy. Haar Cascade Classifier is a machine learning algorithm that can be used to find objects in photos, video and camera server. Learning-based algorithms can also be used to classify images for objects. The camera is positioned low, with a horizontal angle of 90 degrees. The disadvantage of this project is that the robot does not behave intelligently after reaching a certain destination. Incorporating computer vision and machine learning into robot intelligence will help identify the main fireplace. The main objective of this project is to improve the Internet of Things Robots that can take early action in the event of an industrial fire, thus avoiding major damage. To improve system performance, machine learning and computer vision components, as well as additional sensors, may be integrated in the future. Fire learning software techniques will be of great benefit in improving the efficiency of the IoRT system.

Mohd Aliff, M. Yusof, Nor Samsiah Sani, and others. [7] A fire is a catastrophe that can lead to loss of life, destruction of property, and permanent damage to a patient's life. Firefighters are primarily responsible for firefighting, although they are often the most vulnerable. As a result, the study explains the creation of the QRob, a fire-fighting robot capable of extinguishing a fire without putting firefighters in danger. The QRob is also equipped with an ultrasonic sensor to prevent it from colliding with any obstructions or objects nearby, as well as a fire detection sensor. Both sensors are connected to the Arduino Uno, which controls the movement of a DC car. The QRob is set to detect the location of the fire and stand at a height of 40 cm from it. The human user can constantly monitor the robot through a camera connected to a smartphone or other remote device. Due to its compact design, the QRob robot may be rented in areas with small doors or small areas. The user can extinguish fires over a large distance by using a remote control. Users can also monitor ambient parameters throughout the firefighting process using a smartphone camera. According to research results, the robot can detect smoke and fire in just a short time.

Ting L. Chien, H. Guo, et al. [8] Personal health depends on the safety of one's home, laboratory, office, industry, and personal property. For us, we built a smart security system with multiple sensors that included a fire extinguisher robot. The fire engine is made of aluminum frame. The robot has a cylinder shape. The circle is around 50 cm, and the height is about 130 cm. Structure, obstruction and driving system, software development system, fire detection, remote monitoring system, and other systems including a fire engine. The fire detection mechanism for a fire extinguisher combines two fire sensors. Sensors are used in the fire detection system of fire extinguishers and software used in fire detection and combat methods. A low-cost

way to identify obstacles. The touch screen is used for personal machine interaction to display system status and standard user interface (GUI). The main controller

for a fire extinguisher is an industrial personal computer (IPC). Wireless RF controller, computer monitor, and user using a portable robot. In the future, a barrier detection module using an infrared sensor and an ultrasonic sensor with a novel fusion algorithm can be developed and used for a fire engine. Additionally, a laser distance finder can be integrated to obtain a more accurate and faster location map inside and out.

3. CONCLUSIONS

Accidents caused by fire can result in significant injury and property loss. This paper presents fire detection and extinguishment using autonomous robot, as well as a complete assessment of several fire-fighting robots. This will undoubtedly result in a better system for monitoring water quality, and the water resources can be rendered safe by fast action. Despite the fact that there has been numerous good fire- fighting devices, the research topic remains tough. This paper provides an overview of current research efforts by researchers to make fire-fighting robots smarter, less expensive and more efficient. The use of cutting-edge sensors for measuring various quality criteria as well as the usage of wireless communication standards for improved efficiency.

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