International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 11 Issue 4 ǁ April 2023 ǁ PP. 382-385

IoT based Fire Intimation and Fire Extinguisher Robot with Call & Messages Alert through GSM Sim Card

Rahul S[1], Shashank S[2], Aniket S[3], Kamlesh S[4], Yogesh S[5]
[1,2,3,4]*Student, Dept. of Mechanical Engineering, Bharat College of Engineering, Badlapur , Maharashtra, India*

ABSTRACT
A lack of technological innovation has led to many losses in the historically hazardous field of fire fighting. Additionally, the methods used to combat fires today are inefficient and rely too heavily on human beings, who are susceptible to error regardless of level of training. The use of robots rather than people to deal with fire threats is a recent development that has garnered interest. This is why they can be employed in a circumstance that is too risky for anyone to be present. Numerous factors might cause a fire to start, whether it is in a remote location or a facility. The cotton, textile, and petroleum industries, for instance, can suffer significant harm from electricity leaks. It is also a highly hazardous ailment that can destroy surrounding towns and result in major financial losses. Robots are a practical choice for safeguarding the environment, economic development, and human life. The objective is to use an embedded system to construct a FIRE FIGHTING ROBOT. A robot that can put out a fake house fire will be built and developed. It must be capable of automatically moving around a simulated floor pattern while actively looking for a flame. In addition, the robot can act as a fire extinguisher in an emergency and as a path guider under normal conditions. While working toward a realistic and attainable goal to save lives and lower costs, the project will serve to spark interest and creativity in the fields of robotics.
Key Words- *BU Motor, Gas Detector, Flame Sensor,*
Servo Motor, Water Pump, Arduino Uno Controller, GSM Sim, Motor Driver, Relay 5V, Battery, Wheels, Chassis Set, Wiring Lot, Water Storage Lot, Water Tube.

Date of Submission: 06-04-2023 Date of acceptance: 18-04-2023

I. INTRODUCTION

A robot is a piece of equipment that is programmed to engage in a number of dynamic or repetitive actions while carrying out tasks that are typically done by humans or other machines. Numerous studies have demonstrated the usefulness of robots in industrial, medical, rehabilitative, rescue, and other areas. Over the years, robots have been utilized in numerous sectors. Industrial robots are manipulators with a variety of uses. They are designed to carry out a broad range of tasks on certain objects, parts, tools, or devices employing a number of system functions. The Fourth Industrial Revolution (4IR) asserts that a single system is required to control, link, and integrate various robot types and specifications. 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 fire fighters. Such robots allow for the safe and secure identification of fires and execution of rescue missions without endangering human fire fighters. Alternatively, robots can lessen the need for firemen to enter potentially hazardous situations.

Additionally, a small robot's size and independent controls enable it to be employed in the event of a fire in confined spaces with hazardous environments, including tunnels or nuclear power plants.

Fire is one of the most dangerous emergencies that a storage facility, warehouse, any architectural construction can experience. In case of a fire, it's important for first responders to be as quick as possible and to know where the fire is. With the increasing use of IoT devices in buildings, it's natural to wonder how this technology could be used in the emergency response team. A fire detection robot has been developed that uses GSM signals to send notification alerts to the concern people related to that building when there is a fire. The robot will also send images of the scene to the authorities so that they can respond more quickly. This innovative project provides an improved way of notifying people inside a building in case of afire. By using GSM signals, the notification system is rapid and efficient. In today's world, almost everything is connected. From our cars to our smartphones, we rely on electronic systems to do our jobs. Unfortunately, these same electronic systems can

also pose a danger when they're not properly managed or monitored. In this paper, we will discuss one IoT-based issue - fire. Fire is one of the most common and deadliest disasters in modern society. Every year, fire kills more people than weapons accidents and car crashes combined. Fire emergency response requires personnel with specialized knowledge and equipment, which can be difficult to deploy in an emergency when distances are large and communication lines are blocked by smoke or flames. Thankfully, we have developed technologies that allow us to remotely control devices and warn people about emergencies. One such technology is IoT-based fire alarm system. With this system, fire fighters can directly receive alerts about fires from sensors installed throughout the building or area they are trying to contain. This system allows fire fighters to dispatch the correct amount of personnel based on the situation at hand. We hope this paper has illustrated the importance of IoT based fire alarm systems and demonstrated their usefulness in emergency response times. We believe that these systems will play an increasingly important role in disaster preparedness as our world becomes increasingly interconnected

II. LITERATURE REVIEW

Hossain, Md Anowar, Himaddri Shakhar Roy, and other people took part in the project. A hardware-based tool with the ability to move in the direction of fire power is known as the Automatic Fire Extinguisher Robot. Calcium silicate boards that can endure temperatures of up to 300 °C are used to make the robot's shield. When the robot starts to react to fire, the temperature at the thermocouple's ends is dropped. When there is minimal likelihood that the military will be able to access the damaged areas after a fire, the robot is deployed in rescue operations. This robot has the benefit of being able to OPEN automatically as it notices the nearby fire, uses a thermocouple to gauge its temperature, and makes an attempt to douse the flames by travelling across them. An alternative to the thermocouple is a temperature sensor. In conjunction with a thermocouple and a water pump, IC741 serves as an amplifier and a simulator. We anticipate robotic movement using a barrier and a sensor. MATLAB is utilized to capture and process the image.

[2], Hemalatha K N

An IoT-based robot named Pramod B N is intended to assist firemen in life-ordeath circumstances. The existence of a fireplace is determined using a fire sensor. A gas sensor can identify combustible gases when they are present. The Passive Infrared Sensor confirms human presence. Temperature and humidity are transmitted by temperature sensors. The robot's ability to function with manual and autonomous control systems is this project's key advantage. The impacted region is monitored via an IoT-based communication system, and the functions of each module are also outlined. All data is moved to a cloud server for additional analysis. It has undergone extensive testing based on how it performs. Try to extinguish the fire as best you can in an emergency.

[3] Senthil Arumugam Muthukumaraswamy,

Sreesruthi Ramasubramanian, and others.

The capacity to do so and one Android phone the server is intended to control the robot on a web page and has the capacity to keep track of various web server settings. The Android phone's camera will continue to be used by the video streaming robot to snap images. The temperature will be tracked using the temperature sensor by a temperature monitor. Fires are discovered utilizing a smoke sensor in addition to rising temperatures. The IR sensor locates obstructions in the robot's path. The Android phone receives all data from the robot through a Bluetooth module attached to the controller, and a web server is then accessed remotely through a web browser. Introducing a tiny controller-equipped adjustable fire fighting system. According to test results, a compact controller can be the most dependable device for controlling an institutional instrument.

[4] Manish Kumar Rana, Mittal, and Shiva among
Others.

A fire engine was developed to aid firemen in urgent situations. The robot can use fog sprays to shield itself from heat and water and carbon dioxide sprays to put out fires. The investigation resulted in the successful creation of a robot that can put out a fire and operate a wireless communication channel from a distance. The robot has a lot of control, control, weight, and torque for guidance. The effectiveness and functionality of the robotic software, as well as the mechanical design, were tested through a number of experiments. In every experiment, our robot has performed as expected, proving that it is capable of managing challenging situations. Tanks attached to Cease Fire allow for the injection of water and CO2 into the flames. The transmitter used by the remote control has a maximum distance gain of up to 1.8 kilometres with the right note. The fire engine is made to assist fire fighters in lowering their risk of starting a fire. It transmits it to a remote fire extinguisher control, which might watch the situation with an inside camera. Fire fighters can speak with people trapped inside burned-out buildings by using the robot's volume. While this was going on, tests were carried out with flames that were purposefully created, and the robot behaved as expected. Robot performance that is successful in fire simulations reveals its capacity to function with the same accuracy under real-world circumstances.

[5] Raj, M. Srivani, and P. Anantha

Most fires do not result in serious damage if fire fighting is done quickly. In order to undertake a pre-fire extinguishing activity, this article suggests integrating a standalone fire extinguishing robot into a traditional fire prevention system's Internet of Things (IoT). The IoT system notifies the fire department of a fire by sending an alert message. The moving robot to become involved and calls for department. Using a layout algorithm, a fire robot navigates to the fireplace, puts out fires, and sends the control center video stream from the fire station. Through detection, extinction, and notification, a fire fighting robot assists the fire. Live video and a map view are other ways that the robot communicates with the outside world. The robot's lack of cognitive behaviour once it has arrived at a certain location is a drawback of this project. Robot intelligence will help locate the main fireplace by incorporating computer vision and machine learning. This project's primary goal is to enhance Internet of Things robots so they can react quickly in the event of an industrial fire and prevent significant damage. To boost system effectiveness, new sensors and special machine learning and computer vision components might be added in the future. In order to increase the effectiveness of the IoRT system, fire alarm systems will be highly beneficial.

[6] B. Swetha, Sampath,

In indoor spaces, fires are found and put out using fire-fighting robots. At the moment, fire extinguishing robots employ fire sensors to find fire. Fire detection over a vast area is possible with the aid of artificial intelligence systems. A technique for machine learning called the Haar Cascade Classifier was first used to identify objects. Following that, the fire detection model was trained to increase accuracy using transfer learning from a YOLOv3 model that had already been pertained. In images, videos, and camera servers, objects can be located using the machine learning algorithm known as the Haar Cascade Classifier. To categories photos of things, learning-based algorithms can also be utilized. A 90-degree horizontal angle and low positioning define the camera's position. The robot's lack of cognitive behaviour once it has arrived at a certain location is a drawback of this project. Robot intelligence will help locate the main fireplace by incorporating computer vision and machine learning. This project's primary goal is to enhance Internet of Things robots so they can react quickly in the event of an industrial fire and prevent significant damage. Components for computer vision and machine learning, as well as new sensors, may be added in the future to enhance system performance. The IoRT system will function better because to the use of fire learning software approaches.

[7] Nor Samsiah Sani, M. Yusof, Mohd Aliff, and
Others

A fire is a tragedy that can result in human casualties, material loss, and long-term harm to a patient's life. Despite frequently being the most vulnerable, fire fighters are ultimately in charge of putting out fires. The research justifies the development of the QRob, a fire-fighting robot that can put out a fire without endangering fire fighters. In addition, the QRob has a fire detection sensor and an ultrasonic sensor to keep it from running into any adjacent obstacles or objects. The Arduino Uno, which manages the motion of a DC automobile, is wired up to both sensors. When a fire is present, the QRob is programmed to locate it and stand 40 cm away from it. Through a camera attached to a smartphone or other remote device, the human user can continuously see the robot. The QRob robot can be rented in locations with small doorways or spaces due to its compact design. Using a remote control, the user can put out fires from a far distance. Throughout the fire fighting process, users can use a smartphone camera to track ambient conditions. The robot can quickly detect smoke and fire, according to research findings.

[8] H. Guo, Ting L. Chien, et al.

The security of one's house, lab, workplace, place of business, and personal possessions affects one's health. For us, we created a sophisticated security system with many sensors, a robot fire extinguisher included. The fire engine's frame is built of aluminium. The robot is cylindrical in shape. The height is around 130 cm, and the circle is about 50 cm. The building, the driving and obstructing systems, the software development system, the fire detection system, the remote monitoring system, and other systems, such as a fire engine. Two fire sensors are combined in the fire detection system for a fire extinguisher. In the fire detection system of fire extinguishers and in the software used in fire detection and combat techniques, sensors are used. A cheap method of determining impediments the touch screen is utilized for personal machine contact to show system status and the common user interface (GUI). An industrial personal computer serves as a fire extinguisher's primary controller (IPC). Portable robot user, wireless RF controller, and computer display. The development of a barrier detection module for a fire engine that combines an ultrasonic sensor and an infrared sensor in the future is possible. To produce an inside-out location map that is more precise and quick, a laser distance finder can also be added.

III. CONCLUSIONS

Accidents brought on by fire can cause serious injury and property damage. In addition to a thorough evaluation of many fire-fighting robots, this paper discusses autonomous robots for fire detection and extinguishment. A better system for monitoring water quality will definitely arise from this, and prompt intervention can make the water supplies safe. Although there have been many effective fire fighting gadgets, the study issue is still difficult. This document gives a summary of the current research being done to improve fire-fighting robot intelligence, cost, and effectiveness. The application of cutting-edge sensors to measure various quality parameters and the use of wireless communication standards to increase productivity.

REFERENCES

[1]. Hossain, Md Anowar, Himaddri Shakhar Roy, Md Fazlul Karim Khondakar, Md Hasib Sarowar, and Md Azad Hossain line. "Design and Implementation of an IoT Based Fire fighting and Affected Area Monitoring Robot." In 2021 2nd International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST), pp. 552-556. IEEE, 2021.

[2]. Pramod, B.N., K.N.Hemalatha, B. J. Poornima, and R.Harshitha. "Fire Fighting Robot." In 2019 International Conference on Information and Communication Technology Convergence (ICTC), pp. 889-892. IEEE, 2019.

[3]. Ramasubramanian, Sreesruthi, Senthil Arumugam Muthukumaraswamy, and A. Sasikala. "Fire Detection using artificial intelligence for fire- Fighting robots." In 2020 4th International Conference on Intelligent Computing and Control Systems (ICICCS), pp. 180-185. IEEE, 2020.

[4]. Mittal, Shiva, Manish Kumar Rana, Mayank Bhardwaj, Meenakshi Mataray, and Shubham Mittal. "Cease Fire: the fire fighting robot." In 2018 International Conference on Advances in Computing, Communication Control and Networking (ICACCCN), pp. 1143-1146. IEEE, 2018.

[5]. Raj, P. Anantha, and M. Srivani. "Internet of Robotic Things based autonomous fire-fighting mobile robot." In 2018 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), pp. 1-4. IEEE, 2018.

[6]. Sampath, B. Swetha. "Automatic fire extinguisher robot." In 2011 8th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), pp. 215-218. IEEE, 2011.

[7]. Aliff, Mohd, M. Yusof, nor Samsiah Sani, and Azavitra Zainal. "Development of fire fighting robot (QROB)."Development 10, no. 1 (2019).

[8]. Chien, Ting L., H. Guo, Kuo L. Su, and Sheng V. Shiau. "Develop a multiple interface based fire fighting robot." In 2007 IEEE International Conference on Mechatronics, pp. 1-6. IEEE, 2007.