



FIRE FIGHTING ROBOT

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ABSTRACT

Fires can be terrible, causing both material and human casualties. It is essential to have effective firefighting measures in place to lessen these risks. One of the most recent advancements in firefighting technology is the firefighting robot.

Fires are extinguished by remote-controlled or autonomous machines known as firefighting robots in places where human firefighters cannot or shouldn't enter due to danger. These robots are equipped with cutting-edge sensors, cameras, and other firefighting tools, allowing them to manoeuvre through smoke and fire to locate and extinguish flames. One of the key benefits of firefighting robots is their ability to work in dangerous situations without risking human firefighters. They can be used, for example, in situations where chemical fires occur or in unstable constructions. The robots can be used in situations where there is a risk of explosion since they are outfitted with explosion-proof equipment.

Firefighting robots can be quite effective. They are less susceptible to heat and pollutants than people are, and they can operate continuously without becoming tired. As a result, they can extinguish fires more quickly and for a longer time. They may also be made to react to a certain type of flame and quickly adapt to changing conditions. There are several different types of firefighting robots available on the market. Some are made to work on the ground, while others are made to fly or even swim. The precise requirements of the firefighting operation will determine the kind of robot that is deployed. There are benefits and drawbacks to each form of robot.

For instance, ground-based robots work better inside than outdoors to put out fires than aerial robots do. Some robots include sensors that can gauge the fire's temperature, while others have cameras that can capture real-time footage of the flames.

Keywords: Firefighting, Robot.

Introduction

The lives of both firemen and people are at danger while carrying out the dangerous and important work of extinguishing fires. Although it is frequently argued that prevention is preferable to treatment, a fire may occasionally be unavoidable. In these situations, fighting the fire and reducing the harm done become imperative. Yet, battling fires is a dangerous job that should only be handled by trained experts. Robots are being created to aid firemen in their work in order to make it safer and more effective.

Robots that fight fires are made to assist firefighters with their duties and to operate in dangerous conditions. These robots are able to move across areas that are hazardous or challenging for people to access. Robots that battle fires are outfitted with sensors, cameras, and other devices that help them find fires, smoke, and other dangerous things. To find hotspots and monitor fire growth, they can also employ thermal imaging. Firefighters have the option of remote control or independent operation of the robots.

The ability of firefighting robots to penetrate dangerous locations without endangering the lives of firefighters is one of its main advantages. To acquire information, evaluate the situation, and even put out flames, these robots are capable of entering burning buildings, chemical plants, and other hazardous sites. They have foam or water dispensing equipment that they can employ to put out fires. Robots that combat fires are also capable of clearing obstructions, slamming doors, and looking for survivors, among other tasks. Some robots are even capable of lifting heavy objects and removing obstructions. Firefighters can employ firefighting robots to travel through hazardous conditions and perform their duties more effectively because of their qualities. Thermite RS3, a firefighting robot created by Howe and Howe Technologies, is one example. The robot can function in conditions with temperatures as high as 1200 degrees Fahrenheit and is equipped with a water cannon that can shoot water at a rate of up to 500 gallons per minute. The robot can climb stairs and fit into tight spaces thanks to its extremely agile design. Thermite RS3 can run for up to 90 minutes on a single charge and is remotely controlled.

The Colossus robot, created by the French business Shark Robotics, is another illustration. The robot has a water cannon that can spray water at a rate of up to 1300 gallons per minute and in conditions as hot as 500 degrees Celsius. Additionally, the robot is capable of negotiating obstacles including

stairs, rubble, and debris. In conclusion, firefighting robots are an important tool for firefighters since they may help in risky circumstances and reduce the damage brought on by fires. These robots are capable of navigating through dangerous situations, gathering data, and even putting out fires. Robotic firefighting will improve in capability and dependability as more sophisticated technology is developed, making firefighting safer and more effective.

Methodology

The security of a person's house, place of employment, factory, and other buildings is essential. We develop a smart multisensor security system with a robots fighting fires on a daily basis. The security system can identify unexpected and dangerous conditions and warn us. We first design a fire-fighting robot with an extinguisher for the intelligent building. Construction has begun on the fire-fighting robot's aluminium support frame. The robot is shaped like a cylinder.

The diameter is 50 cm, and the height is about 130 cm. A structure, an obstacle avoidance and driving system, a software development system, a fire detecting system, a remote supervision system, and other systems are among the six systems that make up the fire fighting robot. We design the fire detection system using two flame sensors from the firefighting robot.

Humans developed a fireman robot to protect human life because there are so many accidents that happen when putting out flames. This robot's main task is to locate fires autonomously and detect them so that water can be used to extinguish them from a safe distance.

This robot's movements and behaviour will be entirely under the direction of a programmed raspberry pi. This robot, which will resemble a car, will move to the right, left, front, and rear to find and extinguish the fire. Also, this firefighting robot will have an infrared camera and a thermal camera mounted on top of it. While infrared cameras are intended to make night vision photographs that can damage property and render the victim permanently disabled, thermal cameras are used to measure temperature and detect fire. Moreover, they could have ongoing both trauma and mental health. Fire crises are often handled by firefighters, although they frequently face more dangers when putting out fires, especially in risky places like nuclear power plants, oil refineries, and gas tanks. To put out the fire and save the victim, they must search through building debris and obstacles, which offers additional difficulties, particularly in cramped and compact locations. Due of the enormous risks and barriers associated with extinguishment operations, technological breakthroughs can be leveraged to aid in firefighting.

The development of the QRob firefighting robot, which can put out fires without putting fire personnel at unnecessary risk, is discussed in this study as a result. QRob is meant to be smaller than other conventional fire-fighting robots in order to more easily fit into confined spaces and reach deeper into the flames to extinguish it. QRob also contains a flame sensor that can detect fires and an ultrasonic sensor that guards against collisions with nearby objects and barriers. As a result, QRob was able to demonstrate its capacity to autonomously identify fire spots and remotely extinguish fires at particular distances. The QRob is designed to find the fire and stop up to 40 cm away from it. This study proposes an Arduino UNO microcontroller-based firefighting robot with three flame sensors. It automatically locates the fire and puts it out without the need for human participation. When a fire first ignites, the robot has a water ejector that may spray water. The water ejector pipe can be moved in the desired direction using a servo motor.

Results and Discussions

Remote control is possible for a built and planned tracked indoor firefighting robot. The robot features a robust thermal insulation system that keeps the temperature of the electronic components inside within a tolerable range when it is exposed to fire for 60 minutes at 700 degrees Celsius. The goal of our research is to create a constant-speed, real-time firefighting robot that can first locate a fire before extinguishing it with a pumping mechanism.

We have provided a multi-interface real-time monitoring system that can be applied to home automation. The home and building's security system is made up of a firefighting robot, security device, television, remote control computer, GSM modem, wireless RF controller, security modular, and appliance control modular. Industry PC serves as the primary controller for the robot that puts out flames.

The advancement of the fire robot's rescue helper system has allowed for remote control of information transmission.

Conclusion

There are several benefits to deploying robots in firefighting scenarios, and they have the potential to alter the way we put out flames. They can be used in locations where it is dangerous for people to enter, and they can work continuously for long stretches of time without needing to stop or rest. Also, they can collect information and give firefighters real-time information so that they can make better judgements on how to fight a fire.

Yet, even though firefighting robots have a lot of potential, some obstacles still need to be removed before they can be widely used. Ultimately, it is obvious that there is a great deal of potential for firefighting robots, but there is still work to be done before they can be employed frequently in firefighting scenarios. It is conceivable that as technology develops and advances, we will see more sophisticated robots that are better prepared to manage the difficulties of battling fires.

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