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Fire Fighting Rover Using Arduino with Fire Resistance

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ABSTRACT

A fire incident is a disaster that can potentially cause the loss of life, property damage and permanent disability to the affected victim. Firefighting is a momentous and perilous job. The fire has to rapidly & safely extinguish by a firefighter to prevent more damage and destruction. Fire detection and extinguishment are the hazardous job that invariably put the life of a fire fighter in danger. One of the most efficient tools for early extinguishing of fire is fire fighter Rover. In most of the Industries fire sensing is very essential to prevent heavy losses. Robots with this type of embedded systems can save life of Engineers in industrial sites with dangerous conditions. It is desirable to design a robot that can detect fire and extinguish the fire as quickly as possible. In this work, a novel fire fighting Rover with Arduino is presented. A novel Firefighting Rover is designed and built with an embedded system.

1. INTRODUCTION

Fire-Fighting is an extremely dangerous task but still often being performed by human operators, so putting human life, invaluable as it is, in a very hazardous situation. In Industry oil and many other inflammable materials are used for production and other industrial purposes. Under such circumstances the chance of fire accidents is more. So, a suitable preventive measure to extinguish the fire in case of fire accidents within the workplace should be employed. When a fire hazard appears inside the industry, the heat and temperature moderately increase and reach a peak which is very high enough to cause extreme damage. It is also dangerous for human beings to go near such a high temperature. Even a healthy man is susceptible to the toxic gasses carbon dioxide and carbon monoxide. Under such situations Rover can be used in a better manner to extinguish fire and to monitor the dangerous places.

The types of Fire that may occur in an industry can be Classified as under A: Class (Caused due to wood and wooden material) B: Class (Caused due to oil) C: Class (Caused due to fuel stored in tanks). In the grinding sector of an industry, unfinished metal goods are polished and ground.

More chances are there for the Circumstance of fire accidents in the section, due to the fire sparkles are produced while grinding metals, especially when the temperature of the sparkles exceeds 87°C. Because of flaws in the cables or the power line, the cables used in the Electrical sections also result in more dangerous fires. The system has the potential to significantly reduce the damage caused by fires and save lives. With further research and development, the Automatic Fire Extinguisher Rover Using Arduino could become a standard fire fighting solution in buildings around the world.

2. LITERATURE SURVEY

Abhilash Dhumatkar, Sumit Bhiogade (2021) worked on the "Automatic Fire Fighting Robot" project, handling the electrical thermostat technology for controlling the fire 24 hrs. The system is affordable, has many uses, and when put into practice, can provide positive and useful results. Synchronization of various machinery involved in the system i.e., water jet, wireless android device, Thermostat Sensor, and wireless remote WIFI enabled Camera. This is meant to affect the real-world operation of Rover performing a fire elimination function.

Fuzzy logic provided an applicable solution to the otherwise complicated task of mathematically deriving an exact model for the non-linear control system upon which conventional control techniques could then be applied.

Hemalatha K N, Pramod B (2021) Arduino-based Rover is designed to support fire fighters in important situations. A fire sensor is used to encounter the presence of a fireplace. The presence of flammable gases is encountered by a gas sensor. The Passive Infrared Sensor confirms that there are

humans present. Temperature sensor transmits humidity and temperature.

The major advantage of this project is that the Rover can handle both in dependent and manual control systems. An Arduino-based communication method is applied to monitor the affected area via Wi-Fi, and detailed functions of each component are also discussed. All data is shifted to a cloud server for further analysis.

Based on its performance, it has been tested in detail. In any difficulty, do your best to put out the fire. Kavitha. S (2021) presented a paper on the "Fire Fighting Robot" which constructed a model that was Among those involved in the project were Md Anowar, Himadri Shekhar Roy, Hossain, and others. The Automatic Fire Extinguisher Rover is a hardware-based device intended to move in the direction of firepower. Boards composed of calcium silicate, resistant to temperatures as high as 300 °C, make up the robot's shield. To pump water, IC741 is used both as a simulator and an amplifier, in combination with a thermocouple and a water pump.

3. PRE-PROCESSING TECHNIQUE

Detecting fire and extinguishing was a dangerous job for a fire extinguisher, it often risks the life of that person. The major part of the deaths was caused by toxic gases begin in the fire fighting environment. This project aims to give a technical solution to the specified problem. A Rover is a mechanical design that is capable of carrying out a complex series of actions automatically, especially one programmable by a computer. In this rapidly evolving technological age, the world is gradually moving toward automated systems.

4. PROPOSEDMETHODOLOGY

4.1 Summary of Proposed Work

In this project, the prototype robotic system was granted, which consists of several sensors utilized for various objectives, servo motors, a processor, and a communication module for exchanging data between the robotic system and the fire fighters. The main brain of this project is Arduino, but in order to sense fire we use the Temperature sensors and LDRs. These sensors are used to detect the fire. When fire burns it releases a small amount of Infra-redlight, this light was collected by the LDR on the sensor module. We will disclose the direction of the fire we can use the motors to approach the fire by driving motors through the L293D module. We must use water to put out fires when they are nearby. Using a small container, we can carry water, and a 5V pump was positioned in the container and placed on top of a servo motor so that the direction in which the water must be sprayed is something we can regulate. Exist method shown in Figure 1,

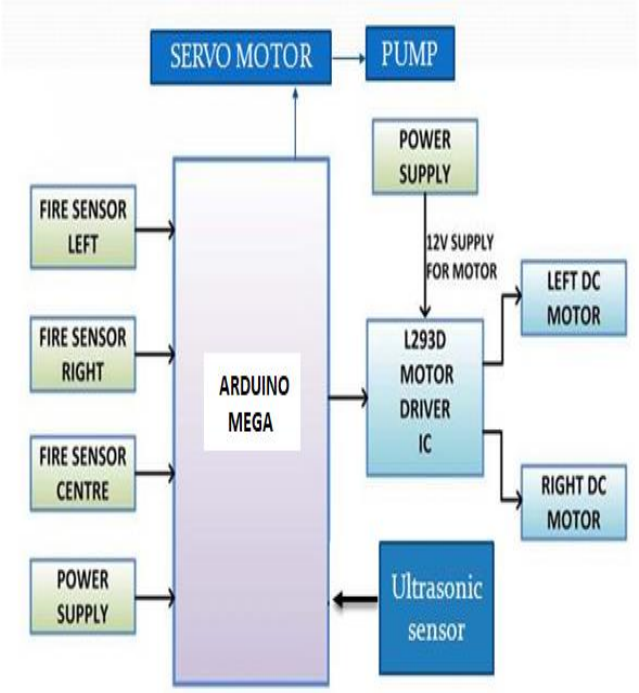

Fig. 1 Summary of proposed work.

4.2 Arduino Mega Board

The Arduino Mega is a microcontroller board based on the ATmega328. It has 14 digital output/input pins (6 can be used as PWM outputs), a 16 MHz ceramic resonator, 6 analog inputs, a power jack, a USB, an ICSP header, and a reset button. It includes everything needed to support the microcontroller; using a USB cord, attach it to a computer or power it with an AC-to-DC adapter or battery to get started. Revision 2 of the Mega board has a resistor pulling the 8U2 HWB line to the ground, making it easier to put into DFU mode. Revision 3 of the board has the following new attribute: 1.0 pin out: added SCL and SDA pins that are near the AREF pin and two other new pins placed near to RESET pin.

5. RESULTS AND DISCUSSION

The project firefighting rover was originated such that the rover can be operated using a smoke detection sensor, The temperature sensor detects the smoke and temperature and when the fire burns it emits a small amount of infrared light, this light will be received by the IR receiver on the sensor module. We locate the direction of the fire we can use the motors to move near the fire by driving our motors through the L293D module. When near a fire we suppress it by using water.

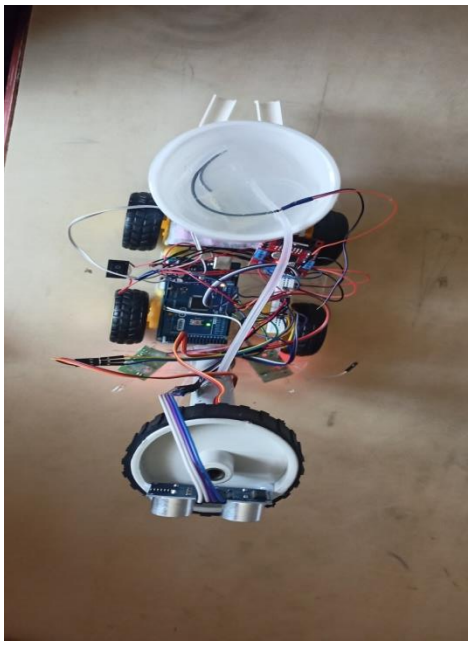

Fig. 3 Fire Fighting Rover Using Arduino

6. **Conclusion and Future Works**

6.1 Conclusion

The fire fighter Rover prototype had an effective design. This prototype can advance to its ability to be integrated with numerous sensors. The toolkit uses a photo diode to detect the infrared light that the fire emits and then sends a signal to the controller. In order to achieve faster results, we plan to expand this work to include a keypad that can be programmed to allow Rover to travel in the right direction with the assistance of a motor driver module and extinguish the flames using a water tank that is spun 90 degrees with the help of a servo. In addition to the characters, this future effort will investigate the usage of a long-range sensor in conjunction with appropriate technology to provide faster and better results.

6.2 Future Scope

The firefighter Rover prototype had an effective design. This prototype can advance thanks to its ability to be integrated with numerous sensors. The toolkit uses a photo diode to detect the infrared light that the fire emits and then sends a signal to the controller. In order to achieve faster results, we plan to expand this work to include a keypad that can be designed to permit Rover to travel in the right direction with the assistance of a motor driver module and use a water tank to put out the flames. that is spun 90 degrees with the help of a servo. In addition to the characters, this future effort will investigate the usage of a long-range sensor in conjunction with appropriate technology to provide faster and better results.

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