International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

ELSEVIER
SSRN

IJIEMR Transactions, online available on 18th Feb 2022. Link :http://www.ijiemr.org/downloads.php?vol=Volume-12&issue=Issue 02

DOI: 10.48047/IJIEMR/V12/ISSUE 02/45

Title **Automatic Fire Extinguishing Robot**

Volume 12, ISSUE 02, Pages: 294-298

Paper Authors

B. Anish, K. Eswar Sai Charan, B. Adithya Ranga Sai, YVD Dhanush, T.S. Praneeth Reddy, G. Dhanush, Dr . Nagendra Panini Challa

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

Automatic Fire Extinguishing Robot

[1]B. Anish, K. Eswar Sai Charan, B. Adithya Ranga Sai, YVD Dhanush, T.S. Praneeth Reddy, G. Dhanush, Dr . Nagendra Panini Challa
Department of SCOPE, VIT University -AP, India
Email: anishbattu1@gmail.com Abstract:-

Abstract
In the future, robots will take the place of people in situations where their lives are in danger. Our goal is to create a fire-suppression and detection robot. By creating and deploying a firefighting robot with an SMS notification. In some dangerous situations like fire accidents we use humans power to stop the fire and save the people in such situations there will be a lot of risk for the human beings even though they take the safety measures in the fire accidents there will be some situations which will be too risky . so our main motto is to use robots as fire fighters in the fire accidents instead of humans beings. In some situations in the house the children use to play with the fire match sticks due to their immature levels they will make it as an fire accidents in the homes or in their play time they bur the papers for the enjoyment purpose as the level of the burning starts though the children are immature they cant stop the fire in such cases it leads to the fire accidents any even the child will fell in the risky situation (or) in home some of the fire accidents will be taken place in the absence of the parents where the child cannot control the fire flames.

For all the problems in above lines there is a solution for it by introducing the fire fighting robot with the SMS alert and call alert. In the situation of the home fire accidents in the absence of the parents to stop the flames by the children he can use the robot by controlling the directions of the robot using mobile phone why because every child is aware of the controlling a toy car and the mobile phone the child can send the robot in the flames place after that the robot will automatically stop when the flame is detected by the flame sensors there by it will automatic starts pouring the water on the flames with control of the servo sg 90. There by the flames gets stopped by pouring the water on the fire flames there by an SMS alert and a call alert will send to their parents. Like this we can stop the fire accidents in the home using firefighting robot and SMS and call alert.

In some situations like building fire accidents we mostly use the man power to stop the flames but there will be an lot of risk even though they take the safety measures there will be a lot of risk like when the building gets fired the walls of the building will be too weak it may even fall on the people in such conditions we loose the fire victims and the people who came for helping they also fell in those risky situations. in such situations we use the robots.

Even in the forest fire accidents also we use the man power to stop the fire in the forest and to protect the forest animals in the forest while protecting the animals and the stopping the fire in the forest both at a time it is not possible because there are some animals in the forest like wild animals which makes the man power to fell in risky conditions in such situations we can use the fire fighting robots.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

Introduction:
The current craze is to tackle fire hazards using robots rather than people. With the help of an Arduino Uno microcontroller, we attempted to solve the issue of emergency fire extinguishment in this work. It will automatically identify a fire and, by hurling water at it, put it out until it has finished detecting the fire. At that point, it will send an SMS to the owner. This robot's design is straightforward, affordable, and portable, which makes it a strong contender for use in industry. The risk of endangering the lives of human fire fighters can be decreased by encouraging the deployment of this robot.

The project's main segments are those for fire detection, signal transmission from sensor to microcontroller, and signal transmission from microcontroller to motor driver IC to begin watering the plants.

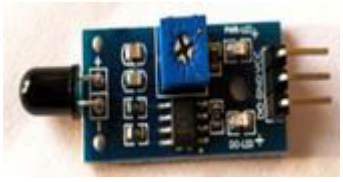

Fig-1: IR Sensor

Fig-2: Arduino Uno Rev3

Fig-3: SIM800L GSM Module

Fig-4: Dual Shaft Motor with Wheels

Background
Despite the risks of the profession, firemen selflessly fulfil a crucial function in their communities, and it is crucial for their safety. The future of firefighting is constantly changing, and new firefighting technology has improved firefighters' abilities to put out fires more successfully in a variety of circumstances while also helping to keep them safe. Firefighting robots are perhaps the most important and influential of these recent technological developments. Since they were initially made available by Howe & Howe Technologies, firefighting robots have revolutionised how fires of all kinds are put out.

Learning how to use the latest firefighting technologies is essential for anyone hoping to advance in the firefighting ranks.

An idea for a firefighting robot is put forth in the historical context. This robot's primary purpose is to become an unmanned support vehicle designed to look for and put out fires. A variety of vehicles are currently available for putting out residential fires and forest fires. Our suggested robot is made to be able to operate independently or under remote control. Such robots allow for the safer identification of fires and the rescue of trapped individuals without putting fire personnel in danger. Alternatively, automation can reduce the need for firemen to enter potentially dangerous situations. The robot can also be utilised when a fire breaks out in tight locations with dangerous surroundings, including tunnels or nuclear power plants, thanks

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

to its compact size and autonomous control.

The SMS alert utilising GSM module is a new addition to our firefighting robot thanks to technological advancements. When fire flames are detected, it notifies the owner. It also notifies the owner after the fire flames have been put out by pouring water on them.

Problem Definition:

Recently, extreme temperatures or the presence of explosive materials have made it occasionally difficult for firefighters to reach the scene of a fire, even when the fire results in significant property damage and human casualties. Fire-fighting robots can be helpful in such circumstances for putting out a fire. So, in locations where fire fighters are unable to work, fire-fighting robots are used. In addition, firefighting robots can be used to shield firefighters from the great peril associated with petrochemical, chemically harmful product, toxicity, or explosion fire mishaps. As a result, it can lessen the harm that a fire might cause to people.

Objectives

The main objective is state below:

• To construct a low-cost firefighting robot with controlled SMS.

• The objective of our suggested project is to create an android-controlled firefighting robot that can put out flames by way of autonomous handling.

The goal of this project is to create and test a robot that can efficiently replace a fireman in hazardous scenarios by putting out building and basement fires. Robotic firefighting systems are designed with certain tasks in mind. Among the responsibilities include analysing and locating flames, conducting search and rescue operations, monitoring dangerous situations, and carrying out the primary duty of controlling and suppressing fires.

Procedure

The Arduino serves as the project's primary brain, but the Fire sensor module is used to detect fire (flame sensor).

The IR Receiver (Photodiode) in these sensors is used to detect fires. A little quantity of infrared light is produced as a fire burns, and the sensor module's IR receiver can detect this light.

So that if a fire is detected, the output pin (DO) will give 0V (LOW), and if there isn't, the output pin will give 5V, we then use an Op-Amp to check for change in voltage across the IR Receiver (HIGH). We thus install three of these sensors in the robot's three directions in order to determine which way the fire is burning.

We thus install three of these sensors in the robot's three directions in order to determine which way the fire is burning.

By driving our motors through the L293D module, we can use the motors to move in the direction of the fire after determining its direction.

We must use water to put out fires when we are close to them. In order to manage the direction in which the water must be sprayed, a tiny container that can hold water is used. A 5V pump is also placed inside the container, and the entire assembly is then placed on top of a servo motor.

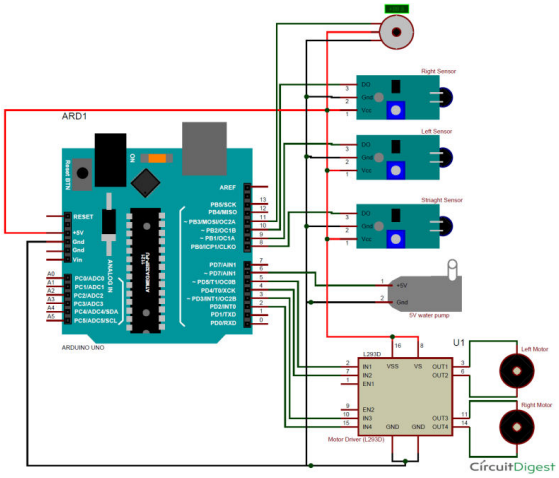

Fig-5: Circuit Diagram of the fire fighting robot

The complete working of the robot

When the robot is fully functional, the maximum distance at which a fire can be detected depends on the size of the fire; for a little matchstick, the distance is relatively closer while still alerting the owner through SMS call.

Our teammates main motto is making of an firefighting robot. the robot will detects the fire and takes place a action by pouring a water on that fire flames. For suppose if we face with an uncontrolled fire accident of two regions at the same time and same place my robot can not detect the flame of the size that on which region it has to pour water and stop the firing in such cases we are going to make our robot by instructing to make our robot to stop the larger flames of the regions.

By the development of the technology, we have added an extra component in our fire fighting robot that is the SMS alert using GSM module, it sends ethe message to the owner when the fire flames are detected and even it will send message to the owner after the stopping of the fire flames by pouring the water on it.

Results:

A firefighting robot has been created to locate the fire and put it out. The flame sensor, which is working to sense the location of the fire, can be used by the robot to locate the location. The Arduino UNO, which controls the movement of the DC motor, is connected to the sensor.

The DC motor stops 20 cm from the fire when the flame sensor detects it. By doing this, the servo motor reacts to the direction of the fire's flames and sprinkles water using a 5 volt motor pump that is controlled by a relay module.

The robot's distance from the fire source determines how long it takes to put out the flames. after extinguishing the fire's flames, sending an SMS alert.

Robot successfully locates the fire on its own and puts it out under operator direction. The distance between the robot and the fire determines how long it takes to put it out.

According to the experimental findings, it is evident that the longer it takes to put out a fire, the further away the robot is from it. To avoid the robot getting too close to the fire while still being able to quickly put it out, it is necessary to calculate the ideal distance between robot and fire for use in future planning. It will alert the home's owner through SMS once the fire flames have been put out.

Fig-6: Distance vs Time graph

Discussion

The development of firefighting robots is the main goal of this project. The robot control sequence will be covered in this section. According to the project's outcomes, which include the connecting of flame sensors:

1) Flame sensor Connection:

a) The robot will react both when the sensor activates and does not activate, as indicated by the robot's lack of response in both situations.

b) A DC motor is connected to this sensor.

c) When a fire was not present and the DC motor was on, this sensor was off.

d) This sensor was turned on when there was no fire and the DC motor was off.

When flame sensor = 1; DC motor = 0,

When flame sensor = 0; DC motor = 1

2) DC motor:

a) This motor is connected to an Arduino Uno and driver motor.

b) Flame Sensor OFF, this Motor ON.

c) When the Flame Sensor is ON, this Motor OFF.

When DC Motor = 1; Flame Sensor = 0.

When DC Motor = 0; Flame Sensor = 1.

Conclusion

Overall, the development of a remote-control firefighting robot has been successful. In addition to having a small body and a light structure, it includes advantageous features such the capacity to automatically detect the position of fire. The robot's diminutive form allows it to be deployed in places with narrow entrances and in cramped areas. After spotting the fire and notifying the owner, the operator

can put out a fire using a remote control at a further distance and send an SMS alert.

Future Scope

- The goal of the research is to create a system that can detect fires and act appropriately without the need for human interaction.
- This gives us the chance to assign robots jobs that were previously assigned to humans but were fundamentally dangerous to their lives.
- An obvious possibility for such automation is fire fighting.
- It can be improved by connecting it to a wire-free camera so that the person in charge can observe the robot's actions on a screen while operating it remotely.
- You can add a camera and a video transmission.

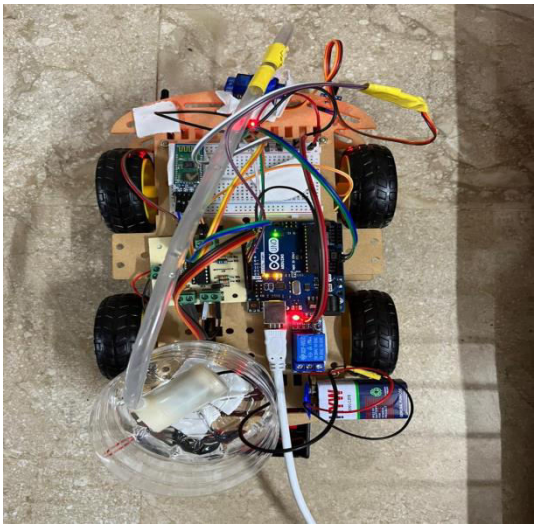

Fig-7: Design model of our project

References

[1] Kim, J.-H., S. Jo, and B.Y. Lattimer, Feature Selection for Intelligent Firefighting Robot Classification of Fire, Smoke, and Thermal Reflections Using Thermal Infrared Images. Journal of Sensors, 2016: p. 13.

[2] Tushar Nandkishor Satbhai, R.M.K., Anant Vijay Patil, Manish Patil, Fire Fighting Robot. International Journal on Recent and Innovation Trends in Computing and Communication (IJRITCC), 2016. 4(4): p. 799-803.

[3] J. Raju, S. S. Mohammed, J. V. Paul, G. A. John and D. S. Nair, Development, and implementation of arduino microcontroller based dual mode fire extinguishing robot, IEEE International Conference on Intelligent Techniques in