

A Novel Camera Based Mobile Robot With Obstacle Avoidance And Fire Extinguish Control

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ABSTRACT

The project is based on mobile wireless robot technology that performs the dual operation as obstacle avoidance and fire extinguish. The sensors used here are ultrasonic sensor for obstacle avoidance and flame sensor to detect the fire. Here, the signals are received by an Arduino board for controlling the robot. The motor drives are used to drive the robot. A wireless monitoring system is used to display the present scenario.in detail It is a robot that autonomously detects and extinguish fire. It uses flame sensor for detection of fire, also ultrasonic sensor to detect obstacles and Arduino board for processing. The Fire extinguisher along with actuator is used to extinguishing the fire which is been detected. The robot continuously scans for fire. This scanning is performed by Flame sensors placed on the sides When a fire is detected, it moves in the direction of fire and stops in front of it and trigger the extinguisher to turn out the fire.In order to achieve the extinguish process a robot has arm with **Electronic valve** and a motor is used along with the body to change the angle of the arm. This arm and motor can be controlled by the Arduino. The power source for the robot comes from a battery.

Keywords: Robotics,Arduino, Obstacle Avoidance, ultrasonic sensor, Flame sensor.

I. INTRODUCTION

There are many possibilities for fire accidents, it makes huge damages. Our paper describes the design of a “A NOVEL CAMERA BASED MOBILE ROBOT WITH OBSTACLE AVOIDANCE AND FIRE EXTINGUISH CONTROL” We worked on the project by deep study about the basics and working. The Fire Fighting Robot is designed to search for a fire in a place, extinguish the fire. When the robot enters into the location it starts navigating, locates the fire, crossing the obstacles and starts extinguishing it also in parallel it transmits the video feed to the remote station from where we can monitor the whole process. This overall task is splitted into smaller tasks, and each task is implemented in the most efficient manner such as camera of the robot, navigation of the robot in every place step by step, finds the fire in a specific room, approaches the fire at a very fixed distance, and extinguishes it.

II. PROBLEMS IN EXSISTING SYSTEM

We Cannot force the robot directly to work. The present condition it can extinguish fire only in the way and not in all the present area. The robot is slower as it moves by means of a robot chassis and also it is bulky as the pneumatic system using a compressed air cylinder

More weight Consuming more amp/hr so minimizes the life time of battery.Obstacle avoidance is hard.

Proposed System:

This robot mainly performs four operations, they are obstacle avoidance, fire extinguish, Manual control and wireless monitoring system.

Block Diagram:



Fig 1: Block diagram

III. BLOCK DESCRIPTION

Our block diagram consists of 9V battery, which is used to provide supply for the Arduino Uno board. The Ultrasonic sensor is used to find the obstacles and the signal is sent to the Arduino Uno. output from the Arduino Uno is given to the

motor driver as input. 12V battery provides the supply for the motor driver. The motor driver is used to drive the Dc gear motor. Two motors are used for the wheel arrangement. Flame sensor is used to detect the fire and gives the signal to the Arduino Uno, which controls the Extinguisher to put off the fire. The Bluetooth controller is used for manual controlling operation by using android application. Where wireless camera is used to show the present scenario.

1) Obstacle Avoidance

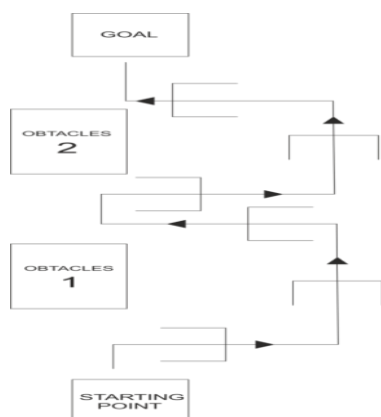


Fig 1: Obstacle avoidance operation

Obstacles are the main problem for the Robots. To avoid the obstacle's

In the way of robot, we are using ultrasonic sensors. The ultrasonic sensors are used to detect the obstacles. The ultrasonic sensor transmits the ultrasonic waves and receives the waves reflected from the object.

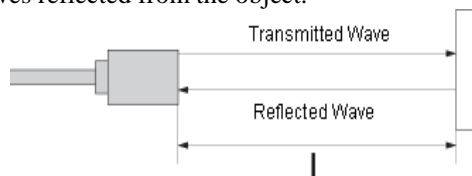


Fig 2: sensor principle

When it detects the obstacle or object, it gives analog input signal to the Arduino UNO board. This converts the analog signal into the digital signal by using ADC converter. The converted digital signal is given to the Motor driver. The motor driver is used to drive the DC gear motors. These motors are used for the wheel arrangement for the robot. Motor driver navigates the robot to avoid the obstacles.

2) Fire Extinguish:

The main operation of our robot is fire extinguish control, to perform this operation we are using flame sensor and fire extinguisher with valve actuator. Flame sensor is used to detect the flame

by measuring the wavelength of the light. Without the interruption of sunlight, like in a room, the flame sensor can easily find the candle flame. The flame sensor continuously scans for the fire. If the fire is detected it send the signal to the Arduino UNO board. The Arduino UNO sends the signal to the motor driver to navigate the robot for fire extinguish operation. The robot stops in a particular range from the fire. The Arduino board gives the signal the motor, which is connected to the Valve actuator. The motor actuates the valve to spray the fire extinguisher to extinguish the fire.

3) Manual Controlling:

For the manual controlling operation we are using Bluetooth controller. To perform the Bluetooth controlling operation the wireless monitoring operation has a major role, because without knowing the present scenario we can't perform the manual operation. The application is developed using android for the Bluetooth controller in mobile phone. Where the controlling signals to the Bluetooth controller is given by the android application in the mobile phone. The Bluetooth controller receives the signal and gives to the Arduino board. The Arduino board controls the robot using motor driver.

Disadvantage: Range between Bluetooth controller to the android mobile phone.

4) Wireless Monitoring System:

The wireless monitoring system is used to know the present scenario of the area. And for the Bluetooth controlling operation also wireless monitoring system is must. When the robot handles the difficulties because of obstacles on that time wireless monitoring system helps for the robot.

Chassis:

All the sensor and components of the robot are carried by the chassis; so a strong and light weight chassis will be ideal. Chassis can be made from different types of materials, some of the types are aluminum, steel, acrylic, plastic, and high density polymer.

Power Supply

The Rechargeable batteries were the power supply of choice for the robot. Combined with basic line regulation rechargeable batteries provide clean and allowed reuse of the batteries when depleted. The selection between different types of batteries was made based on size and power requirements

Advantages:

Manual control

Not blocked by obstacles
Extinguishes the fire in the way of present area

Disadvantage:

High cost
Bluetooth controller range is less
Wireless monitoring range also less

IV. FUTURE SCOPE

In the present condition robot can extinguish the fire only in the way not in all the area. It can be extended to a real fire extinguisher by replacing by a carbon-di-oxide carrier and by making it to extinguish fires of all the room using programming. This gives us the opportunity to pass on to robots tasks that traditionally humans had to do, but were lives threatening. Fire-fighting is an obvious employ for such automation. a autonomous fire-fighting system which includes a collection of robots, monitoring and cooperating in the mission; furthermore, such a system requires option for going through obstacles in the area of fire presence, and ability to receive instructions during an operation.

V. CONCLUSION

The mission for our project is quite simple: find the fire, put out it and go back. However, programming and testing are much more time consuming than I had imagined. The most annoying part is combining the wall following, obstacle avoiding and searching flame all together. Mistake after mistake, then it works. If there is a chance to start over, I can do many things much better. First of all, the shape of the platform should be rectangular, which is much more like a fire truck. Secondly, for the obstacle avoiding, I would use the ultrasonic sensors. which makes the robot hard not to get close to the obstacle. Finally, I test the program for all the operations of our project. Which is easy in the Arduino, it reduces the time and trouble.

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