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Smart Fire Fighting Robot with Material Handling Equipment by RF Technology

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Abstract -*The project is meant to develop a fireplace fighting robot using RF technology for remote operation. The robotic vehicle is comprised of water storage and a pump which is controlled over wireless communication to discharge water. At the transmitting end using push buttons, commands are sent to the receiver to accommodate the movement of the robot either to maneuver forward, backward and left or right etc. At the recipient end three motors are conjugated to the microcontroller and two motors are used for the motion of the vehicle and thus the other one to move the arm of the robot. The RF transmitter acts as a RF remote that has the benefits of sufficient range with antenna, while the receiver decodes before feeding it to a special microcontroller to control DC motors. A cistern in conjunction with pump is located on the robot body and its working is carried out by the microcontroller output through appropriate signal from the transmitting end. A motor driver IC is conjugated to the microcontroller through which the controller controls the motors. Further the project are often enhanced by interfacing it with a wireless camera so as that the person controlling it can view operation of the robot easily.*

Key Words: Wireless controller, microcontroller, motors, RF Transmitter, wireless camera

1. INTRODUCTION

Cultural and social quality management is entrusted with the responsibility of protecting and preserving an institution's buildings, collections, operations and occupants. Detailed attention is needed to emaciate adverse impact thanks to climate, pollution, theft, vandalism, insects, mold and fire. Due to the speed and totality of the destructive forces of fireside, it constitutes one among the more serious threats. Vandalized or environmentally damaged structures are often repaired and stolen objects recovered. Items destroyed by fire, however, are gone forever. An unconstrained fire can demolish a whole contents within a fraction of minutes and totally blow out a building during couple of hours. Hence it's become very necessary to regulate and cease the hearth to guard the Life and costlier things. For that purpose we planned to style and fabricate the fire-fighting robot. Autonomous robot scan act on their own, independent of any controller. The essential idea is to program the robot to reply a particular thanks to outside stimuli. The very simple bump-and-go robot may be a good illustration of how this works. This type of robot features a bumper sensor to detect obstacles. Once you turn the robot on, it zips along during a line. When it lastly hits any barrier, the impact force operates its bumper sensor. The robot's programming tells it to copy, address the proper and move forward again, in response to each bump. During this way, the robot changes direction any time it encounters an obstacle. Modern robots use more thorough modifications of this type of idea. Robotics create new programs and sensor systems to form robots smarter and more perceptive. Today, robots can effectively navigate a spread of environments.

2. METHODOLOGY

The project uses HT12E Encoder which converts 4 bit data to serial output which is then fed to the RF module for transmitting an equivalent to be received by the receiver RF component and output of that is fed to HT12D the serial decoder IC, the output of which is forward to controller module. The transmitting end MC is connected to a group of pushbutton. Thus when a respective button is operated, the program accomplished delivers corresponding 4-bit data which are then transferred sequentially at port 1. The data which is gathered at the receiver end of port 1 controls the motor through motor driver IC L293D as required being interfaced from the Microcontroller output port 2.

The transmitter is powered by a 6v battery serial with a silicon diode to finally develop required voltage for microcontroller circuit. The receiver is powered by a 12v battery serial with a silicon diode to guard the circuits from accidental reverse battery connection. 5V DC out of the 12V available from regulator IC 7805 is fed to the controller, decoder, and therefore the motor driver IC L293D pin 8 for operation of the motor. The receiver end unit utilizes another motor driver IC L293D for operating one DC Motor for arm functioning with a boom mounted on its shaft. At the top of the shaft a nozzle is connected to a water tanks mounted pump which is powered from “NO” contacts of a relay that's driven by transistor Q1 from the output of MC pin 15, thus within the event of a fireplace the robotic vehicle is moved over to the situation by operating the left, right, forward & backward button etc. After it reaches the location the nozzle mounted motor takes position through the water on the hearth from the cistern mounted DC pump actuated by the relay RL1. Thus the hearth are often extinguished.

3. CONSTRUCTION AND WORKING

There are many chances that fire can start in any remote area or in an industry or any place. For instance, in garments, cotton mills, fuel storages electric leakages will end in immense harm. Also, it's a worst case scenario, causing heavy losses not only financially, but collectively provides harm to areas surrounding it. Robotics is that the rising answer to protect the human lives, wealth and surroundings. A Firefighting robot is meant and built are going to be designed with an embedded system. It should be ready to separately navigate through a modeled plan , whereas actively scanning for a flame. The robot can act as a path ways in normal case contributed as a fireplace device in an emergency situation. Such types of robots are designed to search out a fireplace, before it goes out of control, will sooner or later work with firefighters greatly reducing the danger and injury to victims. The Firefighting robot project may aid to generate interest as well as new technologies within the fields of robotics while operating towards a sensible solution to save lives and mitigate the danger of property harm. Fire fighter robot with material handling system by remote applications. The key objective of this project work is to design a fire fighting robot using android application for various applications. The firefighting robot includes a water tanker, that is used to pump the water on fire and it is controlled over wireless communication. For the specified operation, 8051 microcontroller is used. In the proposed system, RF module application is employed to send commands from the transmitter end to the receiver end to regulate the movement of the robot either to move forward, backward, right or left. At the receiver end ,two motors are conjugated to the 8051 microcontroller where two of them are used for the motion of the vehicle and the remaining one to place the arm of the robot. This robot is eqipped with a water tanker with a pump which is controlled over wireless communication to shower water. For the desired operation, an 8051 microcontroller is employed . At the transmitter end, push buttons are used to send commands to the receiver end to control the robot movement, either to forward, backward & right or left. The RF transmitter acts as an RF remote that has the advantage of adequate range up to 200 meters with apposite antenna, while the decoder decode before feeding it to a other microcontroller to drive DC motors via motor driver IC for required work. A cistern with pump is placed on the robot body and its operation is administered from the microcontroller o/p through the right signal from the transmitting end. The entire operation is controlled by a microcontroller. A motor driver IC is conjugated to the microcontroller with the help of this the controller drives the motor. In future, this project are often developed by interfacing it with a wireless camera in order that the person can view the controlling operation of the robot remotely on a display. Actual image of the robot is shown in Fig. 1.

Fig -1: Actual image of the robot

4. APPLICATIONS

- If we attach a Bomb Detector sensor to it, then this robot can also be used in the ministry of defense during wars for detection of Tanks, Mines and Bombs and after detecting they can be picked and can be carried away with the help of gripper at a safer place where there will be no harm to human lives.
- In automobile industry for fixing the minor components of the vehicles and machines.
- In plant nurseries for watering and safe gardening the plants.
- In automobile service station for washing purpose of 4 wheeler and 2 wheeler vehicles

5. FUTURE SCOPES

- The Project can be converted into Android Operated Robot with spy camera connected with Laptop. This will help us to observe the positions of the travelling of the robot.
- It can also be converted into chain drive mechanism by replacing the wheels mechanism by Chain and Sprocket mechanism which can work faster and smoother that wheels.
- If we attach a Bomb Detector sensor to it, then this robot can also be used in THE MINISTRY OF DEFENCE during wars for detection of Tanks, Mines and Bombs and after detecting they can be picked and can be carried away with the help of gripper at a safer place where there will be no harm to human lives.

6. CONCLUSION

The Smart Fire Fighter with Material handling system using RF Technology has been studied and implemented for providing safe material handling and blowing of the fire. It provides better solution for time constraints working and better use of time for the day to day life work without support of anyone. We have designed the frame of the robot as in working condition 13inches *7inches which is sure to sustain the weight of the microcontroller and various type of sensors We, are sure that this robot will definitely be helpful for industries, fire brigades and in special Defense purposes.

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