Fire Fighting Robotic Vehicle

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Abstract: -- **The project is designed to develop a fire fighting robot using RF technology for remote operation. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. An 8051 series of microcontroller is used for the desired operation. At the transmitting end using push buttons, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the remaining one to position the arm of the robot. The RF transmitter acts as a RF remote control that has the advantage of adequate range (up to 200 meters) with proper antenna, while the receiver decodes before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work. A water tank along with water pump is mounted on the robot body and its operation is carried out from the microcontroller output through appropriate signal from the transmitting end. The whole operation is controlled by an 8051 series microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors. Further the project can be enhanced by interfacing it with a wireless camera so that the person controlling it can view operation of the robot remotely on a screen.**

I. INTRODUCTION

The project is designed to develop a fire fighting robot using RF technology for remote operation. The robotic vehicle is loaded with a Fire Extinguisher which is controlled over wireless communication. An 8051 series of microcontroller is used for the desired operation.

At the transmitting end using push buttons, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the remaining one to switch Fire Extinguisher of the robot. The RF transmitter acts as a RF remote control that has the advantage of adequate range (up to 200 meters) with proper antenna, while the receiver decodes before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work. A Fire Extinguisher is mounted on the robot body and its operation is carried out from the microcontroller output through appropriate signal from the transmitting end. The whole operation is controlled by an 8051 series microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors.

- ♣ Now a days the robot's world of population is exceeding 8.6million according to the last edition of world robotics.
- ♣ And those 8.6 million are doing remarkable jobs in order to make humans life easier and happier.
- ♣ Robots achievements can't be easily counted .
- ♣ Further the project can be enhanced by interfacing it with a wireless camera so that the person controlling it can view operation of the robot remotely on a screen.
- ♣ Liquid crystal displays and super capacitors make use of CNT heterogeneous films.

II. LITERATURE SURVEY

Embedded systems do a very specific task; they cannot be programmed to do different things. Embedded systems have very limited resources, particularly the memory. Generally, they do not have secondary storage devices such as the CDROM or the floppy disk. Embedded systems have to work against some deadlines. A specific job has to be completed within a specific time. In some embedded systems, called real-time systems, the deadlines are stringent. Missing a deadline may cause a catastrophe-loss of life or damage to property. Embedded systems are constrained for power. As many embedded systems

operate through a battery, the power consumption has to be very low. Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.

An embedded system is a special-purpose computer system designed to perform a dedicated function. Embedded system is fast growing technology in various fields like industrial automation, home appliances, automobiles, aeronautics etc. Now more than ever, embedded systems designers are recognizing the value of wireless. From home light switches and entertainment systems to industrial controls to remote monitoring and communications, wireless is permeating an increasing variety of applications that might once have been thought of as either standalone or otherwise happily tethered to a wire of some sort.

III.   PROPOSED SYSTEM:

The project is designed to develop a fire fighting robot using RF technology for remote operation. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. An 8051 series of microcontroller is used for the desired operation. At the transmitting end using push buttons, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the remaining one to position the arm of the robot. The RF transmitter acts as a RF remote control that has the advantage of adequate range (up to 200 meters) with proper antenna, while the receiver decodes before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work. A water tank along with water pump is mounted on the robot body and its operation is carried out from the microcontroller output through appropriate signal from the transmitting end. The whole operation is controlled by an 8051 series microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors. Further the project can be enhanced by interfacing it with a wireless camera so that the person controlling it can view operation of the robot remotely on a screen. Hardware used 8051 series

Microcontroller, Push Buttons, RF TxRx, Encoder, Decoder, DC Motors, Relay, Transistor, Robot Body with Water Tank, Resistors, Capacitors, Diode, Battery. SOFTWARE used are Code VIsionAVR,Sinaprog,Proteus Languages: Embedded C or Assembly

WHY RF?
- ♣ Bluetooth range is very low ,but we want somewhat higher range
- ♣ AF communication is point to point, but we want to detect objects which are travelling all the sides of main object
- ♣ Satellite range is very high, it can detect objects at long distance also .so it is also of no use
- ♣ But with RF we can rectify the above three problems.

What is a robot?
"A   ROBOT is a re programmable, multi functional manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks".
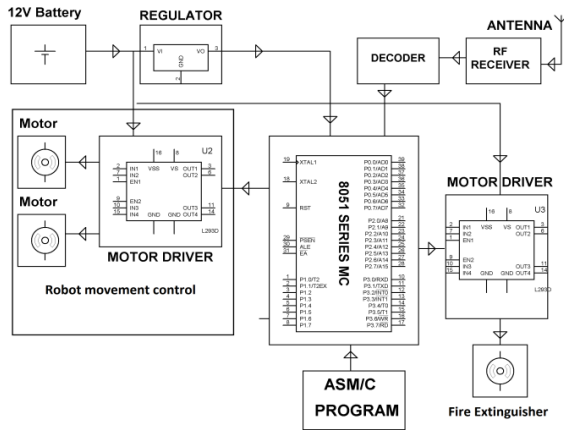
Hardware Requirements
- ♣ 8051 series Microcontroller
- ♣ Push Buttons
- ♣ RF Tx-Rx
- ♣ Encoder, Decoder
- ♣ DC Motors
- ♣ Robot Body
- ♣ Battery

Software Requirements
- ♣ Kiel compiler
- ♣ Language: Embedded C

Block Diagram Receiver and Robot:
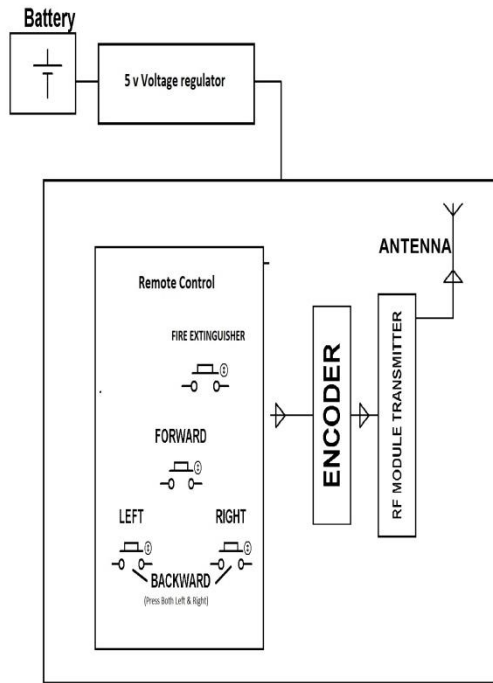
IV. WORKING OF RECIEVER:

The power supply To drive every one of the parts in the recipient area 5V dc and 12V dc are required. Two 6v batteries associated in arrangement are utilized to give the obliged energy to the circuit. Since the microcontroller and different segments in the circuit requires directed 5v supply a voltage At the recipient area the information is gotten by the RF collector. Since the information is encoded amid the transmission it should be decoded before bolstered to the microcontroller. HT 12D Receive and disentangle 12 bit encoded information transmitted by HT12E, for further preparing. The HT12D is 12 bit decoders are a progression of CMOS LSIs for remote control framework applications. They are combined with Holtek's 2^12 arrangement of encoders. For legitimate operation, a couple of encoder/decoder with the same number of locations and information configuration ought to be picked. The decoders get serial locations and information from a customized 2^12 arrangement of encoders that are transmitted by a bearer utilizing a RF transmission medium. They look at the serial information three times constantly with their residential locations. On the off chance that no mistake or unmatched codes are found, the information codes are decoded and afterward exchanged to the yield pins. The VT stick likewise goes high to demonstrate a substantial transmission. The 2^12 arrangement of decoders are equipped for deciphering data that comprise of N bits of location and 12_N bits of information. Of this arrangement, the HT12D is organized to give 8 address bits and 4 information bits.

This information is then given to the microcontroller. The microcontroller forms this information as indicated by the information got that is which order is acquired. To give the orders to the robot switches are utilized here are four switches are associated for forward, in reverse, right and left development of the robot. The robot is stacked with water tanker and a pumpwhich is controlled over remote correspondence to toss water. Atthe accepting end five engines are interfaced to the microcontroller where four of them are utilized for the movement of the vehicle and the one is to position the arm of the robot. What's more, one DC pump engine is utilized for the activity of the water pump. Thereceiver translates before nourishing it to another microcontroller to drive DC engines by means of engine driver ICfor vital work. A water tank alongside water pumpis mounted on the robot body and its operation is carried out from the microcontroller yield through appropriate signal from the transmitting end. The entire operation is controlled by PIC microcontroller. A transfer driver IC ULN2803A is interfaced to the microcontroller through which the controller drives the engines. In this application engine 1 and engine 3 are drive to move the robot in the forward heading. The engine 2 and 4 are drive to move the robot in the regressive heading. To move the robot in the left course engine 1 and 4 ought to be empowered. What's more, for the right development of the robot engine 2 and 3 are utilized. Engine 5 will move the ARM of the robot UP and DOWN. At the point when there is a charge "flame" is acquired then to empower water pump the engine 6 will be empowered and the water is tossed out by the water pump. The activity of the water pump is relies on the yield of the flame sensor. Here the flame sensor is a thermistor. The flame sensor is interfaced with the microcontroller and mounted on the robot body. To stop the activity of the framework the recipient ought to get the paired code of 1111. Further the undertaking can be improved by interfacing it with a remote camera so that the individual controlling it can see operation of the robot remotely on a screen. A VGA remote camera is utilized as a part of this anticipates. A VGA camera utilizes a visual illustrations cluster of 640 pixels wide and 480 pixels high, about what might as well be called a 0.3 megapixel image. Regulator IC 7805 is utilized. Some air conditioner swells can be available in the supply.

These blunder heartbeats are disposing of by utilizing capacitor channel.

V. TRANSMITTER:

Working of trasmitter:
The power supply: To drive every one of the segments in the transmitter segment 5V dc and 12V dc are required. The mains give the 230V air conditioning. The 230V air conditioning is ventured down to 12V air conditioning by utilizing venture down transformer. At that point the yield is given to the full wave rectifier. The rectifier takes out the negative crest voltage of the info voltage .The yield of the rectifier is the throbbing dc. The blunder heartbeats are dispensing with by utilizing capacitor channel. At that point the yield at the parallel of the capacitor is the 12V dc. In any case, the Micro Controller takes a shot at 5V dc .To change over the 12V dc into 5V dc a controller is utilized. The yield of the controller is consistent regardless of the info voltage. At the transmitting end, orders are sent to the recipient to control the development of the robot either to push ahead, in reverse and left or right and so on. The changes associated with the transmitter are utilized to move the robot and arm of the robot. In the wake of

squeezing specific switch the transmitter sends the sign to the collector with the guide of the RF transmitter module. The microcontroller is customized to recognize this information i.e. to which paired code. This information is then changed over to the applicable structure by the microcontroller, and is sustained to the RF transmitter for the transmission purpose. The RF transmitter goes about as a RF remote control that has the point of preference ofadequate range (up to 500 meters) with legitimate radio wire. Before transmitting the information to the collector this information is expected to encode by HT12E encoder. The RF transmitter is interfaced with the microcontroller through this HT12E encoder. The HT 12E Encoder ICs are arrangement of CMOS LSIs for Remote Control framework applications. They are fit for Encoding 12 bit of data which comprises of N location bits and 12-N information bits. Every location/information is remotely trinary programmable if fortified out. All address pins of HT12E is grounded. In this way the information encoded by HT12E will be 0111. This encoded information is accessible at pin 17 of HT12E. The RF transmitter recurrences regulate.

The project provides the following learning's:
1. RF transmitter and receiver module operation.
2. Interfacing of RF modules to Microcontroller.
3. DC motors working and need for motor driver.
4. Interfacing RF modules to Microcontroller.

The main building blocks of the project are:
1. Regulated Power Supply.
2. Microcontrollers.
3. RF transmitter and receiver module.
4. Wireless Transceiver modules.
5. DC motors with driver.
6. LED indicators.

Future scope:
Some of interfacing applications which can be made are controlling home appliances, robotics movements, Speech Assisted technologies etc. By making it GPS enabled, robot can be controlled from remote station also. A CO2 booster can be attached to make it powerful extinguisher.

Advantages, Disadvantages

1. Prevention from dangerous incidents
2. Minimization of –ecological consequences –financial loss –a threat to a human life.
 1. Doesn't predict nor interfere with operators thoughts.
 2. Cannot force directly the operator to work.

VI. CONCLUSION

The project "FIRE FIGHTING ROBOTIC VEHICLE" has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented. Using the RF COMMUNICATION we are successfully able to control the fire fighting robot.

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