International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 4 Issue: 5 201 - 203

Advanced Integrated Fire Halt Robot

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Abstract:- This paper develop a fire halt robot using RF technology to control the fire accidents. This robot is designed with water tanker, a pump, elide fire ball and carbon dioxide cylinder which are controlled by wireless communication. An 8051 series of AT89S52 microcontroller is used to design this robot. In this model Transmitter pass the commands to the Receiver using buttons to control the movement of the robot as per the required application. By using three motors at receiver side and are interfaced to the microcontroller for the movement of the robot and to position the arm of the robot. A motor driver IC is interfaced to control the fire extinguishing devices.

Keywords- *Fire halt robot: RF technology;AT89S52 microcontroller; RF transmitter and receiver;*

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1. INTRODUCTION

This paper aim to to design and build a prototype system that could extinguish a fire in industries and domestic areas and also aims to minimize the risks due to fire. It is the Robot that can move through a model structure, find a lit candle and then extinguish it with help of a blowing technique. Our research paper describes the design of advanced Fire halt Robot. We have worked on the same project at our college presenting a synopsis showing its basic construction and working. The Fire Halt Robot is designed to control the fire with the help of the water sprinkler, carbon dioxide and fire bombs. These types of robots are use to stop the fire in domestic areas effectively. In the conventional fire halt robot and vehicle are mostly used in industries.

This project consist three technologies to stop fire as soon as possible. At the transmitting end using push buttons, commands are sent to the receiver to control the movement of the robot in all directions as per the requirement. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the robot 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 desired range with proper antenna.. 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. As transmitter gives the commands to robot throw a fire bombs in desired direction to stop the fire instantaneously. The gas would blow up the fire based on the user.

Further this 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.

2. HARDWARE

The hardware requires fewer components which reduces the cost of production. The advantage of this technology is that here a single microcontroller controls the entire unit and provides monitoring facility. Both transmitter and receiver consists microcontroller. The 8051 microcontroller is enough to develop the total project. RF module also a very essential device to develop the communication between the transmitter and receiver. The motor driver ic is used to control the motor. Fire sensor is used to detect the fire.

An RF transmitter module as shown in figure.1 is a small PCB sub-assembly capable of transmitting a radio wave and modulating that wave according to the carry data. Transmitter modules are usually implemented alongside a micro controller which will provide data to the module which can be transmitted. RF transmitters are usually subject to regulatory which allows the usage of the maximum transmitter power output, harmonics and band edge requirements.

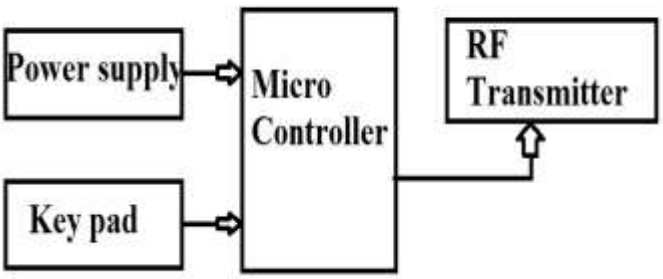

Fig.1 RF Transmitter

An RF receiver module as shown in figure.2 is receives the modulated RF signal, and demodulates it. There are two types of RF receiver modules: super heterodyne and super regenerative. Super-regenerative modules are usually low cost

and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage. Super heterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product.

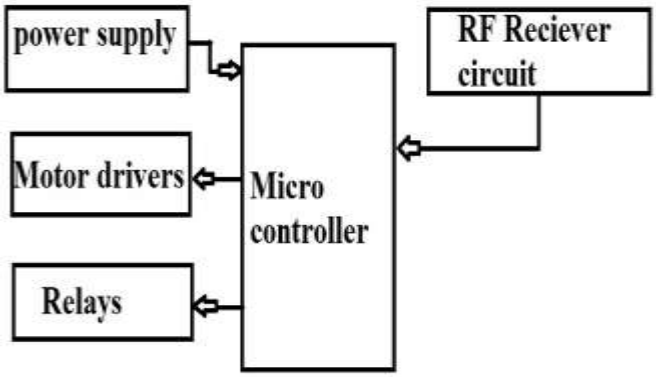

Fig.2 RF Receiver

FIG 2.1 BLOCK DIAGRAM OF TRANSMITTER

2.2 MOTOR DRIVER IC

The motor driver ic is used to drive the dc motors. Wide Supply-Voltage Range: 4.5 V to 36 V. Separate Input-Logic Supply. Internal ESD Protection Thermal Shutdown High Noise Immunity Inputs. Output Current 1 A per Channel (600 mA for L293D). Peak Output Current 2 A Per Channel (1.2 A for L293D) . Output Clamp Diodes for Inductive Transient Suppression. It could control two DC Motors.

2.3 MICROCONTROLLER

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. Microcontroller used in both transmitter and receiver. In the transmitter the microcontroller take the input from push up buttons and transmit the information through RF transmitter. The receiver takes the input from the RF receiver and take the

3. WORKING PROCEDURE

The transmitter consist of RF Transmitter, power supply and key pad made by the push up buttons. Initially switch on the power supply. The code is dumped based on the requirement of user. The required data send through RF transmitter. The RF encoder converts 4 bit parallel data to serial data. There are 16 possibilities. Initially all values are zeros at the transmitter and the address pin should be grounded even through it could operated based the input address ensure that same address input should be present at the receiver. The code dumped in micro controller every data represent a particular operation. if data is 0001 then robot should move forward. All The operations are represented by the data. Those are sending to receiver. Major operations are navigation commands and other dc motor operation. The receiver consist of RF receiver, motor driver ic, water sprinkler and power supply. Initially switch on the power supply and also switch on the power supply of transmitter. Give the respective commands to transmit them through RF module. The water sprinkler sprinkle the water to stop the fire and fire sensor detect the flame. Other important technologies are gas blowing and fire ball. Gas blowing is also a very good technique to stop the fire. The commands could send by the transmitter to switch on the gas cylinder. The elide fire ball technology is a very effective one among these technologies.

The fire bomb is like a ball. Fire Extinguishing Ball is a ball shaped fire extinguisher. Simply thrown into a fire, it will activate within 3 seconds and effectively disperse-extinguishing chemicals. When a fire occurs and no one is present, Fire Extinguishing Ball will self-activate when it comes into contact with fire and give a loud noise as a fire alarm. Because of this feature, it can be placed in may fire prone area such as above electrical circuit breaker or in a kitchen. There is no special training or skill required to operate the ball and no need to face the dangers of the fire.

4. SOFTWARE

KEIL Compiler and Proteus 8 software are used for coding.KEIL Compiler is one among all the C compilers that provides best speed and code size for all pic controllers. Proteus 8 is responsible for designing the circuit by selecting and connecting the respective components. The code from pic c compiler is saved and then dumped in the circuit in proteus software and then is made to run. Here the clock frequency of controller can be set by double clicking onto it. It can be checked after running the circuit whether there is a desired output or not. The codes are written individually for each technology for their respective functioning, integrated into a single code and then is dumped into the micro controller when it is coded perfectly i.e., when error free code is obtained. The sequence of operations for individual sensors is specified below. Initially the code is developed and verified in keil. Later the components are simulated in proteus and output is verified and tested. Later hardware implementation is very simple. Both software's are very accurate and effective.

5. RESULTS

The project "**Advanced integrated fire halt robot**" was designed for developing an efficient robot to stop the fire effectively. The robot is as shown in the Fig .3. The robot is capable of sprinkler water, blowing gas (co2) and fire ball. The user should give the commands through the remote based on the commands. The fire sensor sense fire and buzzer makes a sound when fire accidents occur.

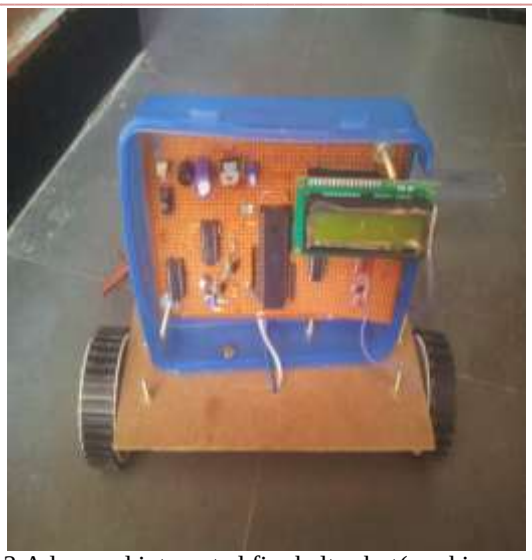

Fig .3 Advanced integrated fire halt robot(working model)

6. CONCLUSION

The developed fire halt robot can efficiently halt the fire accidents not only in industries in domestic areas also. It consists of three effective technologies and among these technologies fire ball is very effective technology in chemical fire accidents.

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