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Fire Fighting Wireless Controlled Robot Using 8051

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ABSTRACT: This Research paper will describe the project done to design and build a small Fire Fighting robot, where a robot will be put in a house model where a light candle is available and the robot should be able to detect, and extinguish the candle in the shortest time while navigating through the house and avoiding any obstacles in the robot's path. Researches were done in the beginning of the project to get more information about robotics in general and to think about the design, hardware components, and the software technique which will control the robot. The design was inspired from the car design where 2 wheels are used in the robot. The Robot is controlled using AT89S52 micro-controller which is considered the brain of the robot. This robot contains Light Sensor, 2 DC motors, and Buzzer is used in the robot's body. Two DC series motors are used to control the rear wheels and the single front wheel is free. The role of Light sensor is to sense the presence of light. The microcontroller controls the speed of the motors with the help of H-bridge driver L293D. The software part of the project is the program code written in the micro-controller to control the Fire Fighting Wireless Controlled robot Using 8051.

KEY WORDS: AT89S52, L293D, Light Sensor, Water Pump, RF module, DC Motor.

I. INTRODUCTION

Robot is defined as a electro- mechanical design that is capable of performing human tasks or behaving in a human-like manner. It's about building systems and putting together motors, solenoids, and wires, among other important components. A fire fighter robot is one that has a small fire extinguisher added to it. By attaching a small fire extinguisher to the robot, the fire detection and controls are automatic.the robot works with sensorfor searching the fire and when fire is detected then automatically spray the water over it.

II. OBJECTIVE

- To detect fire in the disaster prone area.
- Also Provides audio and visual indications.
- Extinguishes fire on detection.
- Reduces the efforts of human labour and level of destruction.

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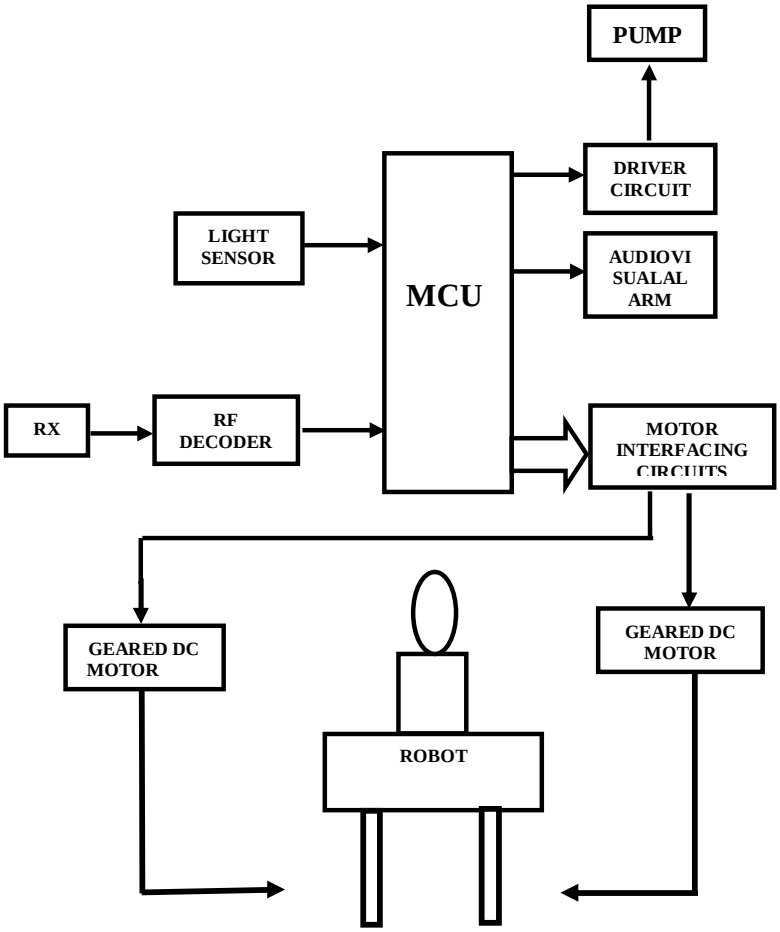
III. BLOCK DIAGRAM

Receiver:



Transmitter:

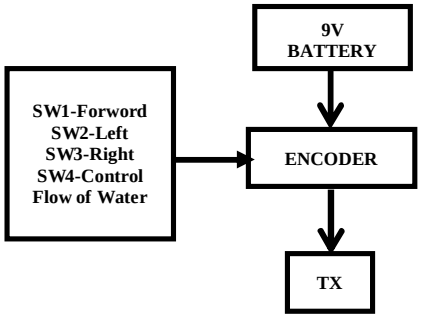


Figure 1: Block Diagram of Fire Fighting Wireless Controlled Robot Using 8051

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A.Microcontroller: A microcontroller is a single chip that contains the processor (the CPU), non-volatile memory for the program (ROM or flash), volatile memory for input and output (RAM), a clock and an I/O control unit. It is a powerful device, which is capable of executing various tasks and interfacing with other hardware devices. The controller used in this project is AT89S52.The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory.

B. Power Supply Circuit: A power supply is an electronic device that supplies electrical energy to an electrical load. Here microcontroller, sensor and audio circuit operates with DC 5V, motor driver circuit operates with DC12V supply and this supply is provided by 12V step down transformer with rectifiers (to charge battery of 12V) and required to convert in to DC 5V by regulator. The 12V DC to convert in to 5V by LM7805 regulator for microcontroller. The LED is used for indication purpose, as show the level of liquid by ON/OFF and resistor is used in series for current limiting purpose.

C. Reset and Oscillator Circuit: Any microcontroller requires oscillation frequency for its operation it can be internal for few microcontrollers and for few it provide external also. This microcontroller requires external oscillator frequency. Reset circuit requires for the restart program from beginning it used when microcontroller hangs or if we required to stop the running condition with beginning process.

D. Light Sensor:. Light sensor is a passive device which converts light energy into electrical signal. It is commonly known as photoelectric device, because it converts light energy or photons into electricity.Light sensors are more commonly known as “Photoelectric Devices” or “Photo Sensors” because the convert light energy (photons) into electricity (electrons).Light sensor is connected at port RA works to sense the light to detect physical input and microcontroller takes action as programmed in controller.

E. Motor Driver(L293D): Microcontroller has very low current output it cannot drive current consuming sources, such like motor hence motor driver circuit requires. We can implement this circuit using transistor or related driver IC. Notification LED can directly drive with current limiting resistor through microcontroller. Motors can be connected with motor driver IC output it can be submersible pump or basic movements motor.

F. DC Motor: It is an electric motor that converts electrical energy into mechanical energy and it is called a DC Motor because it works on direct current. 12V DC power supply is required for the DC Motor for its operation. In this project DC Motor is used to operate wheels of the vehicle.

G.RF Module: The RF module operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. In this RF system, the digital data is represented as variations in the amplitude of carrier wave.This robot is a Fire Fighting Robot and it is controlled by Remote controller. For this purpose we are using microcontroller and it is interfaced to RF Module. The RF Module is used to receive commands send by user remotely through remote control.

H. DC Water Pump: DC powered pumps use direct current from motor or battery to move fluid in a variety of ways. The main advantage of DC pumps over AC pumps is that they can operate directly from a battery, making them more convenient and portable.

IV. WORKING

In this circuit microcontroller works with 4MHz frequency hence 4MHz crystal oscillator is used for (timer configuration), the unwanted frequency produced is bypassed by the capacitor of 22pf capacitor. Reset pin is connected to 10uf capacitor and resistor of 10K whenever reset requires the reset switch (2 lead push to ON switch/ micro push to switch) required to press.

Light sensor is connected to the INT1. The light sensor having 2 points these are (Vcc, Ground). It provideanalog output. According to programming LED of light sensor shows the notification of physical condition is detect or not and takes action for the motor control as designed in program. Light sensor is a passive device which converts light energy into electrical signal. It is commonly known as photoelectric device, because it converts light energy or photons into electricity.

This microcontroller is also interfaced to L293D motor driver which are used to run the Vehicle. This L293D is the H-bridge motor driver Ic which acts as a current amplifier. It takes low current at input and the large current is obtained at the output.

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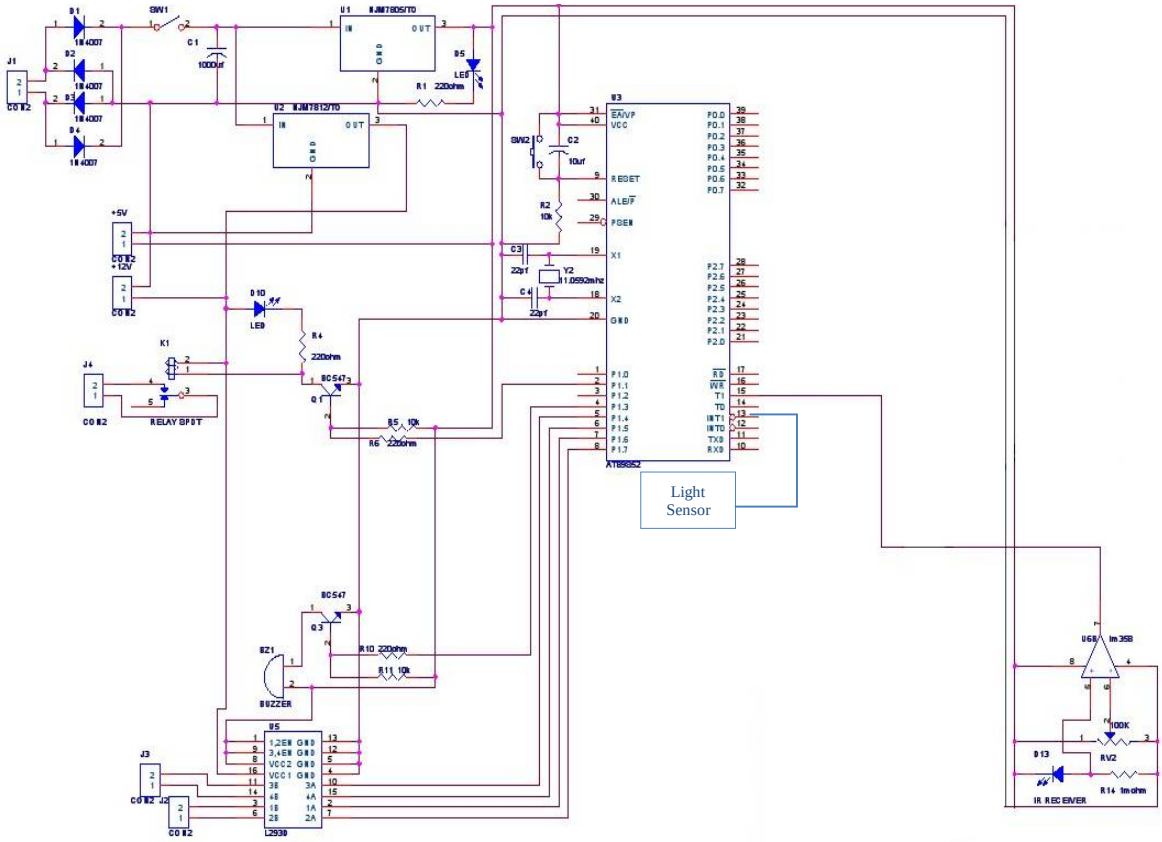

Figure 2: Circuit diagram of Fire Fighting Wireless Controlled Robot Using 8051.

L293D contain 2 in built H-bridge driver circuit, so simultaneously we can be drive 2 DC motors. DC motor is an electric motor which converts electrical energy into mechanical energy and it is called as DC motor because it works on direct current. This robot is a Fire Fighting Robot and it is controlled by Remote controller. For this purpose we are using microcontroller and it is interfaced to RF Module. The RF Module is used to receive commands send by user remotely through remote control.

V. FUTURE SCOPE

Some expansions need to be done in the future work in order to be able to compete and win a good position in the fire fighting competition.
Enhancements on the sensor used to detect the fire, that could be done by using certain type of infrared sensor that is not affected by camera lights because it gives tremendous results and it is able to detect the fire.

VI. CONCLUSION

Thus our group actively coupled with project, and we develop this project named as "**Fire Fighting Wireless Controlled Robot Using 8051**".This project presents a Fire Fighting robot using RF communication and it is designed and implemented with Atmel 89S52 or 8051 microcontroller (MCU). Experimental work has been carried out carefully. The result shows that higher efficiency is achieved. The proposed method is highly beneficial for the security purpose

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and industrial purpose. At future the robot will also capable of throwing water with controlled robotic arm and the object detection using cameras on it. It can be used as further extension of the project to achieve all the features.

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BIOGRAPHY

Prof. S.D. Panchal is an Assistant Professor and H.O.D. in the Electronics & Telecommunication Department, Sandipani Technical Campus, Latur. He is an expert in Embedded System and VLSI. He has more than 5 years of experience in these fields.

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