International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016 [ICSSCCET 2016]

ISBN	978-81-929866-6-1
Website	icssccet.org
Received	25 – February – 2016
Article ID	ICSSCCET072

VOL	02
eMail	icssccet@asdf.res.in
Accepted	10 - March – 2016
eAID	ICSSCCET.2016.072

Design of Autonomous Douser

C H Ram Manoger Lokiya[1], Mahesh D[2], Mohamed Thariq K J[3], Nagendra prasath R[4], Arunkumar R[5]
[1]Asst.Professor, [2,3,4,5] ECE Department, Karpagam Institute of Technology.

Abstract: *There are many chances a fire can occur in house hold or industrial levels. Fire can occur majorly by three means, through house hold wastes, ignitable gases and electric leakages. This fire would cause a huge damage to its surroundings. The aim here is to design a robot which extinguishes fire that occur thorough any of the above mentioned cases. Robots are used because it reduces human labor and in worst case prevents major injuries.*

Keywords: *Extinguisher, Fire sensors, GSM modem, Comparator*

INTRODUCTION

A robot is capable of performing human tasks and to behave like a human. Constructing a robot needs complex and expertise programming. It's about bringing motors, wires, flame sensors and other important components together. A fire fighting robot is a kind which has a water sprinkler and a water tank attached to it. This paper covers the design and development of a robot that detects and extinguishes fire. This robot senses the fire through the flame sensors and processes it in the microcontroller attached in the robot unit, it then moves towards the location of fire with the help of motor driver IC and motors connected to it. Once the flame is detected, the robot actuates a relay which releases water through sprinklers on the flame. The project helps to generate interests and innovation in robotics while working towards a practical problem and to obtain solution to save lives and reduces the risk of property damage.

Sometimes fire fighters have to face risky situations while extinguishing fires and rescuing people. To avoid this scenario, a robot can be used which can function by itself or can be controlled from remote location. As a result of which fire fighting and rescue operation can be done without putting fire fighters at risk. In other words, robots minimize the need of fire fighters to get into risky situations. This robot uses microcontroller, dc motors, castor wheel, water pump, sensors and sprinkler. Microcontroller is programmed to control all parts of the robot. Once the fire sensors and smoke sensors placed in the robot senses the fire, it sends signal to the controlling unit. As soon as the controller receives the signal it turns on the buzzer (that intimates the occurrence of fire) and then actuates the driver circuit which drives the robot to the corresponding location. As the robot reaches the location, relays connected to the pump and sprinklers are actuated and water is sprinkled on the fire.

Description of Components

A. Microcontroller

The AT89C51 is an 8-bit micro controller which consumes low-power and shows high performance. It consists of 4KB of Programmable flash memory and Erasable Read Only Memory.

Cite this article as: C H Ram Manoger Lokiya, Mahesh D, Mohamed Thariq K J, Nagendra prasath R, Arunkumar R. "Design of Autonomous Douser". *International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016*: 380-382. Print.

Features of the microcontroller:

1. 4KB of Flash memory
2. Flash memory is reprogrammable.
3. 128 x 8 bit Internal RAM.
4. Static operational characteristics.
5. 32 programmable I/O ports.

A microcontroller consumes less power and is smaller in size. It has some internal memory for storing the program and data. It also has a control system in order to control the input and output data based on the program loaded to it by the programmer. The peripherals like sensors, driver circuits and displays are connected to the I/O ports of the controller. CPU core is the heart of microcontroller.

B. Electrical Components

The electrical components used here are 12 volt DC motors and relays. The rechargeable battery acts as the power source. The battery could provide a maximum power of 65W and the average power is 7.8 Watts.

C. Fire Sensors

With the help of UV sensor, flame can be sensed from five meters away. If fire occurs in an area, the temperature of the area increases automatically. Thermistors can be used to sense the change in the temperature; they have negative temperature coefficient i.e., the resistance of the thermistor decreases when there is increase in temperature. Taking the output of the thermistor as an input to the comparator and a threshold voltage as another input occurrence of fire can be sensed.

D.GSM Modem

GSM modem is utilized to suggest the event of flame mischance by means of SMS. Utilizing GSM modem a foreordained message can be send to required persons furthermore to flame station with the goal that they get cautioned and achieve the spot rapidly where fire broken out.

E. Driver Circuit

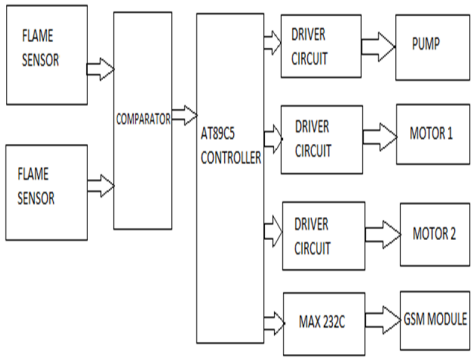
A driver circuit is usually made with a transistor and a relay, which is operated by the microcontroller. Microcontroller will toggle the output from low to high i.e. from zero to one. This pattern is used to control the base of the transistor. When the base of the transistor is high, transistor goes ON or vice-versa.

Methodology

The microcontroller place in the robot drives four flame sensors and it always scans the input signal of the sensors. With the help of these sensors, robot detects fire once occurred. At the same time, sensors measure the distance range and transmit it to the microcontroller of the fire fighting robot through serial interface.

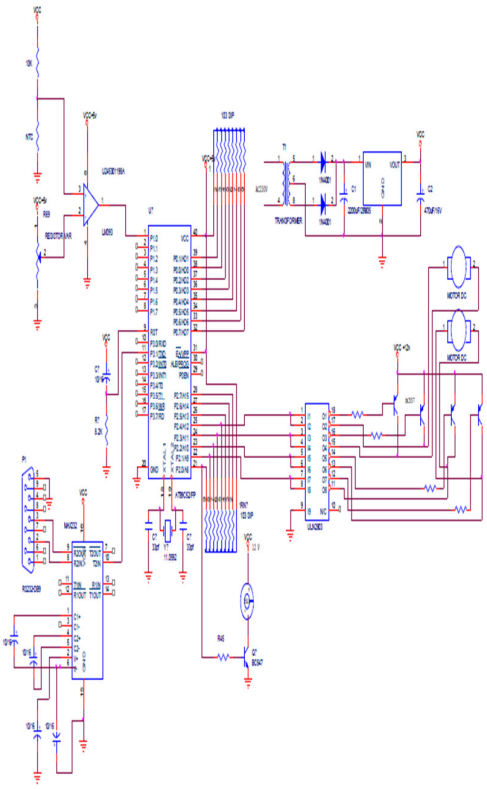
Now the robot turns on the buzzer in order to intimate the occurrence of fire and alerts the concerned person by sending a message with the help of a GSM module attached to it. Then it starts moving in order to reach the spot of fire by calculating the input data. Once the robot has reached the spot, it aligns itself in the direction of fire and actuates the fire extinguishing circuitry which comprises of relays, pumps, sprinkler and a water tank. By actuating the relay, water is pumped from the water tank fixed with the robot and is sprinkled thorough sprinklers. And once the fire gets extinguished, flame sensor senses it and intimates the robot. Then the robot stops the extinguishing operation and returns to its position. The robot uses three motors among which two are used to move the robot and another is used to sprinkle the water.

Block Diagram



Cite this article as: C H Ram Manoger Lokiya, Mahesh D, Mohamed Thariq K J, Nagendra prasath R, Arunkumar R. "Design of Autonomous Douser". *International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016*: 380-382. Print.

Circuit Diagram



Conclusion

This paper gives a point by point system about the robot that persistently screens, insinuate the particular faculty and douses the flame. In an industry if any flame mischance happens, there is no need of a man to screen constantly and redress it. In this procedure no time delay happens and unsalvageable misfortunes are avoided.

Future Scope

In the current condition this robot can quench fire just on its way, not in every room. It can be stretched out to a genuine flame quencher by replacing the water transporter by a carbon-di-oxide bearer and by making it to douse flames of all the room utilizing digital image processing. Additionally the robot couldn't be worked through the batteries in light of the fact that at a few conditions the present necessity for the circuit (current) ascends to around 8A which is high and cannot be gotten utilizing batteries.

References

1. Trinity College, Fire-Fighting Home Robot Contest, http://www.trincoll.edu/~robo
2. Muhammad Ali Mazidi, the 8051 Microcontroller and Embedded Systems.
3. Verner, I.; and Betzer, N. 2001. Machine Control - A Design and Technology Discipline in Israel's Senior High Schools. International Journal of Technology.

Cite this article as: C H Ram Manoger Lokiya, Mahesh D, Mohamed Thariq K J, Nagendra prasath R, Arunkumar R. "Design of Autonomous Douser". *International Conference on Systems, Science, Control, Communication, Engineering and Technology 2016*: 380-382. Print.