

Fire Extinguisher Robot

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Abstract - The objective of the project is to develop a Microcontroller based fire fighting robot. In this system we have used ADC and comparator .system work in a way when there is heat detect in the nearby the sensor which is heat sensor will activate the motor which is connected to the water tank and will remain in the activated state till sensor again detect that the temper is come down to normal.Working of robot: when the sensor detect temperature is more than the normal set value it will send signal to ADC which will convert the analog signal to digital signal voltage which then reach to pin of 8051 micro-controller, because of this micro controller will activate the fire fighting device connected to it. similarly when the sensor again detect that temperature gone down then the set value it will switch off the fire fighting device

Key Words: LM 35, AT89S51(Microcontroller Unit), Crystal Oscillator, Driver IC

1. INTRODUCTION

The firefighting robot is designed to search for a fire in a small floor plan of a house, extinguish the fire (by placing a cup over the LEDs), and then return to the front of the house. This mission is divided into smaller tasks, and each task is implemented in the most efficient manner. The navigation of the robot throughout the house is achieved by data provided by a line tracker and ultrasound transducers. The target acquisition is achieved by data provided by a camera. The deployment of the extinguishing device is implemented with a custom arm controlled by servos. Along with these crucial tasks were other design constraints, such as the size, speed, and supply of power. Each defining characteristic of the robot is described in more detail in this document.

At the heart of the system is the ATMEL ATMEGA32 microcontroller. Program code to control the fire fighting robot is written in C language. The system controls two optically isolated stepper motors for precision movement. Furthermore, the robot performs analog to digital conversion on 6 infrared sensors: 4 for wall proximity detection, one to detect floor markings, and one for candle detection. The 4 proximity sensors utilize heterodyne modulation of the IR signals to reduce the effects of ambient lighting. The extinguishing system is comprised of a large fan salvaged from a toy hovercraft, and a 3.5kHz tone decoder circuit is used to start the robot and gain bonus point

2. BLOCK DIAGRAM

Block diagram given in fig 1, consists of Temperature Sensor(LM35), AT89S51(Microcontroller Unit), LED Sensor, Driver IC. The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). 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 Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer, which provides a highly flexible and cost-effective solution to many embedded control applications.

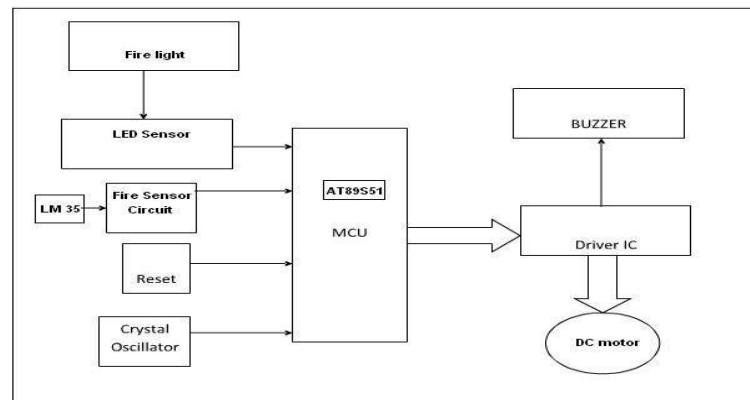


Fig 1: Block diagram of the Fire Extinguisher Robot

2.1 LM35 Temperature Sensor

The LM35 sensor is used to detect temperature and can sense temperature in a range from -55°C to 150°C. LM35 operates from 4v to 30v and it takes less than 60 microampere current drain.

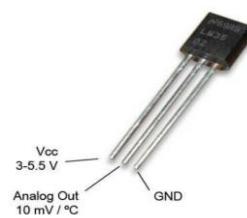


Fig 2: LM35

2.2 AT89S51 MCU

The Atmel AT89S51 is an 8051 based Full Static CMOS controller with Three-Level Program Memory Lock, 32 I/O

lines, 2 Timers/Counters, 6 Interrupt Sources, Watchdog Timer, 2 DPTRs 4K Flash, 128 Bytes On-chip RAM.



Fig 3: AT89S51 MCU

2.3 Crystal Oscillator

The Crystal Oscillator is basically an electronic device which is to provide an electronic signal with a precise frequency to an electronic circuit.



Fig 4: Crystal Oscillator

3. CIRCUIT DIAGRAM & HARDWARE IMPLEMENTATION

The circuit is simple NPN transistor common emitter switching circuit. The transistor T-1 is supplied through negative at emitter. The base is conducted through the port output from computer and collector gives output to energies the relay commonly connected to +ve supply. The diode prevents back emf produced by relay while working

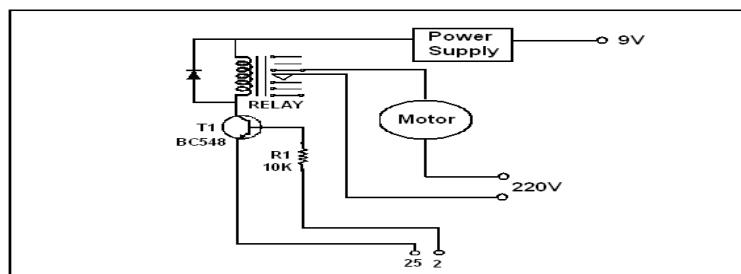


Fig 5: Circuit Diagram of Fire Extinguisher Robot

4. WORKING

There are several possibilities of fire in any remote area or in an industry. For instance, in garments godowns, cotton mills, and fuel storage tanks, electric leakages may result in immense fire & harm. In the worst of cases & scenarios, fire causes heavy losses both financially and by taking lives. Robotics is the best possible way to guard human lives, wealth and surroundings. A Firefighting robot is designed and built with an embedded system. It is capable of navigating alone on a modeled floor while actively scanning the flames of fire. The robot could be used as a path guide in a fireplace device or, in normal case, as an emergency device. This robot is designed in such a way that it searches a fire, & douses it before the fire could spread out of range & control. This type of firefighting robot will sooner or later work with firefighters, thus greatly reducing the danger of injury to victims. Apart from this, this Firefighting robotic project will also help generate interest along with the innovations in the field of robotics while operating towards a sensible and obtainable solution to save lives and mitigate the danger to property.

5. APPLICATIONS

- It can be used in server rooms.
- Extinguishes fire where probability of explosion is high.
- Usable in power plant control rooms, captain bridges, flight control centres.
- Disaster area monitoring and rescues.

6. FUTURE SCOPE

- Remote control of robot.
- Camera and video transmission can be added.
- Improve weight capacity of robot

7. CONCLUSION

Here we successfully developed Fire Extenguisher Robot that detects temperature, smoke and flame at the site where the robot exist. The movement of this robot vehicle is controlled by MCU as per the program. This robot is helpful in those areas where natural calamity and bomb explosions where occurred. If fire is detected with the help of sensors, MCU operates the water pump mechanism through relay circuit.

8. REFERNCE

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