

# Automated Fire Extinguisher Robot with Multisensors and Radar Using PID Controller

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**ABSTRACT:** Even in this 21<sup>st</sup> century, fire accidents cause a major damage for the society. The major thing that has to be noted is that fire accidents spread rapidly than any other disasters and the losses in it cannot be rebuilt. Hence it has to be identified immediately and simultaneously it has to be vanished before spreading. In this project we design an automated fire extinguisher robot, which senses the fire easily with the help of sensors. Radar technology is also been implemented for the identification of the right path for the robot to travel. The sensors are attached with the Atmega microcontroller in the robot itself. With the help of PID controller motor Lm298 is used with H-bridge driver board with further gear, centrifugal, servo motor attachments. A 500ml water tank is attached with the robot, in which water is refilled. This robot identifies the area that are in fire rapidly and this method is a low cost approaching method and it can be easily operated by everyone.

**KEYWORDS:** Atmega microcontroller, Lm298, servo motors.

## I. INTRODUCTION

Fire is a very good servant, but, a very bad master. As long as fire is under our control, it serves a lot of useful purposes for us, but, once it goes out of our control, it can create a lot of destruction. However, despite the presence of fire safety measures, the occurrence of accidents is oftentimes inevitable. Fires can be caused in a number of ways. According to the National Fire Protection Association, fires that start in electrical systems or lighting equipment damage more than 24,000 homes each year. These fires also kill approximately 320 people and injure 830 more every year. With the help of automated fire extinguisher we can identify the places of fire immediately and can be prevented simultaneously before a vast damage to people and property.

## II. PROPOSED SYSTEM

In this automated fire extinguisher method we use multisensory and radars to locate the fire easily before it makes a massive damage to property. This method fabricated providing an extinguishment platform. An Atmega microcontroller acts as a microcomputer which is an easy interface system with RAM, ROM, I/O ports. A LCD display views the functioning of the robot. The system must be in "ON" condition in order to sense the temperature. Flame sensor senses the existence of fire and the temperature sensor senses the high temperature or any of the different temperature sensing in the room. Motor control driver board controls the gear motor and the server motor.

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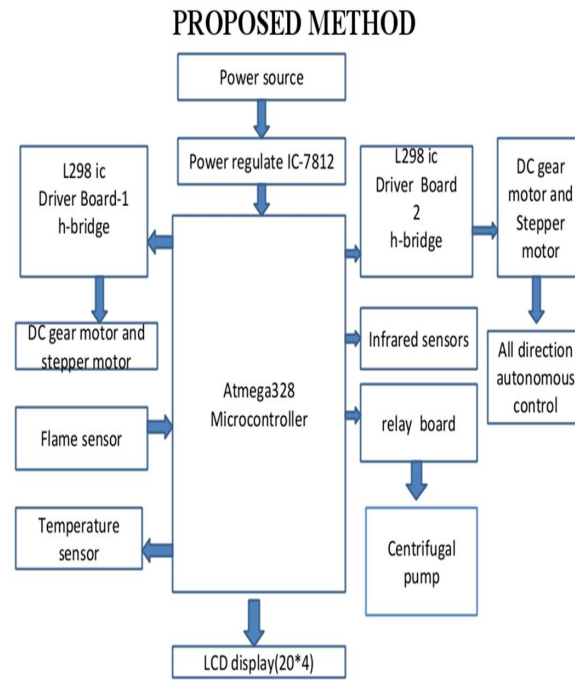


Fig 1 Block Diagram

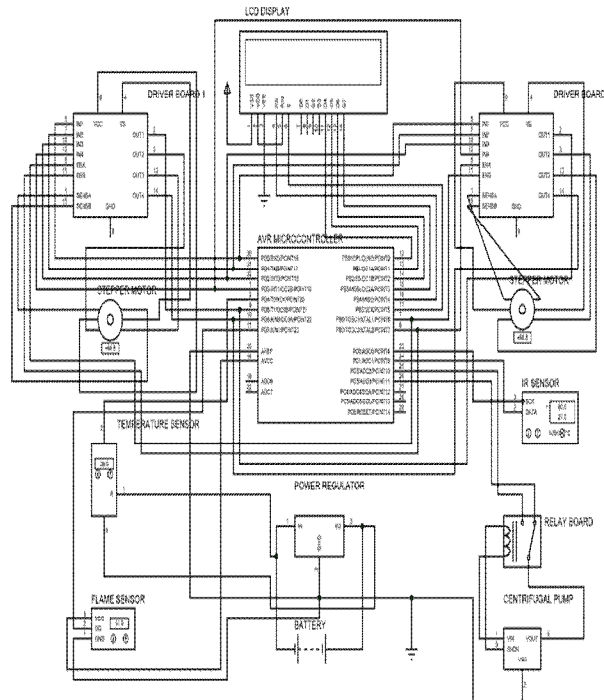


Fig 2 Circuit diagram

## DIAGRAM EXPLANATION

The ATmega48PA/88PA/168PA/328P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega48PA/88PA/168PA/328P achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain timer base while the rest of the device is sleeping... The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot program running on the AVR core. The Boot program can use any interface to download the application program in the Application Flash memory.

## LIQUID CRYSTAL DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons: The declining prices of LCDs. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.

## TRANSISTOR DRIVER CIRCUIT

An SPDT relay consists of five pins, two for the magnetic coil, one as the common terminal and the last pins as normally connected pin and normally closed pin. When the current flows through this coil, the coil gets energized. Initially when the coil is not energized, there will be a connection between the common terminal and normally closed pin. But when the coil is energized, this connection breaks and a new connection between the common terminal and normally open pin will be established. Thus when there is an input from the microcontroller to the relay, the relay will be switched on. Thus when the relay is on, it can drive the loads connected between the common terminals and normally open pin. Therefore, the relay takes 5V from the microcontroller and drives the loads which consume high currents. Thus the relay acts as an isolation device.

## THE DC MOTOR CONTROL CIRCUIT

All DC motors have been controlled using the following circuit:

The 4N25 is an optocoupler, which provides isolation to the microcontroller from the high voltage circuit. ULN2008 is a Darlington pair IC that provides the amount of current that is required by the relay. The third component is a 12volt relay, which is used to turn on the DC motor. The same circuit is used for changing the direction of the DC motor.

## TEMPERATURE SENSOR

National Semiconductor's LM35 IC has been used for sensing the temperature. It is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C). The temperature can be measured more accurately with it than using a thermistor. The sensor circuitry is sealed and not subject to oxidation, etc.

### DRIVER BOARD (LM298)

H-Bridge's are typically used in controlling motors speed and direction, but can be used for other projects such as driving the brightness of certain lighting projects such as high powered LED arrays.

### CENTRIFUGAL PUMPS

Centrifugal pumps are a sub-class of dynamic axis symmetric work-absorbing turbomachinery. Centrifugal pumps are used to transport fluids by the conversion of rotational kinetic energy to the hydrodynamic energy of the fluid flow. The rotational energy typically comes from an engine or electric motor. The fluid enters the pump impeller along or near to the rotating axis and is accelerated by the impeller, flowing radially outward into a diffuser or volute chamber (casing), from where it exits.

### FLAME DETECTOR

A **flame detector** is a sensor designed to detect and respond to the presence of a flame or fire, allowing flame detection. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system.

### EMBEDDED C PROGRAMMING

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations.

### III. EXPERIMENT RESULT

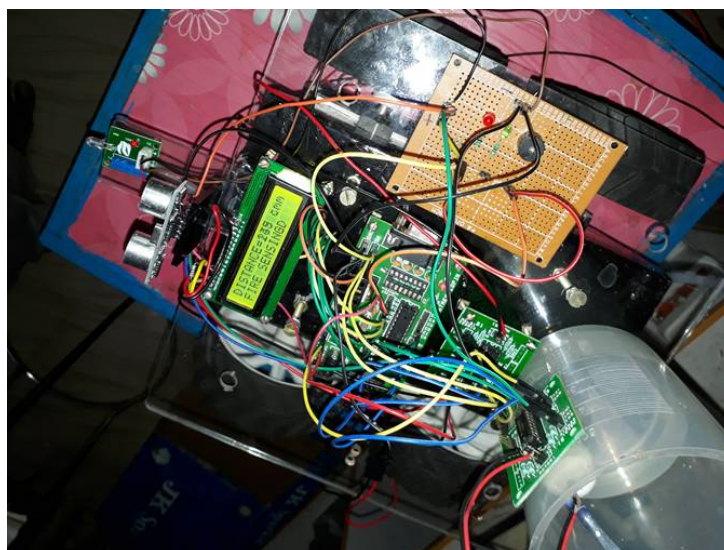


Fig 3 Output

Thus, the fire extinguisher robot senses fire immediately with the help of radar and simultaneously the fire is vanished by the centrifugal pump, pumping water out of the water tank. The robot can withstand even at very high temperature and it senses fire around 100meters. The LCD placed, shows the functioning of the robot step by step. It can easily travel between any obstacles and this is specially modelled for indoors. As the Fire Fighter Robot has to endure different situation, this effectiveness test will help us to make a better model in preventing local and indoor areas and prevents the atmosphere from catching fire.

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