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# FIRE SAFETY ROBOT

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## ABSTRACT

The project is designed to develop a fire fighting robot using Bluetooth technology for remote operation. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. PIC microcontroller is used for the desired operation.

At the transmitting end using Mobile Phone, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the remaining one to position the arm of the robot. The Bluetooth Transceiver acts as a remote control that has the advantage of adequate range, while the receiver decodes before feeding it to another microcontroller to drive DC motors via motor driver IC for necessary work. 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 PIC microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors.

**Key words**: Fire safety robot, Bluetooth technology.

## INTRODUCTION

Fire fighting and rescue is a risky operation. A robot can function by itself or be controlled from a distance, which means that fire fighting and rescue activities could be executed without putting fire fighters at risk by using robot technology instead. Robots decrease the need for fire fighters to get into dangerous situations. Further, if the robots replace or support fire fighter in missions, the load for fire fighters reduced. Moreover, one can say nothing but there is the limit of fire department power. So it is impossible to extinguish fire and rescue many victims at a time in a huge disaster. In this case, the robot

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technology make possible to rescue much more victims. To make human lives easier and to make maximum use of time available.

In this project we use a modular design concept to implement fire fighting robot system. This robot provides fire protection when there is a fire in a industry by using automatic control of robot by the use of microcontroller in order to reduced loss of life and property damage. The robot uses dc motors, castor wheel, chassis, microcontroller, sensors, pump and sprinkler.PIC Microcontroller is used a brain of the robot. Microcontroller controls all the parts of the robot.

In this robot the fire sensors, the temperature sensor and Gas Sensor senses the fire, and sends the signal to microcontroller; since the signal of the sensor is very weak the amplifier is used so that it can amplify the signal and sends to microcontroller. As the microcontroller receives the signal from the alarm sounds, the alarm sound is to know whether the fire is sensed by the sensor or not. After sounding the alarm microcontroller actuates the driver circuit and it drives the robot towards fire place, as the robot reaches near the fire microcontroller actuates the relay and pump switch is made ON and water is sprinkled on the fire through the sprinkler.

## Parts of the robot

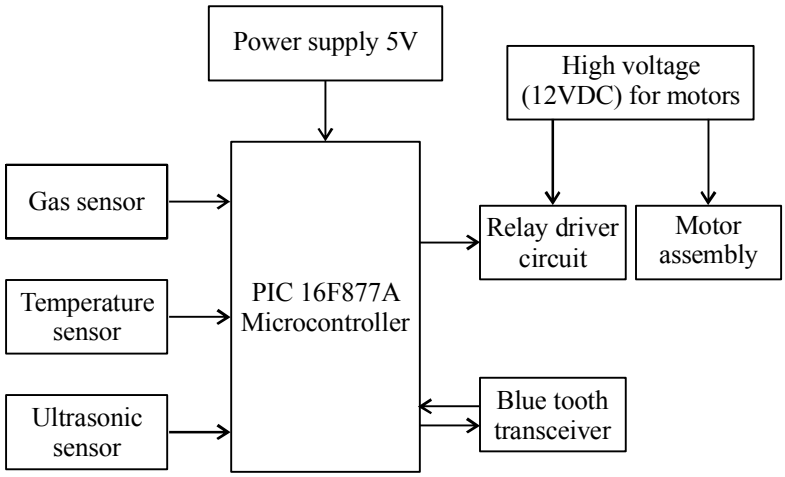
### PIC Microcontroller

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

### Gas sensors MQ2 (Smoke gas sensor module)

This flammable gas and smoke sensor detects the concentrations of combustible gas in the air and outputs its reading as an analog voltage. The sensor can measure concentrations of flammable gas of 300 to 10,000 ppm. The sensor can operate at temperatures from -20 to 50°C and consumes less than 150 mA at 5 V.

## Block diagram




## Ultrasonic sensors

Ultrasonic sensors use sound waves rather than light, making them ideal for stable detection of uneven surfaces, liquids, clear objects, and objects in dirty environments. These sensors work well for applications that require precise measurements between stationary and moving objects.

## Temperature sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ± 1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

## Wireless bluetooth RS232 TTL transceiver module

This is the EGBT-046S Bluetooth Modem module that we use in our HT Bluetooth Module. These modems work as a serial (RX/TX) connection, and are a great wireless replacement for serial cables. Any serial stream from 1200 to 115200 bps can be passed seamlessly from your computer to your target. The module has a pin spacing of 1.5 mm. This is a 3.3 V device and should not be connected to 5V systems without level conversion.

The EGBT-046S Bluetooth Module is a generic Bluetooth device loaded with SPP firmware for UART wireless cable replacement functions.

### DC Motors

DC motors are generally more powerful than servos in terms of speed and torque. Microcontroller could not accurately control DC motors without a motor controller. Therefore, motor Controllers are needed. An encoder used to get feedback from the DC motor.

## RESULTS AND DISCUSSION

The project is made with Pic Mincrocontroller, gas sensors, Wireless Bluetooth RS232 TTL Transceiver Module, DC Motors, Ultrasonic sensor, Temperature sensor to find out the area having fire and keep it off. This project can be further extended with including camera to find out the path it is travelling.

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