

# AUTONOMOUS AND MANUAL VOICE OPERATED FIRE FIGHTING ROBOT

Dr. T. Sasilatha<sup>1</sup>, H.O.D. ECE, SreeSastha  
Institute of Engineering and technology

T.Lavanya Kuresh<sup>2</sup>, ECE IV yr,  
SreeSastha Institute of Engineering and technology,  
[lavanya.andamans@gmail.com](mailto:lavanya.andamans@gmail.com),

M.Preethi<sup>3</sup>, ECE IV yr, SreeSastha Institute of  
Engineering and technology,  
[preethi2618.aug@gmail.com](mailto:preethi2618.aug@gmail.com),

M.Vinodhini<sup>4</sup>, ECE IV yr, SreeSastha Institute  
of Engineering and technology, [vino5335@gmail.com](mailto:vino5335@gmail.com)

## ABSTRACT

There are many different kind of catastrophe in natural and man-made disaster: earthquake, flooding, hurricane and they cause different disaster area like collapsed building, landslide.

In these situations, human rescuers must make quick decisions under stress, and try to get victims to safety often at their own risk. Fire losses throughout the world remains too high and firefighting too hazardous. They must gather information, determine the location and status of victims and the stability of the structures as quickly as possible so that medics and firefighters can enter the affected area and save victims. All of these dangerous and risky tasks are performed mostly by human and trained dogs. This is why since some years, mobile robots have been proposed to help them and to perform tasks that neither humans nor dogs nor existing tools can do.

In this project, we will focused only on robots which will work in this harsh environment of man-made structure like fire, buildings. Our aims to develop an economical fire robot, which works using PIC MCU, ultrasonic sensor controlled by android application. It can be used in areas where rescue is needed.

This robot can be control by two modes. In the Automatic mode, the direction of the Robot is controlled using ultrasonic Sensor. This Sensor will detect the obstacles and control the Robot accordingly. In Manual mode Android user will control the Robot via Bluetooth Communication through voice. The temperature and smoke sensor are used to detect the corresponding fire, immediately is unleashing the water on the particular area.

- Rescue operations are performed mostly by human and trained dogs where Fire fighters face risky situations while extinguishing fires

## EXISTING SYSTEM

and rescuing victims. Sometimes they lost their lives.

- GSM technology was used with no manual control.

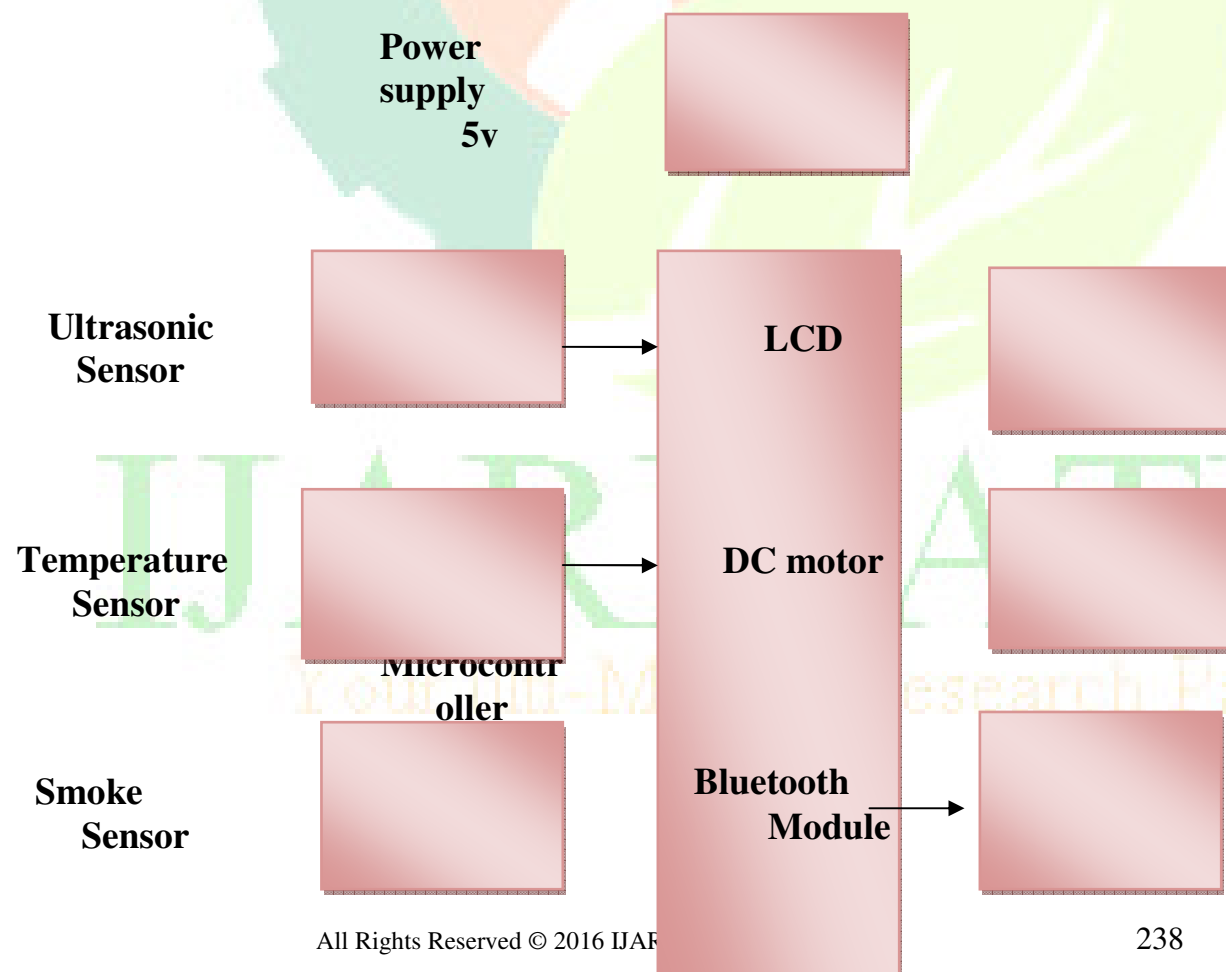
### PROPOSED SYSTEM

The proposed system consists of a simple circuit implemented in to the robot. The circuit module consist of a ultrasonic sensor, temperature sensor, smoke sensor, LCD for display and bluetooth for communication attached with PIC microcontroller. The main aim of this project is to set Automatic Fire Fighting and Direction control Voice based Wireless Robot.

The implementation will work in two modes. Automatic mode and Manual control mode. Both the

mode of operation of Robot can control via Android Application. In the Automatic mode, the direction of the Robot is controlled using ultrasonic Sensor. This Sensor will detect the Obstacles and control the Robot accordingly. In Manual mode Android user will control the Robot via bluetooth Communication through voice. The temperature and smoke sensor are used to detect the corresponding fire. If detected immediately unleashing the water on the particular area

### BLOCK DIAGRAM



Mobile

Bluetooth

## HARDWARE DESCRIPTION

- **MICROCONTROLLER - PIC16F877A**

It is high performance RISC CPU machine only have 35 simple word instructions. Operating speed: clock input (200MHz), upto 368×8bit of RAM (data memory), 256×8 of EEPROM (data memory), 8K×14

of flash memory. Wide operating voltage range (2.0 – 5.56) volts. 2, 8 bit timer and one 16 bit timer is available 10 bit multi-channel A/D Converter Synchronous Serial Port (SSP) with SPI (master code) and I2C (master/slave). 100000 times erase/write cycle enhanced memory. 1000000 times erase/write cycle data EEPROM memory.

- **POWER SUPPLY CIRCUIT**

The hardware of project requires power supplies 5V. The interfacing devices will get the supply from main microcontroller and the motor is driven by 12V so we use relay.

found with a wide range of applications and here it use to display the Temperature.

- **LCD**

LCD (Liquid Crystal Display) screen is an electronic display module and is

A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines i.e. 16x2= 32 characters. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

- **TEMPERATURE SENSOR**

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the temperature in Celsius (Centigrade).

The LM35 is rated to operate over a temperature range of –55° to +150°C. Here it notes the Temperature value and when the temperature cross the threshold value it sends information to controller.

A digital thermometer can be easily created by using LM35 temperature sensor and can be interfaced any microcontrollers.

- **GAS SENSOR**

The sensors contain two or three electrodes, occasionally four, in contact with an electrolyte. The electrodes are typically

fabricated by fixing a high surface area precious metal on to the porous hydrophobic membrane. The working electrode, contacts both the electrolyte and the ambient air to be monitored usually via a porous membrane. Here it detect the smoke coming from surrounding and flush out the water over the object.

- **BLUETOOTH DEVICE**

Bluetooth is a frequency hopping wireless communications technology. The Bluetooth device hops across the full 2.4 GHz Wi-Fi frequency band. Here it used at the time of manual control. Through Bluetooth we can send instruction to the robot for fighting against the Fire.

- **ULTRASONIC SENSOR**

Ultrasonic sensors are based on measuring the properties of sound waves with frequency above the human audible range. They are based on three physical principles: **Time of flight, The Doppler Effect, and the Attenuation of sound waves.** Here when the is operated in order to prevent it from accident we use Ultrasonic Sensors. Ultrasonic sensors are non-intrusive in that they do not require physical contact with their target, and can detect certain clear or shiny targets otherwise obscured to some vision-based sensors. On the other hand, their measurements are very sensitive to temperature and to the angle of the target.

## **WORKING OF MODEL**

Robot uses microcontroller to drive flame sensors and Smoke sensors, and transmit distance range to main controller of the fire fighting robot through series interface. To drive the all the components 5v dc and 12 v dc are required. The mains give the 230v ac so first we step down the 230v ac in to 12v ac by using Regulator. The error pulses are eliminating by using capacitor filter. Then the output at the parallel of the capacitor is the 12v dc. But the Micro Controller is work on 5v dc .To convert the 12v dc into 5v dc a regulator (7805) is used. The output of the regulator is constant irrespective of the input voltage. The Micro Controller requires the preset logic circuit for protection of the internal program and internal clock in case of power failure. A sudden change in the power may cause data error resulting in the corruption of the internal program. The reset logic circuit contains one capacitor and a resistor. The driver circuit generally made by using one transistor and one relay. The driver circuit is mainly operated by the Micro Controller. The Micro controller changes the state of the output pin from the low to high,



i.e. from 0 level to the 1 level. The transistor will act as an ON/OFF switch corresponding to the input of the base. These conditions will be used to control the relay. The thermal sensors provide the senses the heat from within the room. First sensor will give the data to the micro controller if it finds the heat. The micro controller pin bit will goes low when the fire is present. The micro controller will always scan the input signal of sensors. If the first sensor gives the data about fire to the micro controller, it then finds the movement to reach the fire by calculating the input data. The micro controller can give the output to two motors. One motor is used to move in forward direction to reach the destination point and the other is used to put off the fire. After end of fire the robot will go back to the original position.

#### **ADVANTAGES**

- It is a safe method for rescue operation to detect fire accident.
- It uses Bluetooth technology to send the message quickly
- It is fast and accurate
- It reduces the work load
- Number of staff is not required more
- Maintenance cost is low

#### **DISADVANTAGE**

- Range is less.
- Cost is higher when we use fire Extinguisher.

#### **FUTURE SCOPE:**

In the present condition it can extinguish fire only in the free open area and not in all the rooms. It can be extended to a real fire extinguisher by replacing the water carrier or by a carbon-di-oxide carrier and by making it to extinguish fires of all the room using microcontroller programming.

#### **CONCLUSION**

Automatic and manual controlled alive human detection robot has been getting designed. The Microcontroller is reprogrammable so that we can reprogram it when we need modify the features. bluetooth band range is 2.4GHz. Remote controlling is designed for limited distance using Android App design. Also in feature if we can add wireless camera to monitor the alive human body.

#### **REFERENCE**

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Amir M. Naghsh  
Sheffield-Hallam, University, Sheffield,  
UK [naghsh@shu.ac.uk](mailto:naghsh@shu.ac.uk)  
Jeremi Gancet, Space Applications  
Services, Zaventem,  
Belgium [jg@spaceapplications.com](mailto:jg@spaceapplications.com)  
Andry Tanoto, Heinz Nixdorf Institute, University  
of Paderborn, Paderborn,  
Germany, [tanoto@hni.upb.de](mailto:tanoto@hni.upb.de)  
Chris Roast, Sheffield-Hallam, University, Sheffield,  
UK [c.r.roast@shu.ac.uk](mailto:c.r.roast@shu.ac.uk)

##### **[2] AUTOMATIC AND MANUAL CONTROLLED ALIVE HUMAN DETECTION ROBOT DURING DISASTER MANAGEMENT** Shwetha R1, Dr. Chethan H K2

1M.Tech Student, 2Associate Professor  
Dept. of Computer Science & Engineering  
Maharaja Institute of Technology, Mysore

**[3]FIRE FIGHTING ROBOT**

**M.Nithiya&E.Muthamizh , II Yr - ECE**  
**IFET College of Enginnering**

**[4]APPLICATION OF**

**“MECHATRONICS”ALPHA I (FIRE  
FIGHTING ROBOT)**

**Anand Mohan Misra<sup>1</sup>, Mohd. Maroof Siddiqui<sup>2</sup>,  
Priya Gupta<sup>3</sup>, Pameer Singh<sup>4</sup>**

*1 Integral University Lucknow, India,  
[anandmohanmisra7@gmail.com](mailto:anandmohanmisra7@gmail.com)*

*2 Dept of ECE, Integral University Lucknow, India  
[maroofsiddiqui@yahoo.com](mailto:maroofsiddiqui@yahoo.com),*

*3Integral University Lucknow, India,  
[gupta101192@gmail.com](mailto:gupta101192@gmail.com)*

*4Integral University Lucknow, India,  
[pamirisagenius@gmail.com](mailto:pamirisagenius@gmail.com)*

**[5]FIRE FIGHTING ROBOT**

**Sahil S.Shah<sup>1</sup>, Vaibhav K.Shah<sup>2</sup>, Prithvish  
Mamtora<sup>3</sup> and Mohit Hapani<sup>4</sup>**

*1,2,3,4D.J.Sanghvi College of Engineering, Vile Parle  
– West, Mumbai, India*

*Dr.S.Bhargavi*

*Electronics and Communication Engineering*

*S.J.C.I.T*

*Chikballapur, Karnataka, India*

**[6]DESIGN OF AN INTELLIGENT COMBAT  
ROBOT FOR WAR FIELDS**

*S.Manjunath*

*Electronics and Communication Engineering*

*S.J.C.I.T Chikballapur, Karnataka, India*

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