Voice Controlled Intelligent Fire Extinguisher Robot

E.V.Sivakumar[1], P.Manoj[2], S.Punithadevi[3], S.Sherlin Sylvia[4], M.Thangaraj[5]
[1, 2, 3, 4, 5] K.S.Rangasamy College of Technology, Tiruchengode, Tamil Nadu

Abstract- *The need for a device that can detect and extinguish a fire on its own is long past due. Many house fires originate when someone is either sleeping or not home. This paper demonstrates the voice controlled intelligent fire extinguisher robot which is used to extinguish the fire disaster area where the human being cannot reach. This is designed under the low cost where the robot can be used as fire protection system in buildings and various places. The Robotic vehicle has a camera mounted on it whose direction can also be controlled using voice commands. The proposed vehicle has a CO2 blower which is capable of spraying the gas to extinguish fire. The Robot can be moved towards the required direction according to the given voice command. This project describes a new economical solution of robot control systems. The presented robot control system can be used for different sophisticated robotic applications. Speech recognition is the process of recognizing the spoken word to take necessary actions accordingly. The vehicle is capable of detecting obstacles and senses the fire using flame sensor. Here the buzzer is used to alert the completion of the fire extinguisher. To perform this intelligent task, PIC16F877A microcontroller is used which is loaded with the embedded C language.*

Keywords:- Microcontroller, Speech recognition, Flame sensor, Buzzer, CO2 blower, Obstacle Detector

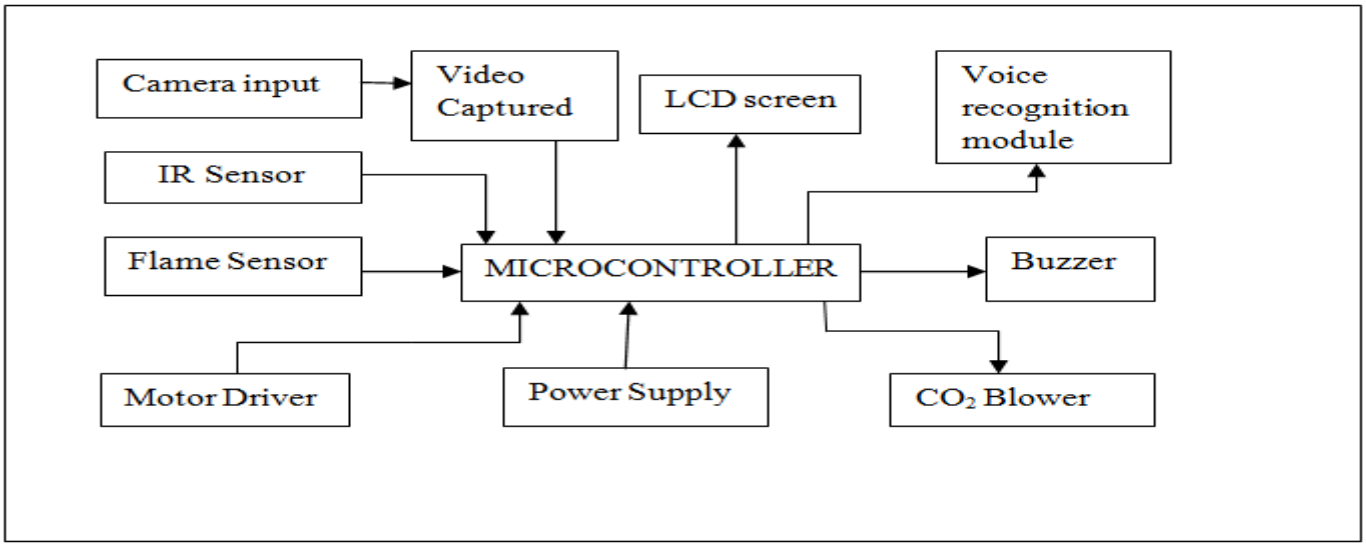
I. INTRODUCTION

Fire fighters face risky situations when extinguishing fires and rescuing victims, it is an inevitable part of being a fire fighter. In contrast, 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. In other words, robots decrease the need for fire fighters to get into dangerous situations. This robot provides fire protection when there is a fire in a tunnel or in an industry by using this robot which it reduces the human work and the fire can be easily extinguished. In this project speech recognition plays a major which is the controller of the robot. By giving the voice command the robot moves according to the command given by the user. The special feature of our project is that our visual basic program control window based voice recognizing software. So for controlling any movement of robot we have to just speak name of movement. The voice recognizing software compare our voice with already stored voice, if match found robot start executing command according to voice command, otherwise it give error message.

After going through all papers, we came to a conclusion to do a project on building a fire-extinguisher robot that can be controlled through our voice.

II. METHODOLOGY

A. Block Diagram



B. Construction

In this frame work our paper comprises of a camera which is used to see the live video by the user and the CO2 blower is used to extinguish the fire.

III. PROJECT DESCRIPTION

The schematic representation of the project is given here. The block diagram consists of microcontroller which acts as a base part of the project. When the voice command is given the voice recognition module senses the speech and reaches the microcontroller. By this the robot moves according to the given voice command. The flame sensor detects the flame and reaches the microcontroller which it allows the CO2 blower to extinguish the fire. Obstacle may present in the pathway of robot. To avoid obstacle IR sensor is used which it indicates the user to avoid obstacle. The fired area can be viewed by the LCD display which it sends the video signal to LCD display and can be viewed by the user. This helps where the human being cannot reach.

1. 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

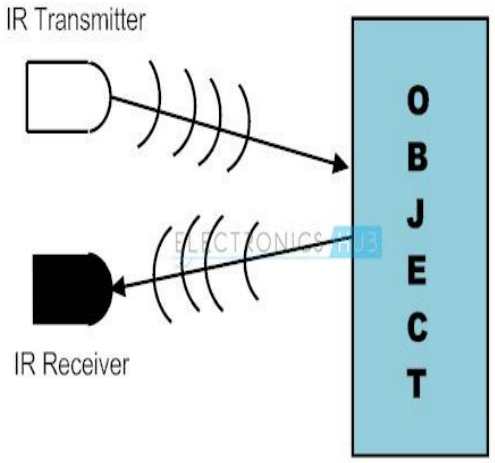
2. VOICE RECOGNITION

Speech recognition is an important asset for a robot, increasing its ability to interact with human beings and above all using their most natural form of communication. Here the commands are stored in the microcontroller using the embedded C language. By this the few commands are stored which the robot have to act by the human command. If the user says the command it moves towards the required direction.

3. FLAME SENSOR

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Flame detectors respond to the production of one or a combination of ultra-violet or infrared spectrums of electromagnetic radiation. These detectors are often used in situations where there is a potential for the rapid development of fire such as flammable liquids. These detectors comprise an electronic circuit with an electromagnetic radiation receiver. Flame detectors are actuated when they receive electromagnetic radiation from one or more defined wave lengths are received according to their design in the ultra-violet or infrared spectrum. This sends the signal to the microcontroller and alerts the user about the fire.

4. OBSTACLE DETECTOR



The energy emitted by the infrared source is reflected by an object and falls on the infrared detector. The positioning of the IR LED and the IR Receiver is an important factor. When the IR LED is held directly in front of the IR receiver, this setup is called Direct Incidence. In this case, almost the entire radiation from the IR LED will fall on the IR receiver. Hence there is a line of sight communication between the infrared transmitter and the receiver. If an object falls in this line, it obstructs the radiation from reaching the receiver either by reflecting the radiation or absorbing the radiation.

5. CAMERA AND VIDEO

In this the camera is mounted on the robot which is used to see the live video of the fired area. This is mainly useful for the human where the human being cannot enter into that area. The captured video can be viewed by the LCD display.

6. CO2 BLOWER

It is used to extinguish the fire in the fire captured area. The CO2 blower is mounted on the robot. When the command is given by the user the CO2 gas is sprayed over the fire

7. MOTOR DRIVER

L239D is a typical motor driver IC which allows DC motor to drive on either direction. L239D is a 16-pin IC which can control a set of two DC motors simultaneously in ant direction. It means that it can control two DC motor with a single L239D IC. It works on the principle of H-bridge. H-bridge is circuit which allows the voltage to be flown in either direction. As we know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction. Hence the H-bridge IC are ideal for driving a DC motor.

IV. APPLICATIONS

1. It is used in hazardous places.
2. The IR sensor in the robot will sense the obstacles and it will make decisions according to the obstacles it encounters.
3. Construction of speech based intelligent fire extinguisher vehicle system.
4. Live images feed back through wireless video camera.
5. Obstacle detection capability

V. CONCLUSION

In conclusion, this voice controlled fire extinguishing robot, was developed had fulfilled its objective of achieving versatility and efficiency in operation. This Robot can successfully extinguish the fire without any human risk. All the experiment had been successfully carried out and the results are credible. This project is to prevent the fire from spreading which could cause further damage and extinguish before it spreads. This will reduce the loss of properties and save human lives.

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