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VOICE CONTROLLED WHEELCHAIR

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ABSTRACT

The project aims at controlling a wheelchair by means of human voice. It enables a disabled person to move around independently, using a voice recognition application which is interfaced with motors. The prototype of the wheelchair is built using a microcontroller, chosen for its low cost, in addition to its versatility and performance in mathematical operations and communication with other electronic devices. The system has been designed and implemented in a cost effective way so that if our project is commercialized the needy users in developing countries will benefit from it.

GENERAL TERMS: *Wheelchair, Low Cost, Automatic, Voice controlled.*

KEYWORDS: *Voice controlled wheelchair, Fire Sensor, Obstacle avoidance technique.*

I. INTRODUCTION

Persons in the present world are busy in their professional life, so they do not get sufficient time to take care of the disabled people in their home. It may be expensive for the household to afford a care taker for these persons.

Today's people has to manage home along with their office work simultaneously. After long working hours, they have to take care of the home along with these disabled persons. They may not get enough time to take care of disabled persons.

The system is designed to help physically disabled persons to move around in home. The design aims at following points:

1. Wheelchair starts moving when voice command is given.
2. Sounds an alarm/buzzer when detects an obstacle nearby.
3. Sounds a fire alarm if the wheelchair detects fire nearby.
4. Wheelchair has an emergency switch which when pressed, text message will be send to the predefined mobile users automatically which indicates that the person needs someone for some work.

ORGANISATION: Section (1) deals with the introduction of the research paper. Section (2) gives a brief description of the proposed design, which includes the basic principle, block diagram and circuit diagram.

II. PROPOSED DESIGN

2.1 Basic Principle:

Sound level of physically disabled person in dB and the wheelchair moves as the amplified signal is generated from the voice input. This amplified signal is then converted into a digital signal.

2.2 Block Diagram

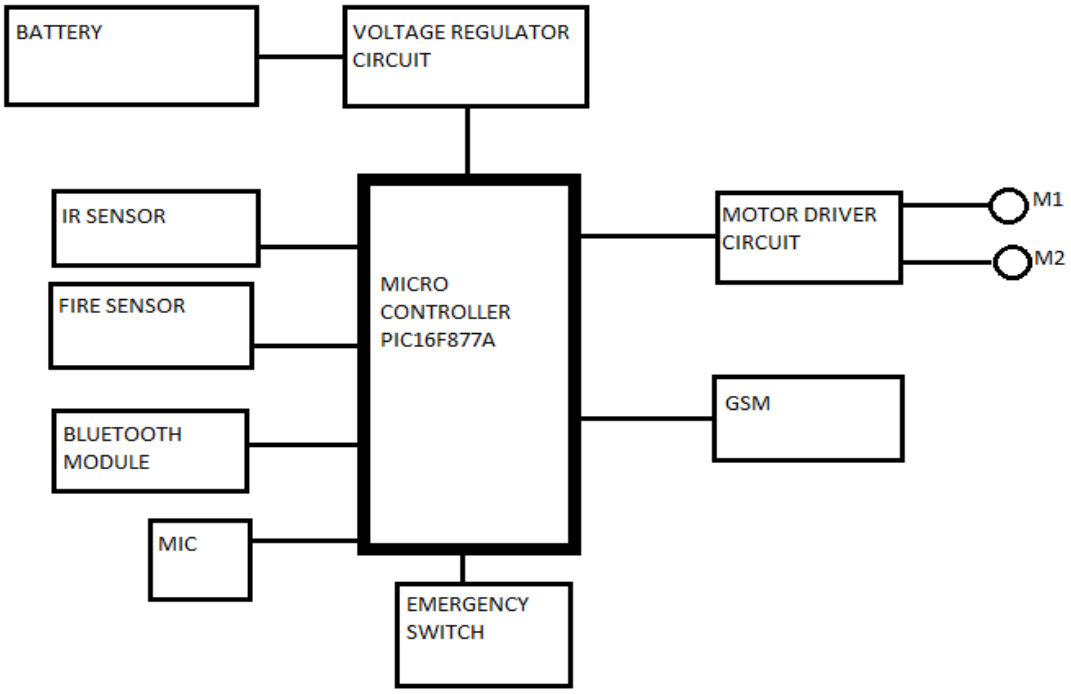

Figure 1 Block Diagram of Voice Controlled Wheelchair

2.2.1 MIC: When physically disabled person speaks when sitting on wheelchair, microphone detects the voice and converts the sound signal into electrical signal. The electrical signal is then fed into amplifier.

2.2.2 Signal Conditioning: Signal amplification is done here. Op-amp is used as amplifier for signal conditioning circuit. The electrical signal from MIC is provided as input to the circuit. The output from MIC is amplified by op-amp so that it can be used by microcontroller.

2.2.3 Microcontroller: PIC16F877A is used to receive the amplified signal and convert this amplified signal to digital signal. Microcontroller controls the driver circuit that starts a motor and moves the wheelchair. Microcontroller also controls the buzzing of alarm when the wheelchair detects an obstacle and fire nearby.

2.2.4 Motor Driver Circuit: Motor driver circuit consists L293D IC, which supplies essential power to drive the motor. This isolates the PIC and ICs from electrical problems.

2.2.5 Motor: DC motor is used to move the wheelchair. We are using DC motors which are having planetary gear box. It is connected to PIC through a driver circuit. The driver circuit protects PIC from back EMF

2.2.6 Fire Sensor: It is a fire sensor LM358 are operational amplifiers which can operate with only a single power supply voltage, have true-differential inputs, and remain in the linear mode with an input common-mode voltage of 0 VDC. These amplifiers operate over a wide range of power supply voltage with little change in performance characteristics. At 25°C amplifier operation is possible down to a minimum supply voltage of 2.3 VDC.

2.2.7 Alarm: Alarm will be generated on two conditions:

1. When wheelchair is about to come in contact with any obstacle nearby.
2. When wheelchair detects fire nearby.

2.2.8 GSM: When an emergency switch interfaced with GSM module is pressed text message is send to predefined mobile users which indicates that person needs some personal attention.

2.2.9 Bluetooth Module: HC05 Bluetooth to serial port module is an easy to use Bluetooth SERIAL PORT PROTOCOL module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR(ENHANCED DATA RATE) of 3Mbps.

2.3.0 IR Sensor: An IR LED, also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760 nm wavelength. Such LEDs are usually made of gallium arsenide or aluminum gallium arsenide. They, along with IR receivers, are commonly used as sensors.The appearance is same as a common LED. Since the human eye cannot see the infrared radiations, it is not possible for a person to identify whether the IR LED is working or not, unlike a common LED.

2.3 Circuit Diagram

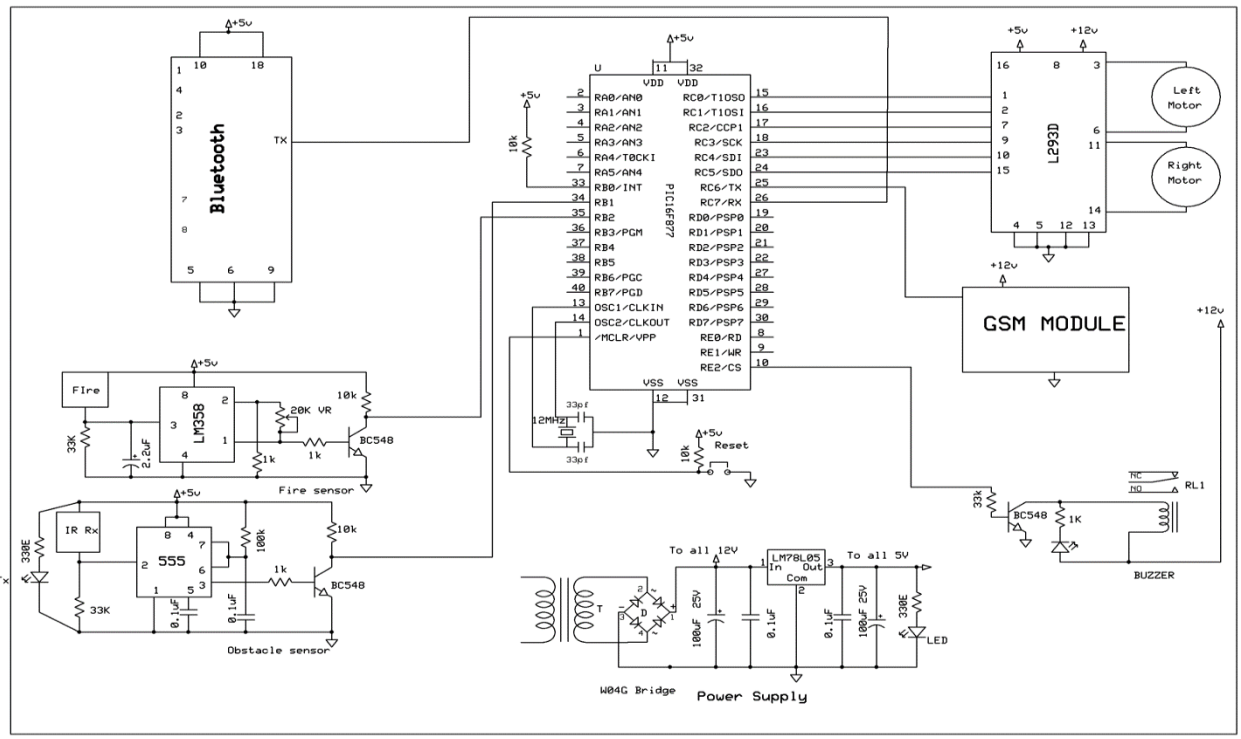

Figure 2 Circuit Diagram of Power Supply and Wheelchair

2.4 ACTUAL HARDWARE IMPLEMENTATION

Figure 4 Actual Hardware Implementation

III. RESULT & DISCUSSION

The system is programmed in such a way that it moves the motors of the wheelchair when the microphone gets the sound of more than 20 dB but when the system is placed in noise, commands are not taken properly by the system. The proposed design is working properly but with some errors like the speed of DC motor is a bit high, which has to be calibrated during implementation.

IV. FUTURE WORK

We can use GPS navigation system for further navigation. The remote monitoring desktop show the direction in which the physically disabled person is moving. This direction indication can be replaced by the actual image of the wheelchair by using camera on the wheelchair. Home appliances control circuit can also be interfaced with the wheelchair.

V. CONCLUSION

Looking after physically disabled persons is hard problem worldwide. Looking after physically disabled persons is our moral ethics. This system emphasizes the importance of physically disabled person's care. The above designed system is economical and user friendly and very useful for working family members. They can manage their work efficiently.

With the development of technology day to day work has been eased for family members along with person care who is using this wheelchair.

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