Voice Controlled Autonomous Wheelchair Using IoT

S. Sangeetha[1], S. Vigneshwari[2], R. Dhinakaran[3], M. Prabu[4], R. Karpagam[5]

[1,2,3,4]*UG Student, Department of Biomedical Engineering, Rajiv Gandhi College of Engineering and Technology, Puducherry, India*

[5]*Assistant Professor, Department of Biomedical Engineering, Rajiv Gandhi College of Engineering and Technology, Puducherry, India*

***Abstract*: This paper describes design and implementation of voice controlled autonomous wheel chair using internet of things (IoT). Physically disabled personal can move to various places with a help of voice controlled wheel chair and if any emergency occurs, a call can be generated automatically to his/her guardian. Voice commands are given as the input to the wheelchair and an alarm system is fixed for giving an alert to take tablet at given period. The main advantage is that only a particular person can control the wheel chair using voice command. The voice command is given through a mobile phone which is transmitted to the IoT, then the motor rotates according to the IoT's input.**

***Keywords*: IoT, Voice controlled, Wheelchair.**

1. Introduction

Now a days, the disable patients cannot move from one place to another without an help of another person. So, the wheelchair was first introduced to move independently. Then further it is implemented as joystick control, which can be controlled by the joystick and it is located in the wheelchair itself. Then gesture control was made to the wheelchair in which the hand gesture is given as the input to the wheelchair. The entire wheelchair can be controlled by the patient. The eye blink control wheelchair is introduced where the entire setup can be controlled by blinking the eye. And another method is controlling the wheelchair by using mobile application. The above wheelchairs which are controlled by the joystick and gesture have many disadvantages. The joystick controlled wheelchair cannot be used by paralyzed patients and the gesture control wheelchair can be miss directed easily when there is no proper conscious. To overcome this, the voice control wheel chair was introduced which can be controlled using voice commands as the input signal. The wheelchair can be controlled and directed according to the patient command.

2. Literature review

Generally, physically handicapped person can move with the help of the wheelchair using voice controlled technology and further implementation was made in that wheelchair like voice commands and also using hand, gesture control. Wheelchair is made up of motors and steel rods in olden procedures. The basic limitation in the reference papers are referred and noted:

- *Low cost self-assistive voice controlled technology or disabled people*: the main of this paper is to control the wheelchair using pic controller and it can also control the home appliances.
- *Smart electronic wheelchair using Arduino and Bluetooth module*: It controls the wheelchair using Arduino.
- *Voice controlled autonomous wheelchair*: In this the voice recognition module is used but it has less accuracy.
- *Voice controlled intelligent wheelchair*: this paper can control the wheelchair but only few voice can be recognized, it causes limitation.

3. Hardware required

The components used in it are:
- Microphone
- IoT
- GY 87
- GY 257
- Buzzer
- Relay
- DC motor

A. Microphone

Microphone is used to get the input signal from the patient. It converts sound signal into a corresponding electrical signal, it acts as the transducer. The microphone circuit captures the sound waves accurately. It can record, transmit and amplify the audio signal. It is the main source for collecting the data and it is transmitted to the IoT, the google assistant will get the signal first and transferred to IoT.

B. IoT

The IOT used here is ESP8266. This IoT is a microchip which can connect Wi-Fi and transfer data easily, it is a 32-bit microcontroller and uses digital output. This also has 17 GPIO pins and 11pins can be used remaining 6 pins are flash memory

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pins. It contains 2.4 GHz Wi-Fi. The IoT is connected to the mike and a mobile application is created for giving the input to the wheelchair. The program for controlling the wheelchair is fed into the IoT ESP8266 and also it has the program for creating the call to the guardian when emergency occurs.

C. GY87

Gyrosensor87 is the 3-axis accelerator, the 3-axis are x,y,z – axis direction. The fig. 1 is the sensor used in our project. It is used in this project for motion detector where the patient cause's seizure it gives the signal automatically to the IoT and the call is stimulated to the patient guardian.

Fig. 1. GY87

D. GY527

GY is used as a tilt switch here. The wheelchair when deflected from the path or it fells it will indicate to the IoT automatically. The cost is low when compared to vibrational sensor, so that gyro is preferred. It is connected to the IoT device as the input. The use of this gyro sensor is to measure the direction of all sides.

Fig. 2. GY527

E. Buzzer

The purpose of the buzzer is for creating an alarm or to make a sound. It is used for a reminder. A sound signal is produced according to the time interval. Buzzer produces an audio signal and it can be used as alarm.

F. Relay

Relay is a type of switch that closes and opens the circuits electronically. When motors are connected to control the circuit, the microcontroller cannot drive the over load, the components can be short circuited or it can be damaged. In that case, the current should be controlled and give to the controller, for that purpose relay is used.

G. DC motor

DC motor is used to rotate the wheelchair according to the instruction given by the user. DC motor direct electrical energy into mechanical energy. Two DC motors are used here for rotating the wheels of the chair.
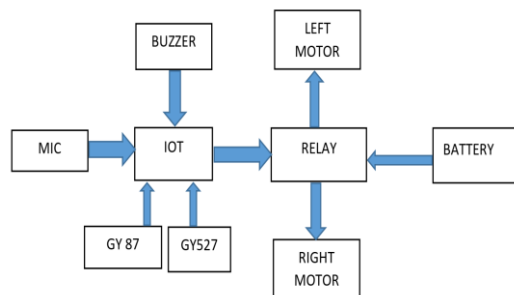
4. Block diagram

Fig. 3. Block diagram

A. Description

The above block diagram represents the working of the wheelchair; the mike will get an input from the patient it converted into audio signal. The signal is then passed into the IOT, a program for rotating the wheel chair is fed into the IOT controller. Then the signal is passed to the motor according to the 5instruction given by the user or the patient. The command used here is right on, left on, stop, move front and move back. Then sensors are connected to the IoT controller, the sensors used in it are GY87, GY527. And buzzer is also connected to it.

This project is about when the person falls from the wheelchair if guardian is not near them, a call is automatically send to the guardian. For that case GY 87 is used, it senses the path of the wheel chair when the wheelchair deviates from the normal path or the chair get disturbed or an obstacle occur it senses and give an instruction to the IoT. This IoT will generate the call to the guardian, the work of the GY 257 is also similar. This will sense the vibration of the patient it is fixed in the wheelchair so that when the seizure occurs to the patient it will indicate or senses by the gyro and gives the instruction to the IoT controller, this IoT makes the call. The program for controlling the wheelchair and the program for making a call for the guardian for the above cases is already programed to the chip.

The battery is connected to the motor and a relay is present next to that because replay controls the flow of current. The IoT require only 5 volts, when more voltage is given the components inside the IoT will get damaged and it can be destroyed and misleads the wheelchair. So the voltage is controlled by the relay in this 2 replay is used for the 2 motors. The buzzer is used here for the remainder; an alarm is created according to the time interval. A program, is fed for that, when a patient has to take tablet an alarm is created or generated for the convenience of the patient.

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Table 1

DIRECTION	IoT I/P 1	IoT I/P 2	RELAY 1	RELAY 2
RIGHT	H	L	H	L
RIGHT	L	H	L	H
LEFT	L	H	L	H
LEFT	H	L	H	L

Fig. 4. Flow chart for voice control

The above flow chat represents the working of the voice commands.

Program:

5. Conclusion

This IoT based project has reduced the work of the physically handicapped person. Then it is also useful for paralysis people who cannot operate the wheelchair using hands. They can move independently. They can be monitored by the guardian when they are not near them. Indication for taking tablet.

6. Future scope

The project can be implemented further by adding sensors that indicate the urinary bag used for the dialysis patient, then the wheel chair can be converted into the stretcher, further the home appliances can be controlled by the software.

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