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REHABILITATIVE DEVICE BASED ON VOICE CONTROL SYSTEM

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Abstract: Voice-controlled devices are being explored for applications in various fields including medicine. The voice controlled technology has shown great promises for the differently abled persons to control rehabilitative devices without engaging their hands. This allows them to concentrate on the work to be done with hands. In the present study, a voice-controlled device was developed capable of wirelessly transmitting the control signals to the rehabilitative device. A wheelchair was used as a representative of the rehabilitative device and the technology can be extended for operating rehabilitation aids (e.g. voice-controlled wheelchair and environment control)., the device is proposed for the use by differently abled person

Keywords: zigbee, DC Motor Drivers, Microcontroller, Ultrasonic sensor, Voice recognition module.

I. INTRODUCTION

The idea of using voice activated technology for controlling the motion of the wheelchair and home automation are to prove that it can be a unique concept that would stand apart from the rest of the aveage projects. The use of this new technology in conjunction with a mechanical system in order to simplify everyday life and it would spark interest in an ever growing modern society. Many people with disabilities do not have the dexterity necessary to control a switch on an electrical wheelchair. This can be a great for the quadriplegics who is permanently unable to move any of the arms or legs. They can use their wheelchair easier only using voice commands and also they can control home appliances. The aim of this study is to implement an interesting application using small vocabulary word recognition system. The methodology adopted is based on grouping a microprocessor with a speech recognize development kit for isolated word from a dependent speaker. The resulting design is used to control a wheelchair and home appliances for a handicapped person based on the vocal command. The main objective of the project is to design and implement a wheelchair for disabled a person which is controlled by the voice of the user. There are seven conditions for basic motion of the wheelchair and control of home appliances to be applied by the user. Such as moving forward-backward turning right-left, static or stop and light on and off.

II. EXISTING MODEL

The existing model of wheelchair is the electronic wheelchair consists of joystick interface. Where the movement of wheel chair is controlled by the commands of the joystick through instructions given by the hand movement of the user. Disadvantages of the existing model are

1. Other systems cannot be connected to this existing system.
2. This system cannot be improved.

III. PROPOSED MODEL

The Wheelchair operates with voice, taking voice as an input signal for the movement of wheelchair in a particular direction. Now based on the voice signals the micro-controller is programmed to take decisions which in turn control the movement of wheelchair.

- When person gives voice signal as for ward direction, chair will move in forward direction.
- If person gives voice signal as backward direction, chair will move in backward direction.
- If person gives voice signal as left direction, chair will move in left direction.
- If person gives voice signal as right direction, chair will move in right direction.

IV. SYSYTEM DESCRIPTION

BLOCK DIAGRAM:

In this paper we have two block diagrams first block diagram explains about the wheel chair and the other block diagram explains about the environmental of the wheelchair. The block diagram of the wheel chair consist of Zigbee, Ultrasonic sensor, LCD, Arduino, Voice module, Power supply and motor drivers to control the movement of the wheelchair An ultrasonic sensor is connected to the wheel chair system in order to avoid obstacles collision. Fig 1 shows the block diagram of the wheel chair.

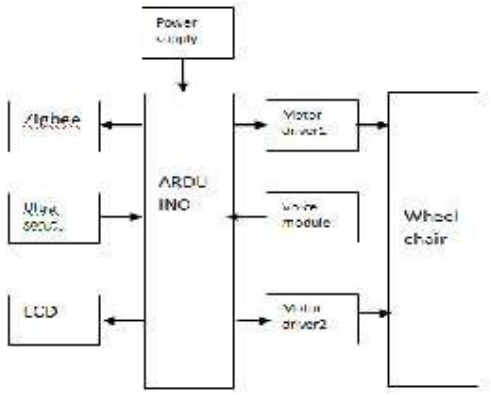

Fig.1 Block diagram of wheel chair

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In the other hand, fig 2 shows the block diagram of the environmental control. It consists of Zigbee receiver, LCD, Power supply, Arduino and relays.

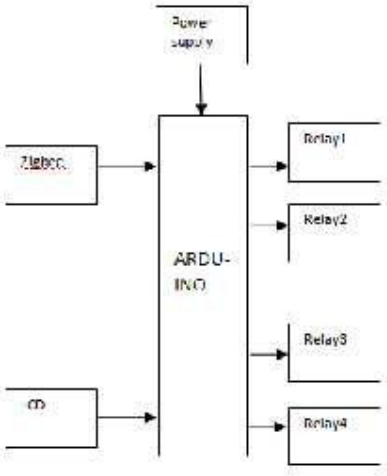

Fig. 2 Block diagram of environmental control.

Another arduino is interfaced with the receiver Zigbee and are connected to environmental control relays. (e.g. light, fan).

III SYSTEM CONSTRUCTION

Whenever a wheelchair voice command is given the voice module processes the information and gives appropriate data to the arduino to control, the wheel chair mechanism in the required manner. When the environmental voice command is given, the voice module sends the data to arduino which transmits the data to the other arduino via Zigbee .The data received is then processed by Zigbee and perform necessary action as requested by the user.

A. Microcontroller Unit

Since the proposed system is a part of a multi input control system a careful selection of the microcontroller unit is required. It represents the main part of the system. It must have special characteristics and specifications to cover the required input-output ports and peripherals of the system design. This will make the interface between the microcontroller and the input and output modules.

The Arudino Uno is selected as the microcontroller unit for the system. It is basically used in communications and in controlling or operating many devices. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins of which 6 can be used as PWM outputs, and in the remaining, 6 of them can be used as Ana log inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Fig. 1 shows the pins of microcontroller. It contains everything needed to support the microcontroller. It should simply connect to the computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

Fig. 3 circuit diagram for ATmega328 Arduino Uno

B. Obstacle Detection unit

Unit Here in this system we use Ultrasonic sensor as the obstacle detection unit. Ultrasonic sensors work on a principle similar to sonar which evaluates distance of a target by interpreting the echoes from ultrasonic sound waves Fig.2 shows the Ultrasonic sensor This module can easily be interfaced to micro controllers where the triggering and measurement can be done using two pins. The sensor transmits an ultrasonic pulse wave and produces an output echo pulse that corresponds to the time required for the burst echo to return to the sensor. By measuring the echo pulse width, the distance target can easily be calculated .

Fig. 4 Ultrasonic sensor

C. Voice Recognition module

Here in this system we use voice recognition board for the user to start and stop the movement of the wheel chair.

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Thus once the user gives the command "1" then the wheel chair gets started and operates according to the movement of the head. In the same way, when user gives the command "0" the wheel chair goes to off state that which means the functioning of the wheel chair will stop even if the head movement is present. Thus this device is been added so as to control the movement of wheel chair.

when the person is in rest position or when in unnecessary or unexpected movement of head while speaking or may be of his regular activities. Fig. 3 shows the voice recognition board used in system. Thus the voice recognition board is completely assembled and easy to use programmable speech recognition circuit.

The commands that you need can be programmed to recognize. It has 8 bit data out which can be interfaced with 16- bit PIC microcontroller. The audio input from the microphone can be given through the audio jack assembled in this board. The input command with their corresponding characters can be displayed in LCD. Thus here in this project we will use only two commands 1 and 0 which the board will detect and gives input to the microcontroller and controls the functioning of the wheel chair.

Fig. 5 Voice recognition kit

D. Motors Driver Unit

In motors driver unit we use DC motors for the movement of wheels in the wheel chair. DC motors are the electrical machines which convert electrical power into mechanical power and cause the movement of wheels.

Thus we use two DC motors two control the direction and movement of wheels motors.

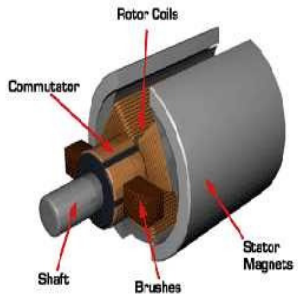

Fig. 6 DC Motors

VI. WORK DESCRIPTION

Wheelchair consist Ultrasonic sensor, which is used to detect if there is any obstacle present on the path of the wheel chair and sends the output signal through LCD. It also consists of zigbee transmitter. The next ne is voice recognition module, which is used to start and stop the functioning of the wheel chair.

All these three units are connected to the Arduino Uno microcontroller unit which is programmed using the embedded C technology will pass the instructions to the motor driver unit which is gives the signals for the DC motors to run the wheels of the wheel chair. Environmental control system consists of zigbee receives the signals from the zigbee transmitter of wheel chair and controls the relays present in the environmental control.

Voice signal	**Motor1**	**Motor2**
Forward	Clockwise	Clockwise
Backward	Anti Clockwise	Anti Clockwise
Turn right	Stops	Clockwise
Turn left	Anti Clockwise	Stops

VI. FUTURE WORK

This project can be extended by using a heartbeat sensors to this system. Heart beat sensor continuously monitors the heart rate, which can be designed such that alarm horns if the heart level goes beyond set level. We can make a wheelchair which can be operated by a wireless remote. Output of sensor can be applied to wireless transmitter circuit and can received at wheelchair circuit by receiver circuitry. So wireless operation can reduce wiring arrangements Researchers are going on development of handicap wheelchair using nervous system of human. By including GPS, position of the wheelchair can also be known. Wheel chair can be fitted with direct mind reader.

VII. CONCLUSION

In this paper, an auto-calibrated head orientation controller for rehabilitation application are proposed. The system aims to help quadriplegic, paralyzed and elderly patient to control robotic wheelchairs by using their head movements instead of traditional joystick controller

. The system is a part of a multi input control system, which also includes a voice controller to give the user control options to drive the system.

As the system is used for handicap and elderly users, obstacle avoidance system should is also been added

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to the system to provide higher safety conditions. This system gives independent movement and a psychological advantage of being independent. Some training is essential to use the accelerometer as its quite sensitive but in the end there could not be a better use of technology for an individual who is deprived of the same physical strength. A prototype of this system is experimentally tested. It is designed to be characterized by low price and higher reliability.

VII. REFERENCES

1. Skraba, Andrej, et al. "Prototype of speech controlled cloud based wheelchair platform for disabled persons." Embedded Computing (MECO), 2014 3rd Mediterranean Conference on. IEEE, 2014.
2. Sobia, M. Carmel, V. Brindha, and A. Abudhahir. "Facial expression recognition using PCA based interface for wheelchair." Electronics and Communication Systems (ICECS), 2014 International Conference on. IEEE, 2014.