Speech Based Wheelchair Controlled Using Voice Recognition Module

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Abstract-– Our project is about wheelchair controlled using the voice recognition module. Persons, who are with disabilities like Paraplegia, Quadriplegia. Voice recognition module acknowledges the command by the user and gives the trained data stored in the memory to the Arduino Microcontroller. Microcontroller controls the movement and direction of the wheelchair. IR sensor is also placed to avoid collision in the path of the robotic wheelchair. The cost of the wheelchair is kept low to make it affordable.

Keywords– Arduino microcontroller, voice recognition module, IR sensor, motor driver, BO motor.

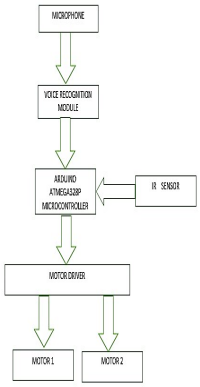
I .INTRODUCTION

Speech mechanism is simple and easy to access. The voice recognition module is used as a speech controlled device in our project. The voice recognition module makes it easy for people having severe problems like upper and lower limb disabilities. This voice kit is used to control the wheelchair for individual mobility. Voice kit is dependent on speaker (user). It easily interfaces Arduino microcontroller to process the voice commands. Five basic commands to the wheelchair such as forward, reverse, left, right, stop. IR sensor is used to ignore the barriers in the path.

II. LITERATURE SURVEY

In 2017, Timofei et al. proposed the patients or disabled people controls the movement of wheelchair without using a strength with various methods of using a wheelchair. Robotic wheelchairs are powered by electric or by battery. This wheelchair is controlled by joystick. Under BCI wheelchair can be controlled by voice and gesture control too. In 2015, Andrej et al. proposed a cloud-based wheelchair with WebKit Speech API, Voice commands are given through cloud application. The GUI module acts as browser to access in mobile video connections. The Javascript applying node is the software developed to function the wheelchair. In 2018, Khagendra Joshi et al. proposed a design of wheelchair for physically challenged people to access wheelchair in a comfortable manner. Disabled people are “sometimes, depending” on or accompanied by other people to assist them. It is more difficult to act according to their own or by themselves. They face many problems due to their disability to them. The created a smart wheelchair to their normal lifestyle.

III .METHODOLOGY

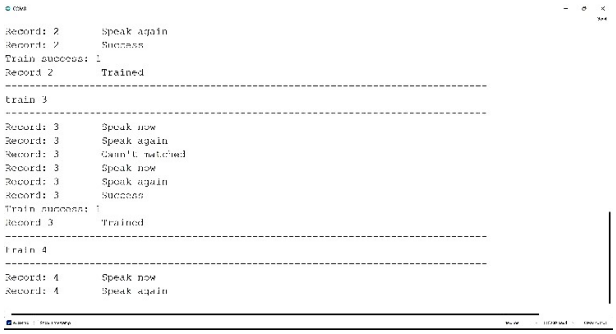


IV.VOICE RECOGNITION MODULE

Voice recognition module V3 is used and it supports maximum 80 voice commands. Voice 1500s (one or two words, speaking) and maximum 7 voice commands are affected at the same period. This board can control in 2 ways serial port and general input pins. General input pins on the board could generate several kinds of waves while communicate voice command acknowledged. A Speech recognition module to control the wheelchair through voice commands. The voice commands are given by the user. In the world there are 1.3 billion people who are handicapped. The wheelchair commercially controlled to assist people with upper and lower limb disabilities and who cannot be poverty-stricken. An Arduino microcontroller processes the speech signals as voice commands. A voice controlled wheelchair prototype was developed using an Arduino IDE (Integrated Development Environment.

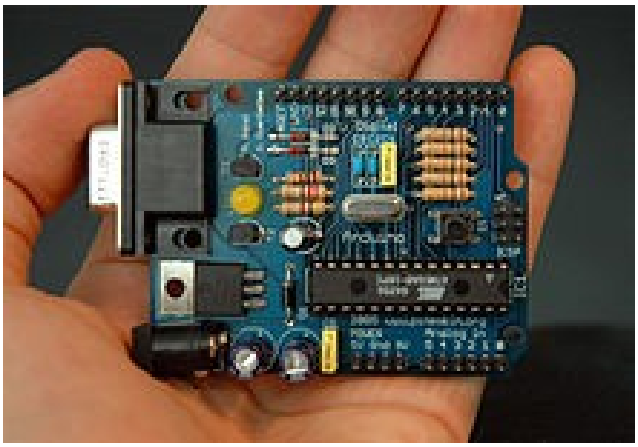
TRAINING VOICE RECOGNITION MODULE

The voice module has been trained with the forward, reverse, left, right, and stop controls.



V.ARDUINO UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino. Cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. [1] The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. [4] It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available. "UNO" means one in Italian and was chosen to mark the release of the Arduino Software (IDE) 1.0. The UNO board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases.[4] The UNO board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform The ATmega328 on the Arduino UNO comes preprogrammed with a bootloader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The UNO also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.



VI.EMBEDDED C PROGRAMMING

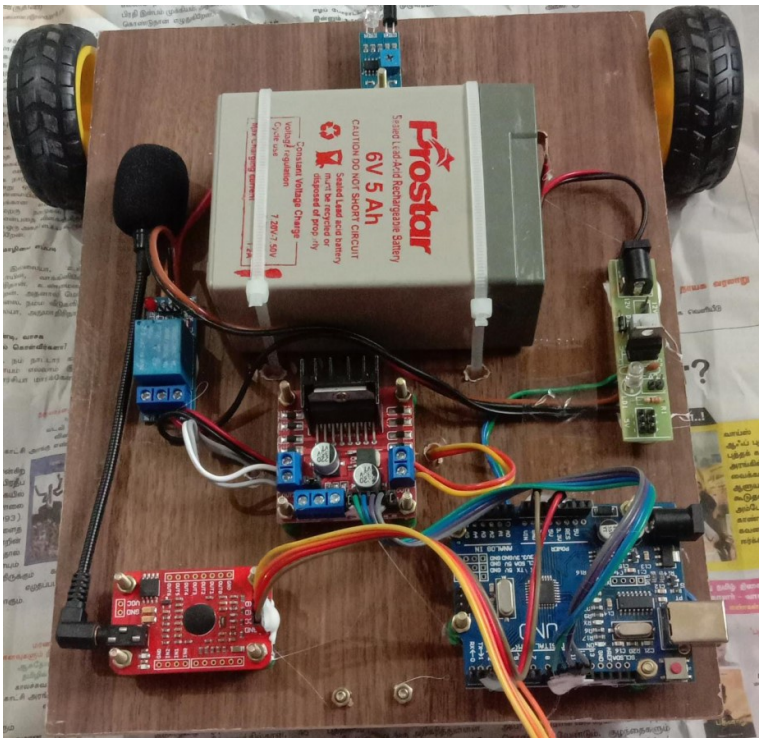
Embedded systems programming is different from developing applications on a desktop computer. Two salient features of Embedded Programming are code speed and code size. Code speed is governed by the processing power, timing constraints, whereas code size is governed by available program memory and use of programming language. The purpose of the embedded system programming is to get maximum functionality in minimum space and minimum time.

VII.IMPLEMENTATION

All the connections are given in the picture. The rectifier is an electrical device that converts an alternative current to direct current. As we discussed about the voice recognition module, the trained voice commands are referred and recognized and then processed for the movement of wheelchairs. This signals are caught by the Arduino UNO Microcontroller then send it to the motor driver to drive the motors for the motion of the wheelchair.

S.No	Commands	Direction
1	Forward	Move in front
2	Reverse	Move in backward
3	Left	Turn in left
4	Right	Turn in right
5	Stop	No movement

The lead-acid battery is used commonly because of their inexpensive compared to newer technologies. Most of the world's lead-acid batteries are automobiles starting, lighting and ignition batteries.



Hardware specification of Microcontroller

- Microcontroller: Microchip ATmega328p
- Operating Voltage: 5 Volt
- Input Voltage: 7 to 20 Volts
- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 20mA
- DC Current for 3.3V Pin: 50mA
- Flash Memory:32kb of which 0.5 KB used by bootloader
- SRAM:2 KB
- EEPROM: 1 KB
- Close Speed: 16 MHz
- Length: 68.6 mm
- Width:53.4 mm
- Weight:25g

Power supply components

- 7805 regulator IC
- 100 uF Electrolytic capacitor, at least 6V voltage rating
- 100 nF ceramic or polyester capacitor
- Rectifiers

VIII.FUTURE ENHANCEMENT

Development of speech recognition in the field of biomedical like wheelchair is more useful for patients to reduce their suffering because of their immobility.

- Home appliances may also induce in this wheelchair control.
- Multi choice position system may design for comfortable life style.
- Complexity of connections will be reduced.
- More sensors will also be placed for patient safety.

IX.CONCLUSION

Our project is successfully implemented by a voice recognition module interfaced with Arduino UNO. This paper helps to increase the knowledge about speech recognition system. It is easy access for children to elderly people with their simple and own requirements. We can use different languages for their convenience. The main cause of this project is buying the wheelchair that can be affordable by middle and local people to make their life simple and easily accessible. This makes people back to their rehabilitation life. Also, they helps mobility of an individual on their own. This increase the level of safety by using obstacle sensor to detect.

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