



Republic Of Iraq

Ministry Of Higher Education and Scientific Research

University of Al Qadisiyah

multimedia Department



Smart Wheelchair with Voice Control

Project submitted to the Council of the College
of Computer Science and Information
Technology / Multimedia Department as part
of the requirements for obtaining a Bachelor's
degree

By

Karar Haidar Sahip

Alaa Razak Khudair

Hassan abbas sahip

Saif Wael Naji

SUPERVISOR

Dr. shroouq jumaa



جمهورية العراق
وزارة التعليم العالي و البحث العلمي
جامعة القادسية

كلية علوم الحاسوب وتكنولوجيا المعلومات
قسم الوسائط المتعددة

كرسي متحرك ذكي مع التحكم الصوتي

بحث مقدم الى مجلس كلية علوم الحاسوب و تكنولوجيا المعلومات / قسم الوسائط
المتعددة كجزء من متطلبات نيل شهادة البكالوريوس

اعداد الطلبة

كرار حيدر صاحب

علاء رزاق خضير

حسن عباس صاحب

سيف وائل ناجي

باشراف

د. شروق جمعة

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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أَنْتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العلي العظيم

سورة البقرة (٣٢)

شكر وتقدير

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الاهداء

الى الذين بذلوا الارواح والمهج فداءً للوطن ، الذين
بتضحياتهم رسموا لنا نافذةً امل .. الذين تركوا كل مغريات
الدنيا و النعم من اجل المبادئ و القيم.

لتلك النفوس الابية و الطلعات البهية التي احتظنت العراق
بأرواحها و سقت ارضه بدمائها ... الى الشهداء الكرام نهدي
هذا الجهد المتواضع

ABSTRACT :

The main objective of our project is to design an automatic wheel chair using voice recognition. A voice controlled wheelchair makes it easy for physically disabled person who cannot control their movements of hands.

The powered wheel chair depends on motors for locomotion and voice recognition for command.

The circuit comprises of an Arduino, Voice recognition module and Motors. The voice recognition module recognizes the command by the user and provides the corresponding coded data stored in the memory to Arduino Microcontroller.

Arduino Microcontroller controls the locomotion accordingly. The wheelchair also has provision for joystick for physically disabled people who can move their hands.

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chapter 1

INTRODUCTION

Our project mainly aims at alleviating the problem for the physically disabled people and helps them monitor

themselves without depending on others for their life style.

Present world actually aims at blending the digital world with the physical world and help people make their life easy.

The present idea of our project is germane in that aspect where we try to interface human with the machine and help him communicate with the machine.

This project is based on the use and programming of Arduino.

What Exactly Is an Arduino?

Wikipedia states “Arduino is a single-board microcontroller designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open-source hardware board designed around an 8-bit Atmel AVRmicrocontroller, though a new model has been designed around a 32-bit Atmel ARM.

The software consists of a standard programming language compiler and a boot loader that executes on the microcontroller,, [12].

What is a microcontroller?

A microcontroller is an integrated circuit (IC) containing all main parts of a typical computer, which are as follows:

- Processor
- Memories
- Peripherals
- Inputs and outputs

The processor is the brain, the part where all decisions are taken and which can calculate.

Memories are often both spaces where both the core inner-self program and the user elements are running (generally called Read Only Memory (ROM) and Random Access Memory (RAM)).

I define peripherals by the self-peripherals contained in a global board; these are very different types of integrated circuits with a main purpose: to support the processor and to extend its capabilities.^[1]

Inputs and outputs are the ways of communication between the world (around the microcontroller) and the microcontroller itself.

The very first single-chip processor was built and proposed by Intel Corporation in 1971 under the name Intel 4004. It was a 4-bit central processing unit (CPU).

Since the 70s, things have evolved a lot and we have a lot of processors around us. Look around, you'll see your phone, your computer, and your screen.

Processors or microprocessors drive almost everything. Compared to microprocessors, microcontrollers provide a way to reduce power consumption, size, and cost.

Indeed, microprocessors, even if they are faster than processors embedded in microcontrollers, require a lot of peripherals to be able to work.

The high-level of integration provided by a microcontroller makes it the friend of embedded systems that are car engine controller, remote controller of your TV, desktop equipment including your nice printer, home appliances, games of children, mobile phones, and I could continue...

I also want to quote a particular music hardware development open source project: MIDIbox (PIC-, then STM32-based). [13]

This is a very strong and robust framework, very tweakable. The Protodeck controller is based on MIDIbox.[14]

Arduino has been used in thousands of different projects and applications. The Arduino software is easy-to-use for beginners, yet flexible enough for advanced users. It runs on Mac, Windows, and Linux. Teachers and students use it to build low cost scientific instruments, to prove chemistry and physics principles, or to get started with programming and robotics. Designers and architects build interactive prototypes, musicians and artists use it for installations and to experiment with new musical instruments. Makers, of course, use it to build many of the projects exhibited at the Maker Faire, for example. Arduino is a key tool to learn new things. Anyone - children, hobbyists, artists, programmers - can start tinkering just following the step by step instructions of a kit, or sharing ideas online with other members of the Arduino community.[2]

Now that you have understood you have a whole computer in your hands, let's specifically describe Arduino boards. [3]

chapter 2

THEORY

In this chapter we will give a general description of all the parts used in the completion of the project.

The part list:

- Arduino mini pro (with FTDI)
- Voice recognition modual with microphone
- 2 * motor dc
- Controller for dc motor
- Ultra sonic Senser (hc-sro4)
- Analoge joystick
- Lithum Battery (with battery holder square)
- ON-OFF- Switches
- Wires to conected

1) Arduino pro Mini

A general description of this type is now discussed:-

The **Arduino Pro Mini** is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, an on-board resonator, a reset button, and holes for mounting pin headers.

A six pin header can be connected to an FTDI cable or Sparkfun breakout board to provide USB power and communication to the board. The Arduino Pro Mini is intended for semi-permanent installation in objects or exhibitions.

The board comes without pre-mounted headers, allowing the use of various types of connectors or direct soldering of wires.

The pin layout is compatible with the Arduino Mini. There are two version of the Pro Mini. One runs at 3.3V and 8 MHz, the other at 5V and 16 MHz. The Arduino Pro Mini was designed and is manufactured by SparkFun Electronics.[4]

We have programmed this arduino using the language Arduino built by C, where we used the library of voice recognition .[5]

2) Voice Recognition Modul

The module could recognize your voice. It receives configuration commands or responds through serial port interface. With this module, we can control the car or other electrical devices by voice.

This module can store 15 pieces of voice instruction. Those 15 pieces are divided into 3 groups, with 5 in one group. First we should record the voice instructions group by group. After that, we should import one group by serial command before it could recognize the 5 voice instructions within that group. If we need to implement instructions in other groups, we should import the group first. This module is speaker independent. If your friend speaks the voice instruction instead of you, it may not identify the instruction. Please note that speaker independence requires strictly good MIC. The MIC we supply is not good enough for it to be speaker-independent.[6]

3) Motor dc

Small 3V DC Toy Motor for Arduino/Raspberry-Pi/Robotics

The Small 3V DC Toy Motor gives the mechanical throughput of 150 RPM simply used in different robotics purposes.[7]

Features of Small 3V DC Toy Motor:

- Voltage: 3V to 6V.
- RPM: 150 rpm.

Applications of Small 3V DC Toy Motor:

- These motors are normally used in toys, robotics purposes.[8]

Also Searched as : Small dc motor, 3v dc motor, 3v toy dc motor, Toy dc motor, Small dc motor for arduino, Small dc motor for quadcopter, Small 3v dc motor.

4) Ultrasonic Sensor

They are commonly used for a wide variety of distance measuring applications, non-contact presence, and proximity. These devices typically transmit a short burst of ultrasonic sound toward a target, which reflects the sound back to the sensor. The system then measures the time for the echo to return to the sensor and, computes the distance to the target using the speed of sound in the medium. Ultrasonic sensors work on a principle similar to Radar or Sonar, which evaluate attributes of a target by interpreting the echoes from radios or sound waves respectively. It is used as the obstacle detector in the hardware in reverse direction.[12]

Ultrasonic Sensor



Figure(2.1) Ultrasonic Sensor

5) Analoge joystick

A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. A joystick, also known as the control column, is the principal control device in the cockpit of many civilian and military aircraft, either as a center stick or side-stick. It often has supplementary switches to control various aspects of the aircraft's flight.[9]

Joysticks are often used to control video games, and usually have one or more push-buttons whose state can also be read by the computer. A popular variation of the joystick used on modern video game consoles is the analog stick. Joysticks are also used for controlling machines such as cranes, trucks, underwater unmanned vehicles, wheelchairs, surveillance cameras, and zero turning radius lawn mowers. Miniature finger-operated joysticks have been adopted as input devices for smaller electronic equipment such as mobile phones.[10]

Chapter 3

Practical

Currently the prototype of the project as the following :

This project was implemented concentrating to design a power wheelchair which has both control systems for the disabled having

- 1) voice controlled by microphone.
- 2) joystick.

Figure 3.1 shows the functioning of the wheelchair using voice commands and joystick :

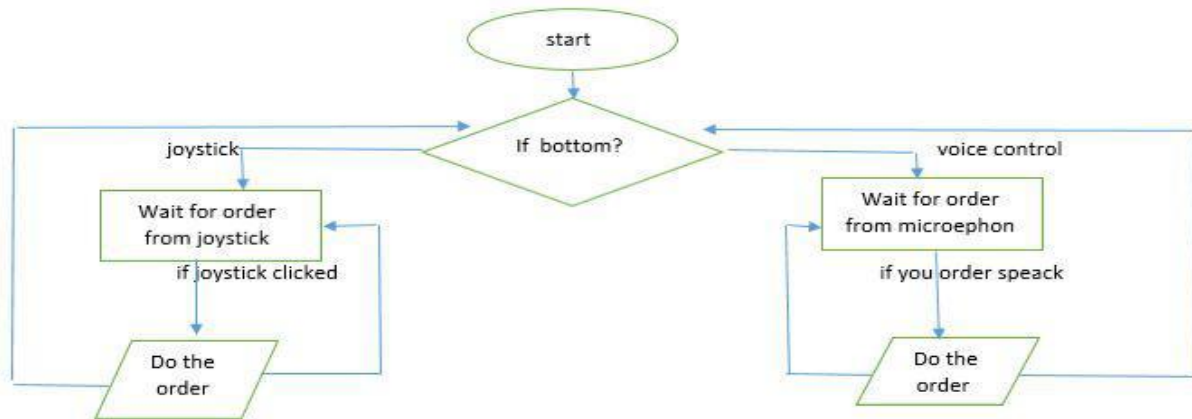


Figure 3.1 flowchart showing general discretion of the project.

As shown in Figure 3.2 the direction of the wheelchair depends on the user. For the forward command the wheelchair moves in forward direction. For the reverse direction the opposite movement of wheel rotation will occur.

The left command will make right wheel moves forward and left wheel moves backward.

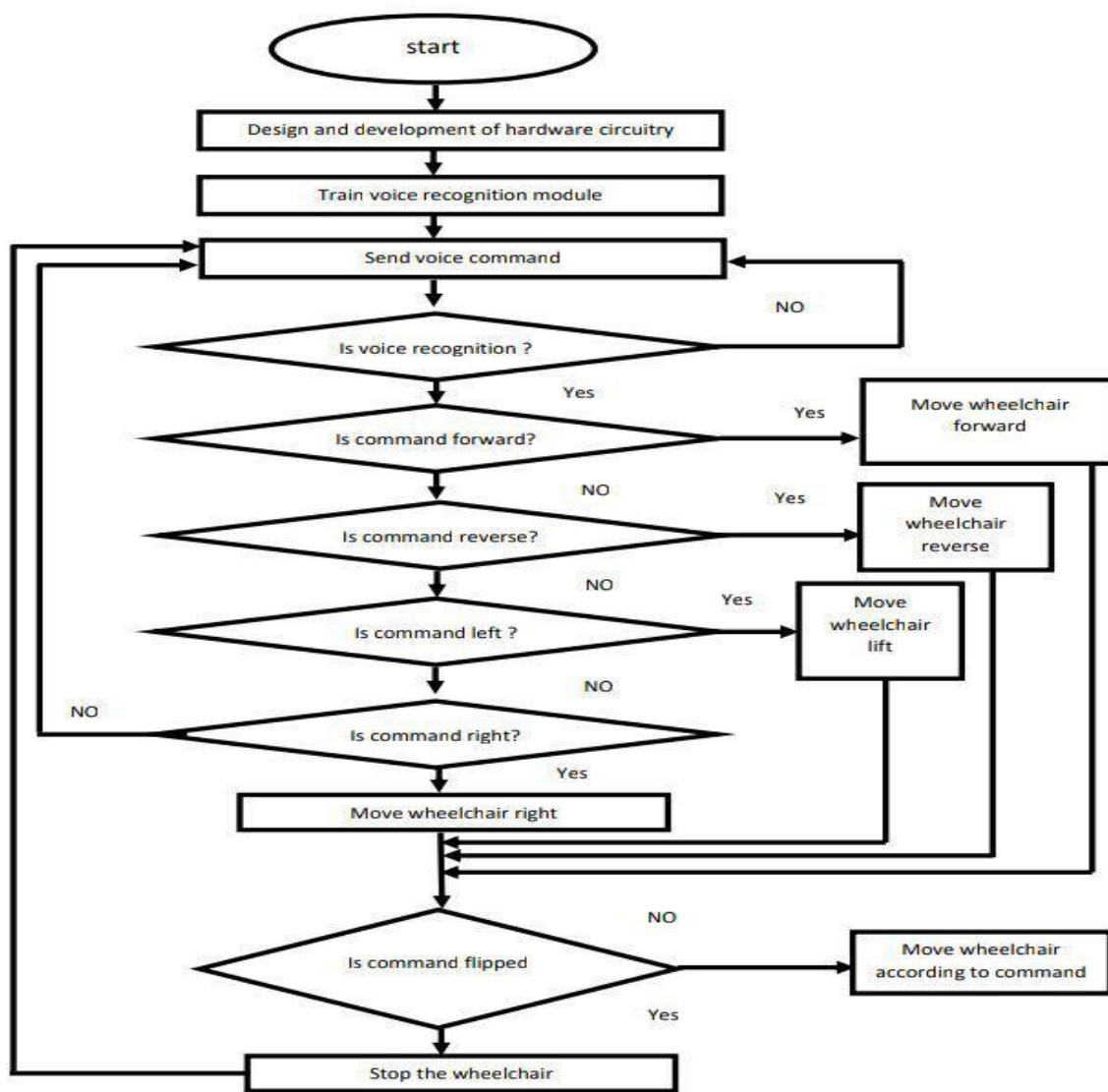


Figure 3.2 flowchart for the voice control

The right command will make left wheel moves forward and right wheel moves backward.

Work of the Sensor :

Ultrasonic Sensor: We use sensors to detect the obstacle of specific distances and alert the user by sending waves collide with the solid body and then return to the sensor to be issued the alarm is very effective and effective.

Chapter 4

THE CONCLUSIONS

The voice controlled wheel chair system is implemented as an example of companionship of human and machine.

Independent movement is achieved with the help of the voice controller.

It is designed to be characterized by low price and higher reliability. It is concluded that smart living will gradually turn into reality that consumer can control their home remotely and wireless.

This project presents a new idea for proposing smart chair depending on the voice controlled ,where disable people are the beneficiaries.

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