Voice Based Wheel Chair Using Pic-Microcontroller

V. Tamil Selvam[1], S. Sameer[2], N. SutheshKumar[3], C. Venkatesh[4]
[1, 2, 3, 4] Dept of Electronics and Communication Engineering
[1, 2, 3, 4, 5] Sri Eshwar college of Engineering, Coimbatore.Tamilnadu, India.

Abstract- *The paper is designed to control a robotic vehicle or a movable wheel chair by voice commands for remote operation. The pic-microcontroller is used together with an Android Application for the desired operation. The Android Application is connected to the Bluetooth module (HC-06) present on the Robot via Bluetooth. The commands are sent to the robot using our voice commands present on the android application. At the receiving end two dc motors are connected to the microcontroller where they are used for the locomotion of the vehicle. The RF transmitter of the Bluetooth can take their voice commands which are converted to encoded digital data for the advantage of passable range (up to 100 meters) from the robot. The receiver decodes the data before providing it to another microcontroller to drive DC motors via motor driver IC for important work. This technology has a benefit within a communication range as correlated to RF technology.*

Keywords- Bluetooth Module, Pic-Microcntroller, LCD display, DcMotor

I. INTRODUCTION

The advanced design, we wish to control the movements of the vehicle using voice commands from the user. This Instruction will be delivered to the Android Application on the user's phone which is connected to the robot using a Bluetooth Module. The commands issued will then be relayed over an RF channel and will be received by the Module. The objective of Voice Controlled Robotic Vehicle is to observe and act on the commands received from the user. Here, the system will need the training from the user (for the accent) after which the device will start understanding the commands issued. This is done by adding voice command to the controller through a code.

1.1 All about Voice Recognition

The process of empower a computer to identify and respond to sound produced in human speech. Voice recognize is the process of taking spoken word as an input to the program. Voice recognition is the ability of the machine to receive and interrupts interdiction, or to understand and carry out spoken commands.

1.2 Why Voice Recognition?

Both speech and voice recognition use recordings of human voice, but they do different things with it. Voice recognition stripes out personal variation to detect the words. Speech recognition typically neglects the language and meaning to detect the physical person behind the speech. For our project, if we want to make it manageable than Voice Recognition is the best methodology to control this robot.

1.3 The Main Objectives Of The Project Are:

1. Operating the Robot wirelessly through mobile phone.
2. Usage of Android touch screen smart phone in performing the task.
3. Bluetooth wireless transmission.

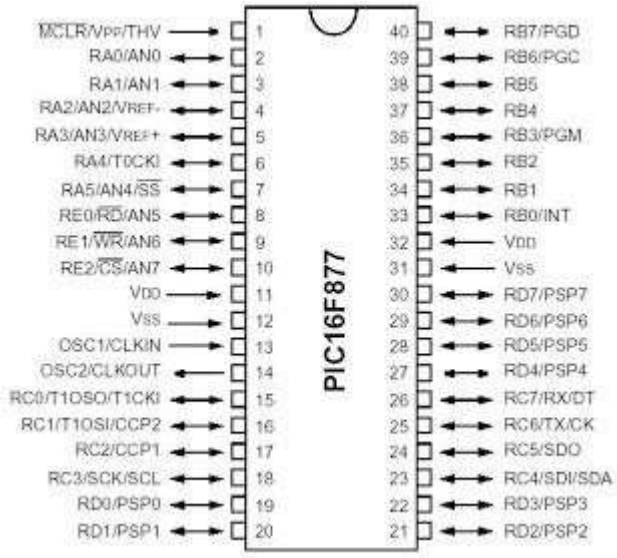
II. COMPONENT DESCRIPTION

2.1 HC-06 Bluetooth Module

This module is capable of connecting with pc, mobile phone or any other Bluetooth enabled device. It is combined with the microcontroller over the serial UART port of micro-controller. Bluetooth is a wireless control transport protocol running at 2.4 GHz, with client-server architecture, suitable for forming personal area networks. Bluetooth is an immensely fundamental feature designed for low power devices. Bluetooth is a consistent feature or particularization that is available in all Smartphone**.**

2.2 Control Unit

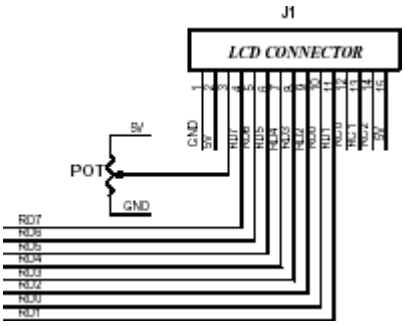
The control unit consists of the microcontroller which is of PIC16F877. Data received from the sensing unit are passed as an input to the built-in analog to digital converter (ADC) in the microcontroller. Then the data is processed and used units in kilowatt hour and remaining balance and units



PIC16F877 is one of the most advanced microcontrollers from microchip. This controller is widely used for experimental and modern applications because of its low price, a wide range of applications, high quality and ease of availability. It is optimal for applications such as machine control applications, measurement devices, and study purpose and so on. The PIC16F877 features all the components which latest microcontrollers normally have. The microcontroller receives the inputs from sensing units and the inputs are stored in a central database. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of FLASH is the most freshly developed. Technology that is used in pic16F877 is flash technology, so that data is reserved even when the power is switched off. Easy Programming and Eliminating are other features of PIC 16F877.

2.3 Display Unit

Liquid crystal display(LCDs) have materials, which mingle the properties of both liquids and crystals. An LCD consists of two glass panels, with liquid crystal material sandwiched in between them. LCD does not generate light. So light is needed to read the display. By using backlighting the reading is possible in the dark. Cryonics dot-matrix (alphanumeric) liquid crystal displays are available in TN, STN types with or without backlight.



The use of a C-MOS LCD controller and driver ICs results in low power consumption.

2.4 Android Application

MIT app inventor allows computer program to create software applications for the Android operating system (OS). MIT App Inventor is an opening to programming for beginner's and app creation that transforms the complex language of text-based coding into visual, drag-and-drop building blocks. The simple graphical interface helps even a new person to create a basic, fully functional app within an hour or less.

App Inventor Connects three aspects:

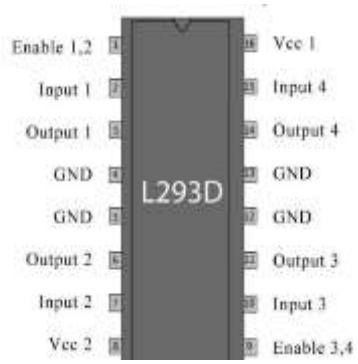
(i) App inventor creation,
(ii) App Inventor Blocks Rewriter, and
(iii) An Contender or Android Phone.

The set-up process for the software is easy and system conditions are very basic. It is compatible with Mac OS, Windows and Linux Operating systems. Browser recommended for the software are Google Chrome, Mozilla Firefox 3.6 or higher, Apple Safari 5.0 or higher, Google Chrome 4.0 or higher and Microsoft Internet Explorer 7.0.

2.5 Motor Unit

2.5.1 H-Bridge

Microcontroller cannot supply the current needed to run DC motor. So fulfill this requirement IC's are used to drive the motor. The L293 and L293D are quadruple high-current half –H bridge drivers. The L293D provides bidirectional drive currents of up to 1A at voltage from 4.5V to 36V. The L293D is designed to produce bidirectional drive currents of up to 600-MA at voltages from 4.5V to 36V. Both devices are designed to drive primary loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high voltage loads in positive-supply applications. On the L293D, exterior high-speed output clamp diodes should be used for inductive transient suppression. A Vcc1 terminal split from Vcc2, is provided for the logic inputs to minimize device power dissipation. The L293 and L293D are specialized for operation from 0ↄC to 700C.



2.5.2 Dc Motor

HC -06 Bluetooth module.D.C. motor is controlled by DC voltages and moves in forward, backward, left and right, direction according to the polarity of voltage applied. Mostly all mechanical movement which wheel chair performs is accomplished by an electric motor. Electric machines are used to convert energy into mechanical energy. Electric motor is used to power devices. An example of small motor applications such as motors used in automobiles, hand power tools, robot and food blenders. Micro-machine is electric machine with parts the size of red blood cells and has many applications in medicine

2.6 Power Supply

The transformer will step down the power supply voltage (0-230V) to (0-15V and 0-9V) a level. If the secondary has less turns in the coil then the primary, the secondary coil's voltage will decrease and the current or AMPS will increase or decreased depend upon the wire gauge. This is called a STEP-DOWN transformer. Then the secondary of the transformer will be connected to the rectifier. Voltage regulators contain a class of widely used ICs. Regulator IC units contain the circuitry for reference source, control device, comparator amplifier and overload protection all in a single IC. IC unit provides regulation of either a fixed negative voltage, a fixed positive voltage or an adjustably set voltage. A fixed three-terminal voltage regulator has an unregulated dc input voltage, it is applied to one input terminal, a regulated dc output voltage from a third terminal, with the second terminal connected to ground. The series 78 regulators provides a fixed positive regulated voltage from 5 to 24 volts. Likewise, the series 79 regulators provide fixed negative regulated voltages from 5 to 24 volts. It is a regulated power supply circuit using the 78xx IC series. These regulators can deliver current around 1A to 1.5A at a fix voltage levels. The common regulated voltages are 5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, and 24V. It is essential to add capacitors across the input and output of the regulator IC to improve the regulation. Here, we are using 7805 and 7812 regulator so it converts variable dc into constant positive 5V and 12V power supply respectively.

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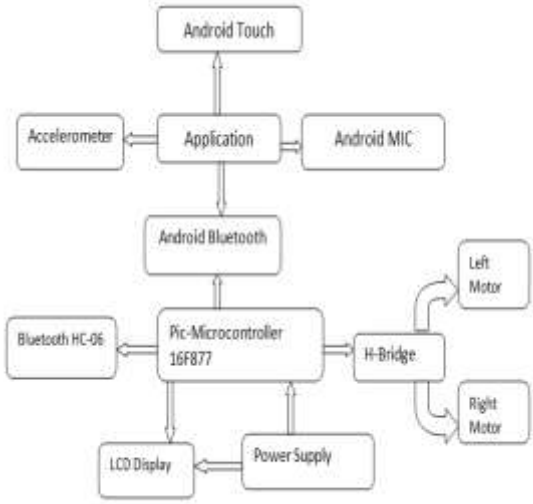
III. SYSTEM ARCHITECTURE



A wheel chair can be controlled by using Bluetooth module HC-05 and ATMEGA328P-PU microcontroller with android Smartphone device. The whole system is controlled by a microcontroller. Bluetooth module and the DC motors are interfaced to the microcontroller. The data receive by the

Bluetooth module from android smart phone is fed input to the controller. The controller acts accordingly on the DC motor of the wheel chair. The wheel chair can move in all the four directions using the android phone. The direction of the wheel chair is indicated using LCD display. In order to achieve the task the controller is loaded with the program written using Embedded 'C' Languages. For the communication of the device with the cell phone or a mobile we are using the HC-06 Bluetooth device. The Bluetooth device (HC-06) is connected to the wheel chair that receives the data from the android device and also it can transmit the data. It is used for converting serial port to Bluetooth module. It has two modes as Master and Slave. Bluetooth is a wireless communication device that running at the speed of 2.4 GHz with the architecture of client-server and which is suitable for forming personal area networks. It is designed for devices such as smart phones (low power). Bluetooth is the only convenient communication protocol because there is no scare of getting the frequency interference. Bluetooth protocol uses the MAC address of the mobile phone. Bluetooth gives the connectivity between the two devices using their MAC address.

IV. CONCLUSION

The voice commands are successfully transmitted via Bluetooth technology and on reception to meet the desired operations. This project reduces people efforts at places or situations where human interventions are difficult. Such systems can be brought into use at places such as medical, industries, military and defense, research purposes, and development of smart monitoring and controlling system for household electrical appliances in real time. The system principally monitors electrical parameters such as voltage and current and subsequently calculates the power consumed. This automated system collects data from EB meter and transfers the data to the central database for calculating the power consumption, compared with previous data and alerts the user if the power consumption reaches the threshold value.

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