Android based Wheel Chair Operation using PIC Controller

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Abstract— Android based Wheel Chair operation has been developed to control a mobile robot/wheel chair using android based Commands. The system is divided into two main unit's Android application unit and robotic/wheel chair control unit. In the Android application, hidden Markov models are used as main method in recognizing android based commands. The robotic control unit is developed under the ARIA environment, which is provide by the robot/wheelchair manufacturer. We are taking the Android data from the microphone using a Bluetooth module. This data is stored in an array. This array is passed on to a function which extracts word from the array (i.e. Transferred data are extracted & quiet periods are dumped). These words are sent to a function which extracts frequency as a function of time. This frequency vector of the Transferred data. This vector is compared with reference vectors.one of the reference vectors would match (i.e. the inner product in this case greater than the other T The command corresponding to this reference vector is fed to the microcontroller. In this project we are getting a user dependent isolated data recognition system with a recognition accuracy of about 85% using the accuracy can be improved further & the system can be used for more number of data if during the training of the system the Bluetooth data are improved.

Key words: Wheel Chair Operation, PIC Controller, Android

I. INTRODUCTION

There are several applications are there in the market so that handicapped people can use these applications for their daily tasks. One of the major android applications is voice controlled application created for the blind and handicapped persons so that they can use their computer in an appropriate manner. Person can give commands to application and that voice commands are filtered into different frames. These frames are then encoded and given to the computer system and final output is given. There is another wheel chair is also developed in which the wheel chair is controlled by the motion of the hands or head. The transmitter is mounted on the user head with accelerometer and the transmitter continuously transmits the signals. The receiver mounted on the wheel chair and receives the signals and control the movements of the wheel chair based on control or signal commands. The transmitter and receiver receive the commands wirelessly by using Wireless Radio Frequency Module. The system is developed for the handicapped people are the Hephaestus Smart Wheel chair. This Hephaestus system consists of the different sensors to receive and transmit the commands. In this system the hardware device joystick is mounted on the wheel chair and Hephaestus system acts as the interface between the joystick and the wheel chair. The joystick is connected to the computer system and it receives the input from the user and these commands are given to the computer system and by using Hephaestus system these commands are executed and controls the movement of the wheel chair. The major limitation of this system is cost. The cost of the hardware devices such as joystick is very high so that wheel chair cost increases and the normal people cannot afford it. So that the proposed system is developed by considering all aspects so that it will be useful to the people.

II. PROJECT DESCRIPTION & RESULTS

A. *Existing System*

1) Manual Operation
2) More Time Consumption

B. *Proposed System*

1) Robotic/Wheelchair Control
2) More Efficient.

III. BLOCK DIAGRAM

A. *Transmitter Section*

Fig. 1:

Wheelchair Receiver Section:

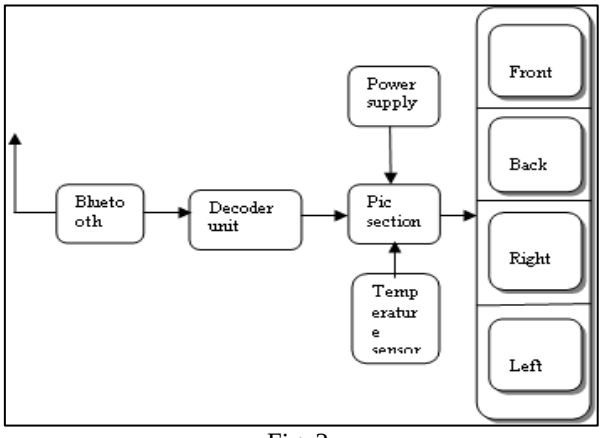

Fig. 2:

IV. REQUIREMENTS

A. Hardware Requirements

- Microcontroller
- Bluetooth module
- Temperature sensor
- Pressure sensor
- Robot module
- Smart Phone

B. Software Requirements

- Embedded C
- Android Studio

V. APPLICATION

- Commercial applications

A. Hardware Description:

1) PIC 16F877A

PIC microcontroller is the first RISC based microcontroller fabricated in CMOS (complementary metal oxide semiconductor) that uses separate bus for instruction and data allowing simultaneous access of program and data memory. The main advantage of CMOS and RISC combination is low power consumption resulting in a very small chip size with a small pin count. The main advantage of CMOS is that it has immunity to noise than other fabrication techniques. Various microcontrollers offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877A is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877A.

2) Core Features

- High-performance RISC CPU.
- Only 35 single word instructions to learn.
- All single cycle instructions except for program branches which are two cycle.
- Operating speed: DC - 20 MHz clock input, DC - 200 ns instruction cycle.
- Up to 8K x 14 words of Flash Program Memory.
- Up to 368 x 8 bytes of Data Memory (RAM)
- Up to 256 x 8 bytes of EEPROM data memory.

B. HC-05

1) Bluetooth to Serial Port Module

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle.

C. Specifications

1) Hardware Features

- Typical -80dBm sensitivity
- Up to +4dBm RF transmit power
- Low Power 1.8V Operation ,1.8 to 3.6V I/O
- PIO control
- UART interface with programmable baud rate
- With integrated antenna
- With edge connector

2) Software Features

- Given a rising pulse in PIO0, device will be disconnected.
- Status instruction port PIO1: low-disconnected, high-connected;
- PIO10 and PIO11 can be connected to red and blue led separately. When master and slave are paired, red and blue led blinks 1time/2s in interval, while disconnected only blue led blinks 2times/s.
- Auto-connect to the last device on power as default.
- Permit pairing device to connect as default.
- Auto-pairing PINCODE:"0000" as default
- Auto-reconnect in 30 min when disconnected as a result of beyond the range of connection.
- Default Baud rate: 38400, Data bits:8, Stop bit:1,Parity:No parity, Data control: has. Supported baud rate: 9600,19200,38400,57600,115200,230400,460800.

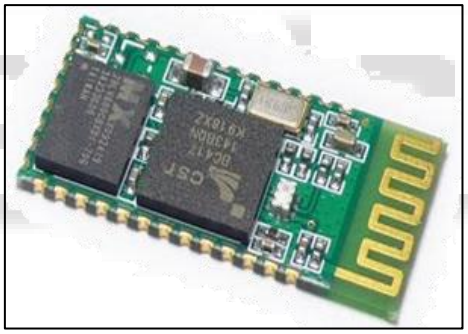

Fig. 3:

D. Temperature Sensor

1) Features

- Calibrated Directly in ° Celsius (Centigrade)
- Linear + 10 mV/°C Scale Factor
- 0.5°C Ensured Accuracy (at +25°C)
- Rated for Full −55°C to +150°C Range
- Suitable for Remote Applications
- Low Cost Due to Wafer-Level Trimming
- Operates from 4 to 30 VLess than 60-µA Current Drain
- Low Self-Heating, 0.08°C in Still Air
- Nonlinearity Only ±¼°C Typical
- Low Impedance Output, 0.1 Ω for 1 mA Load

2) Description

The LM35 series are precision integrated-circuit temperature sensors, with an output voltage linearly proportional to the Centigrade temperature. Thus the LM35 has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming

to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to +150°C temperature range.

3) Software Description

a) Installing Android Studio

Once downloaded, the exact steps to install Android Studio differ depending on the operating system on which the installation is being performed.

b) Installation on Windows

Locate the downloaded Android Studio installation executable file (named android-studio-bundle-<version>.exe) in a Windows Explorer window and double click on it to start the installation process, clicking the Yes button in the User Account Control dialog if it appears. Once the Android Studio setup wizard appears, work through the various screens to configure the installation to meet your requirements in terms of the file system location into which Android Studio should be installed and whether or not it should be made available to other users of the system. Although there are no strict rules on where Android Studio should be installed on the system, the remainder of this book will assume that the installation was performed into a sub-folder of the user's home directory named android-studio. Once the options have been configured, click on the Install button to begin the installation process.

On versions of Windows with a Start menu, the newly installed Android Studio can be launched from the entry added to that menu during the installation. On Windows 8, the executable can be pinned to the task bar for easy access by navigating to the android-studio\bin directory, right-clicking on the executable and selecting the Pin to Taskbar menu option. Note that the executable is provided in 32-bit (studio) and 64-bit (studio64) executable versions. If you are running a 32-bit system be sure to use the studio executable.

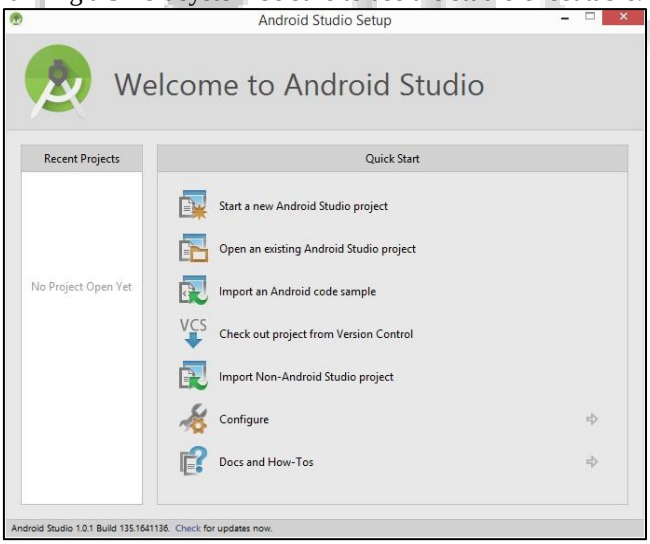

Fig. 4:

VI. RESULT

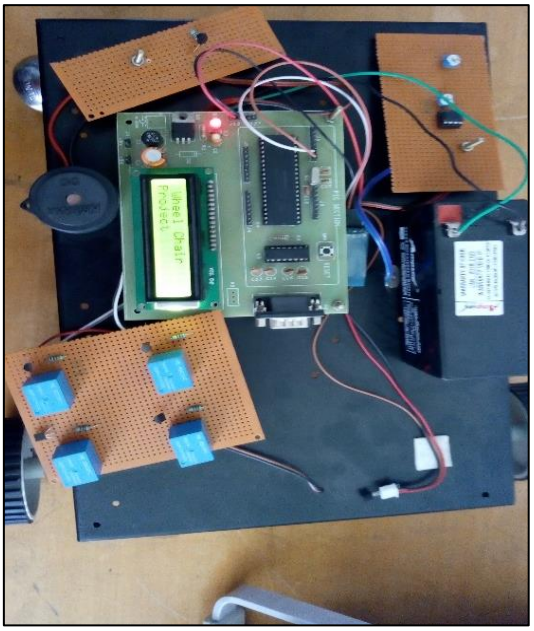

Fig. 5:

A. *Advantages*

- Easy to drive with negligible efforts.
- Less complexity and less hardware to mount.
- Can be mounted on the existing wheelchair.
- Wireless control helps to monitor the wheelchair easily.
- Reduces manpower and dependency on other human drive.
- Wheelchair is compact and economical.
- Android application can scan the valid input at a faster rate and hence control the movement of wheelchair.
- Provides easy movement for physically challenged people.
- Easy to develop an existing wheelchair and does not require any sophisticated components.
- Low power consuming and easy to operate the wheelchair.

VII. FUTURE SCOPE OF PROJECT

- Voice recognition module is used to develop the voice recognition system. Voice recognition issues a command to control the movement of wheelchair. For movement of wheelchair Microcontroller Atmega328 and DC motor circuit were built. For not to occur disorder during recognize the user voice, this system works in a quiet environment. Furthermore, the pronunciations accuracy must be ensured and the word-related (voice) the users voice must clear in short distance on microphone was essential in this innovation.
- Using gear box we can produce high speed moving wheelchair.
- PWM modulation can also increase speed.
- Solar Panel can also be used to charge the battery for power supply to the components required to drive the wheelchair.
- The wheelchair can also include the gesture feature to operate the wheelchair.

– Wheelchair only can function properly when the weight of the load for this system must be below 50 kilogram. Obstacle avoidance sensors are used.

VIII. CONCLUSION

In previous day, wheel chair are controlled by manually. By this method wheel chair are controlled by smart phone. This reduced the man power and cost. Today everyone use the android phone so it is very easy to operate and controlled.

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