VOICE RECOGNITION ROBOT USING HC-05

HARSHINI P[1], DEEPIKA D[2], KAVIYA S[3], KALPANA DEVI S[4]

1,2,3 - Students of Department of Electronics and Communication,
Prathyusha Engineering College
4-Associate Professor, Department of Electronics and Communication,
Prathyusha Engineering College

Abstract

This paper proposes a system where the human voice is key source to direct devices. With the support of an android application, control of any real world device is achieved by recognizing human voice commands and then processing it. The control of a robot is achieved by the simple use of an proficient control system utilizing the Arduino microcontroller board, the Bluetooth module and an easy user interface based android voice application. This shows that it is feasible to efficiently influence and automate the real world activities using human voice as a control mechanism.

Keywords: **Voice command, Bluetooth, Android Interface, Arduino Uno**

1. INTRODUCTION

The main objective of our project is to minimize the cost and power consumption which involves more efficient, accessibility and manipulation of objects. Now-a-days, smart phones are becoming more powerful, larger storage capacities and effective communication method. Usually Bluetooth technology is mainly used for data sharing; and adds a new attribute to our mobile phones. People use digital technology in home or office, and has replaced conventional wired digital devices into wireless devices. A host Bluetooth device is capable of communicating with upto 7 Bluetooth modules at same time through one link. Bluetooth technology and other similar techniques have considerably increased the smart phone users. Smart mobile phones have progressively turned into an all-purpose portable device and provide people for their daily use.

In recent years, Android open source platform has been used widely in smart phones. Using smart phone as brain of robot is already an active research field with several open opportunities and promising possibilities. This paper presents a review of current robots controlled by mobile phone and discusses a close looped control systems using

audio channels of mobile devices, such as phones and tablet computers. In this work, the robot in made to move (forward, backward, left & right) by the android application.

2. PROPOSED WORK

The purpose of our work is to provide simple robots hardware architecture with powerful computation. This simple architecture of robot is also useful for education purposes, because students can build their own robots with low cost and use them as platform for experiments in several courses.

3. TASK OF ROBOT

A robotic car is constructed and it is controlled through voice commands. These types of systems are called as Speech Controlled Automation Systems.
The fundamental tasks that a robot can do are:-
1. Move forward
2. Move back
3. Turn right
4. Turn left
5. Stop (stops current job)

A. *ARDUINO UNO (ATMEGA 328p)*

The microcontroller board used in this work is Arduino Uno (ATmega328P) consisting of 14 digital I/O pins (6 can be used as PWM outputs), 6 analog inputs (A0-A5), a 16 MHz crystal oscillator frequency, a USB connection, a power jack, an ICSP header, and a reset button. The Arduino Uno converges from other foregoing boards for the reason that it does not use FTDI USB-to-serial driver chip. To process both analog and digital signals, the Arduino Uno has an integrated Analog to digital convertor. To store code, the Atmega328p has 32 KB of flash memory (0.5 KB is used for boot loader), 2 KB of SRAM and 1 KB of EEPROM. Arduino Uno has an operating voltage of 5V and a recommended input voltage of about 7V-12V. However, the Arduino Uno does not have a current driving capacity to drive all the DC motors attached to it, therefore requires intermediary motor driver. The 14 digital I/O pins on the

Uno can be used as an input or output, using pinMode(), digitalWrite(), and digitalRead() functions. Each pin receives a maximum current of40mA and has an internal pull-up resistor of 20-50 kohms which is disconnected by default. To achieve the interface of Bluetooth and Arduino, Serial in-out pins of the Arduino are used namely: Serial 0 (RX) receive and 1 transmit (TX) TTL serial data. Arduino IDE software is used to program Arduino Uno using a set of C/C++ functions.

B. BLUETOOTH MODULE HC-05
Range of Bluetooth is about 100m. Serial port Bluetooth module is fully qualified Bluetooth V2.0+ with enhanced Data Rate of 3Mbps Modulation with a complete 2.4GHz radio transceiver and baseband. CSR Bluecore 04-External single chip Bluetooth with CMOS technology and Adaptive Frequency Hopping Feature is used. It has a footprint as small as 12.7x27mm.This simple Bluetooth architecture simplifies the system. Using the Tx and Rx Serial pins available on the board, the interface module can easily be connected to Arduino Uno. The module can be linked to an android smartphone by means of an "BT voice control for Arduino" application.

C. MOTOR DRIVER (L293D)
A 40mA DC current, which drives the microcontroller, is not sufficient to drive all the DC motors directly, so the motor driver (L293D) pins are directly placed on the Arduino Uno board in the form of a stack. For powering all the motors connected to the shield, a 12 V external power supply is provided to the motor shield.

D. DC MOTOR
The robot utilize two DC motors of 100rpm speed that drives the two wheels at the front while the two wheels at the back follow the ones at the front. According to the command voiced out to the app, the Bluetooth module deciphers it, converts it to text and sends it to the Arduino board. The microcontroller then processes the command and correspondingly, passes a signal to the motor driver for the right movement of the motor. The electric signal is converted to mechanical energy that hence, rotates the shaft of the motor. A linear forward or backward motion of the robot is produced when the shaft of the motor attached to the wheel rotates. Two 100 rpm motors were used in this system that is powered by a total of 12V supplied to the motor shield.
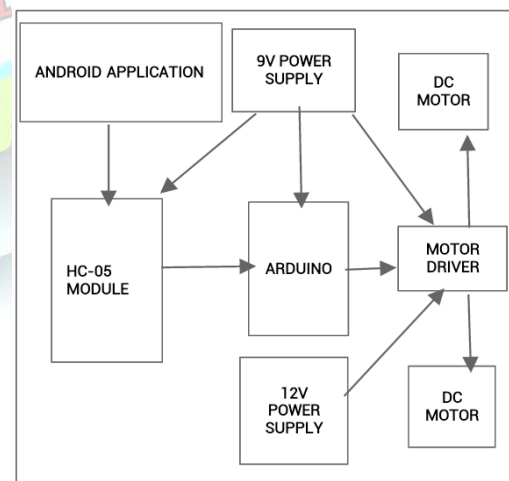
4. BLOCK DIAGRAM

5. APPLICATION INSTRUCTIONS

STEPS:

1. First make sure your HC-05 Bluetooth is paired with your mobile. The password is either "0000" or "1234". Check the manual of Bluetooth module.

2. Click on the "SELECT DEVICE" icon to select paired Bluetooth module.

3. When we give voice command as "FORWARD", the robot moves in the forward direction.

4. When we give voice command as "BACKWARD", the robot moves in the reverse direction.

5. When we give voice command as "RIGHT", the robot turns in the right direction.

6. When we give voice command as "LEFT", the robot turns in the left direction.

7. When we give voice command as "STOP", the robot stops its functioning.

8. Click on Disconnect icon to disconnect the paired Bluetooth module.

Fig 1 Block Diagram

The block diagram of the simple voice recognition robot is shown below. It consists of the smartphone which has "BT voice control for Arduino" application that recognizes the voice commands and is being wirelessly transferred to the Bluetooth module HC05. The module converts the command to manuscript and the strings of characters are sent to the

microcontroller for further processing. The microcontroller decodes the strings obtained and correspondingly performs further powers functions. The motor power functions are powered and driven by a Motor Shield.

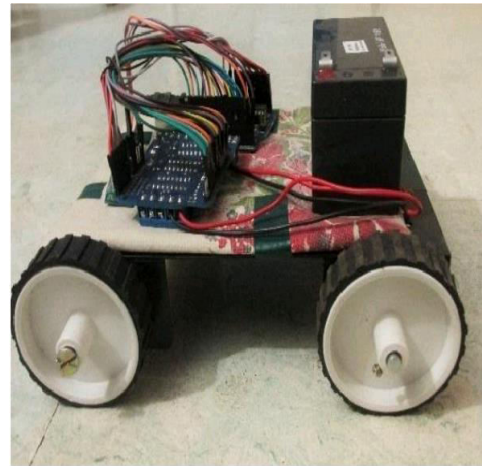Fig 5.1 Screen shot of application.

Fig 5.2 GIVING THE COMMAND

FIG 5.3 GIVING PASWORD TO PAIR DEVICE

6.IMPLEMENTATION

The robot is designed to be controlled by the means of voice commands. It requires a smartphone to implement voice control. This system uses the android application in the smartphone to recognize verbal instructions instead of using a speech recognition module. It uses google speech to text conversion to recognize and process human voice. This processed text is sent to the microcontroller through Bluetooth. The microcontroller further processes the commands to control the robot·

FIG 6.1 VOICE RECOGNITION ROBOT

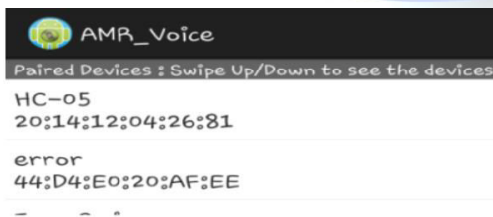| BINARY VALUES		COMMANDS
11	-	forward
01	-	right
10	-	left
00	-	stop

7. RESULT AND DISCUSSION

The voice recognition robot is implemented and using the right algorithm, the robot was maneuvered effectively using voice commands. The robot is able to move forward, backward, right, left and stop when initiated. This system would find wide range of applications. Mainly systems such as household appliances like washing machines microwave ovens etc. will become voice controlled in future. In such cases, this research will work out practically satisfying the needs of the day efficiently.

8. CONCLUSION

The prototype system revealed the simplicity of a voice recognition system such as the wheelchair. It depicts how voice control mechanism can be obtained without having to use any other control mechanism such as buttons or joystick. By inducing further commands and improving voice reception, the devices can be automated to the fullest.

9. FUTURE SCOPE

1. Power Optimization such as sleep and wakeup schedules can be incorporated.

2. Image processing can be implemented in the robot to detect the color and the objects.

3. For more accurate working, servo motors can be deployed.

4. Automatic Targeting System can be implemented in the robot for tracking the target

5. The app could be further developed using background noise eliminating tools in order to capture only the command and hence making the system more efficient.

REFERENCES

[1] Bluetooth based android phone/tablet controlled robot, http://www.robokits.co.in and http://www.robokitsworld.com

[2]Praveen Blessington,B.T.P.Madhav, M. Sagar Babu, R.Rajiv Reddy, D. I. P. Mani Kumar, I. Naga Raju, N. Anil Babu. "Acoustic Controlled Robotic Vehicle" Proceedings of 2012www.ijetae.com ISSN 2250-2459

[3] Ritika Pahuja, Narender Kumar. "Android Bluetooth Robot using 8051" proceedings of, July 2014.

[4]F.A.Himmelstoss, "DC motor drive with at low speeds high torque", EUROCON International Conference

[5] Android Developers Guide. Android Architecture. 2013.

[6] Heidi Monson (1999) Bluetooth technology system and implementations, John Wiley & Sons.