

VOICE RECONITION ROBOT CONTROL USING ANDROID DEVICE

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Abstract— Android is a very familiar word in the world today. Millions of devices are running the Google Android OS and millions are being developed daily. Google has made the Android development platform open to everyone around the world, so there are millions of developers. There are numerous possibilities as well. One of the possibilities of Android development is its fusion with Arduino (a microprocessor), which in itself is a tiny computer. Possibilities from the combination of these two-development platforms cannot be derived from any permutation or combination logics. While there are many results already published, there are more innovations every day.

This thesis focuses on the outcome of possible combination of Android & Arduino. That gives detailed information on building a Robot which can be controlled by Android device & also through the voice device.

Keywords— Voice Recognition Robot Through Voice Command Using Combination Of Arduino & Android.

I. INTRODUCTION

It has always been a dream of human being to create machines that behave like humans. Recognizing the speech and responding accordingly is an important part of this dream. With the improvements of the technology and researches on artificial intelligent, this dream comes true relatively.

A growing elderly population has created a need for innovative eldercare technologies. Robot interaction, which uses built-in speech recognition in Android phones to control a mobile robot. By using a smartphone for speech-based robot control and present speech recognition accuracy results for younger and older adults obtained with an Android Smartphone.

Then speech synthesis would be done by android app which would analyse the speech and would convert the voice commands into text. These processed commands would be then sent to the robot via bluetooth. A bluetooth device would be placed on the robot which would receive the command. These commands would be analysed by the Microcontroller on the robot which would analyse the commands and would control the robot using the motor driver circuits.

Speech is the most important way of communication for people. Using the speech as interface for processes became more important with the improvements of artificial intelligent.

II. DETAILS

In this paper we describe communication between human & speech recognition Robot-

2.1. ARDUINO UNO

“Arduino is an open-source electronics prototyping platform based on flexible, easy-to use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.”An Arduino

microcontroller is a simple yet sophisticated device, which has taken the world of electronics by storm. Because of its versatility in innovation, the product has gained several accolades from the electronics professionals.

Here we used of Arduino as the brain of the project which controls the action of the robot through signals sent from it. A bluetooth modem is a medium that enables Arduino to connect to the android device or smart-phone. Thus, the modem is the bridge for the commands sent from a smart-phone to the Arduino. The specifications are mentioned in **Table 1**.

Table1: ATmega328 specifications

GND	Ground pins
Microcontroller	ATmega328
Operating voltage	5Volts
I/P Voltage	7-12Volts
Digital I/O pins	14 (6 for PWM o/p)
Analog I/P pins	6 Pins
DC current/I/O pin	40mA
DC current for 3.3V pin	50mA
Flash memory	32KB
SRAM	2KB
EEPROM	1KB
Clock speed	16MHZ.

2.2. Bluetooth Modem

Bluetooth is a technology developed to eradicate the need of wires to communicate among different devices. Bluetooth is a wireless technology which has been a major innovation in world of technology as it has made the communication robust, easy, and low cost and energy. It uses spread spectrum, frequency hopping and full duplex signal at a nominal rate of 1600hops/sec.

HC-05 module is an easy to use Bluetooth 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 Blue core 04-External single chip Bluetooth system with CMOS technology and with Adaptive Frequency Hopping Feature. This device is capable of

establishing connection with any bluetooth device and can connect to any microcontroller for the exchange of serial data.

2.3. Working Principle

Hardware design is the formation of a circuit which would enable the communication among different hardware used. The process of building the circuit involves the alignment of Arduino, motor drivers and Bluetooth together. The Arduino board comes with an inbuilt female pin header which has connections to its input/output pins, TX (transmit signal), RX (receive signal), ground pins and voltage pins., a male pin header can be mounted on motor drivers. That comes with the same alignment of pins so it can be overlaid on the Arduino, so there is no need for wires to join between them.

Get voice input from user. Do processing on the voice commands. This is known as speech synthesis. In this process the voice inputs are processed to check for appropriate inputs. If the inputs are in proper format then a text command is generated which would be sent to the microcontroller to control the boot. Bluetooth of the android is used to send the generated command to the controller. In this processing following steps are followed:-

Handshaking, pairing, ports assigning, Socket Programming.

After ports are assigned sockets gets created through data is send and receive between bluetooth.

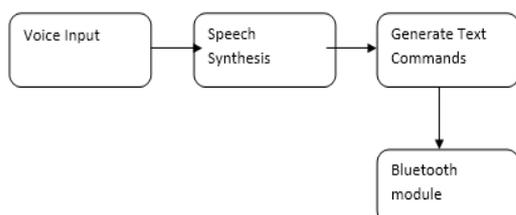


Fig.1. Block diagram of software Model

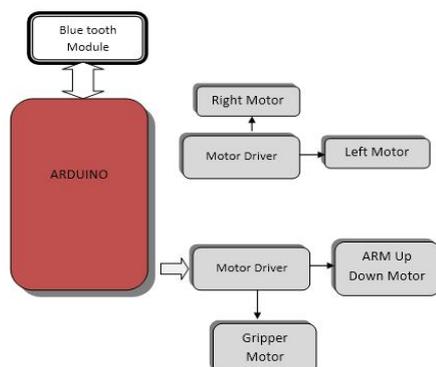


Fig.1. Block diagram of Hardware Model

Bluetooth module is used to receive the command sent from android phone. The command received is sent to the Arduino board where the controller (ATmega8) would process the command. While processing it will identify which command is being received and accordingly which action is to be

performed. After the action to be performed is decided then the controller would sent digital signal to the motor driver circuit for controlling the motors.

2.5. Software Design

To develop apps for Android devices, use a set of tools that are included in the Android SDK. Once you've downloaded and installed the SDK, you can access these tools right from your Eclipse IDE, through the ADT plug-in, or from the command line. Developing with Eclipse is the preferred method because it can directly invoke the tools that you need while developing applications.

During this phase you install and set up the development environment & create Android Virtual Devices (AVDs) and connect hardware devices on which can install the applications.

Then set up and develop your Android project, which contains all of the source code and resource files for your application. Build your project into a debuggable.apk package then install and run on the emulator or an Android-powered device. If you are using Eclipse, builds are generated each time project is saved. Eclipse already comes packaged with a compatible debugger.

During this configure build your application for release and distribute your application to users. The emulator provides versatile networking capabilities that can use to set up complex modelling and testing environments for your application.

III. RESULTS AND DISCUSSION

The functionality of the system can be divided into two parts:

- The speech recognition part, which is responsible for recognizing the phrases.
- The robot controlling part, which is responsible for the right reactions to the commands.

First the speech recognition part of the system is tested.

To make a test with quantitative results is very difficult. With speech it is almost impossible to fully control the variables. Every person has a different voice. No one is able to say a phrase in the exact same manner two times. The background noise will vary constantly.

So the test design used is a more qualitative approach:

- Three persons with different quality of spoken English are chosen as test persons.
- The test is done in a room with little background noise.
- After a little practicing, the test person is presented a sheet with typical commands. They vary from the simplest commands (.stop. Forward, Right , Left .back., etc.)

- The performance of the system is registered.

Secondly the robot control part of the system is tested.

To test the robot control part is much easier. If a command is not recognized properly, the command can be spoken again until correctly recognized.

A list was made with representative commands. A wanted result for each command was specified. Then the commands were spoken. In case of false recognition, the commands were spoken again until the right commands were recognized. The results were registered and finally compared to the wanted results

CONCLUSIONS

Android application and underlying network and software system allow remote voice control of robot. The simple robot which is controlled by a smart phone and also receives the voice commands. People with physical limitations such as handicapped people could use the feature to compensate their abilities. The paper gives detailed information about Arduino and the use of android application design. The guidelines provided are very simple to use and understand thus, making it very easy to build a foundation in Robotics learning as well as app design.

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