

VOICE CONTROLLED HOME AUTOMATION WITH ANDROID

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Abstract

This paper presents the complete design of voice controlled Home Automation System with low cost with android phone and wireless communication. Today we are living in 21st century where automation is playing important role in human life. Home automation allows us to control appliances like light, door, fan, AC etc. The main goal of this system is to control home appliances by using voice commands. Android is the best OS platform for speech recognition and for wireless communication android speech recognition can recognize commands efficiently and convert them into the required data format, and send the data through the wireless transmitter. The receiving microcontroller (AVR atmega328) then processes the received data and switches the respective appliances via connected driver circuits.

Keywords-

AVR atmega328, Home Automation, Smart home, Bluetooth2.0, speech recognition, Android OS, Driver Circuit,

1. Introduction

Home automation system has become very much popular now days, its popularity has been increasing rapidly in recent years due to simplicity through smartphone and connectivity.

The aim of the this System is to provide those with special needs with a system that can respond to voice commands and control the on/off status of electrical devices, such as lamps, fans, television etc., The system should be reasonably cheap, easy to configure, and easy to run. In future voice will be the primary interface between humans and machines, such as Humanoid robot, concept cars. This system reduces the gap between human and machine. Human can control machine with voice commands with this system.

In this project android app provides user interface to control various appliances.

Android App generates codes for each command and transmit to microcontroller using Bluetooth module. Bluetooth module is interfaced to AVR atmega328 IC at serial communication pins. it sends received data to microcontroller in UART protocol. Then microcontroller processes the received data and switches the respective appliances via connected driver circuits. Driver circuit consists transistor to drive relay and Relay drives appliances.

2. Block diagram

2.1. Conceptual Block diagram:

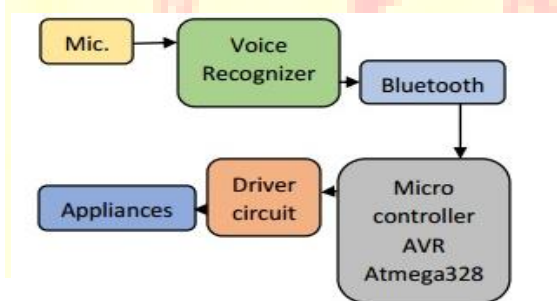


Fig. 2.1

2.2. Project Block diagram:

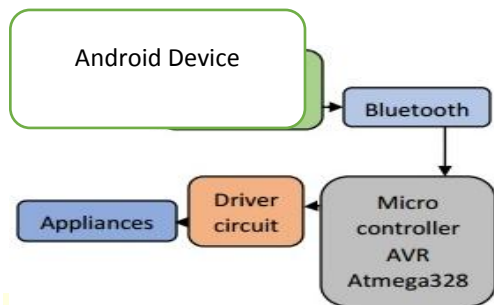


Fig. 2.2

Android device: android phone

Bluetooth: Bluetooth module HC-05

Microcontroller: AVR Atmega328

Driver circuit: Relays

3. Speech Recognition

Speech recognition is the process of converting a voice signal to a digital data. This digital data can be processed using microcontroller or microprocessor system

As we using Android speech recognition

So voice signal is processed by using android device.but This feature is currently limited to only a few languages such as U.S. and British English.

4. Hardware design

4.1 Bluetooth

Bluetooth is a wireless technology used for transfer or receive data over short distances from fixed and mobile devices, and building personal area networks (PANs).

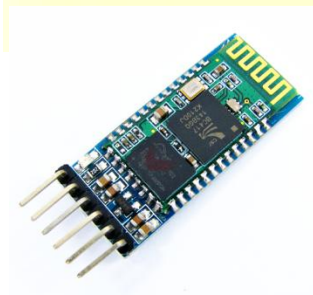


Fig. 4.1

Fig. 4.1 Shows Bluetooth module HC-05 which works on Bluetooth standard 2.0. It can be interfaced with 8051,pic,avr microcontroller very easily and communicates with microcontroller serially.

4.2 AVR Atmega328

In this project we have used arduinouno board.it is a microcontroller



Development board with microcontrolleric ATmega328.

Fig.

4.2

It has 14 digital input/output pins.out of which 6 can be used for PWM signals, 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an UART and a reset button.

4.3 Driver Circuit

Basically for Driving high voltage relays or power MOSFETS are used. We used 12v relays, and to drive relay we used 2n222 transistor.

5.Schimatics

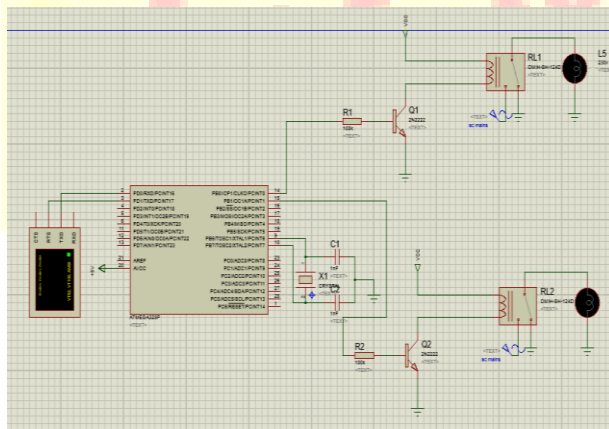


Fig. 5

6. Software Design:

Software design is divided into two sections

1. Main function of the system designed in Atmega328 microcontroller
2. Designing of Android application

6.1 Embedded programing for Atmega 328

Fig. 6.1 illustrates the control flow in Atmega32 microcontroller. The input to the main controlboard is detected by Atmega328 microcontroller. Any input to Atmega328 microcontroller will cause an interrupt to the main function loop of Atmega328. This will cause a change in the output peripherals connected to driver circuit.

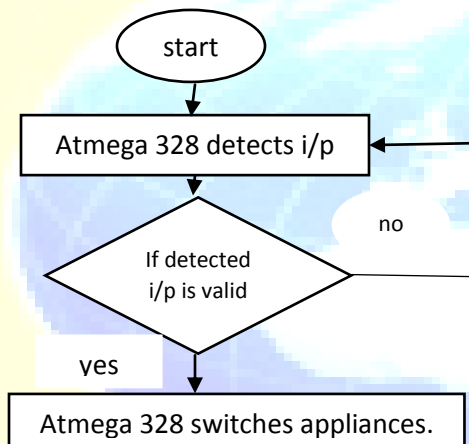


Fig. 6.1

6.2 Android Application Development

Android Application is interface between human and appliances. The Android application is designed using MIT AppInventor2.

App Inventor for Android is web application provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT).

It allows newbie to computer programming to create software applications for the Android operating system (OS).

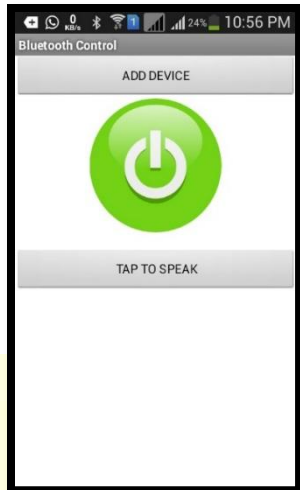


Fig. 6.2

Fig. 6.2 illustrates the Android application i.e., installed and tested using the Android device which has Android 4.2.2. The application is simple to use, user can turn on and off the appliances that are connected to main control board by speaking only .

7. Results

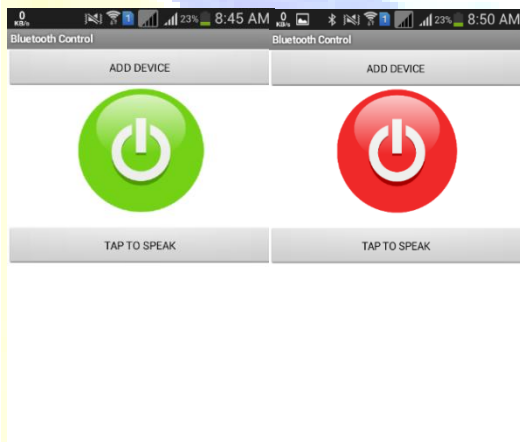


Fig. 7.1 a, b

It shows the user interface in android phone.

- a. When it is not connected with HC-05 bluetooth module i.e. Hardware
- b. When it is connected with HC-05 bluetooth module.

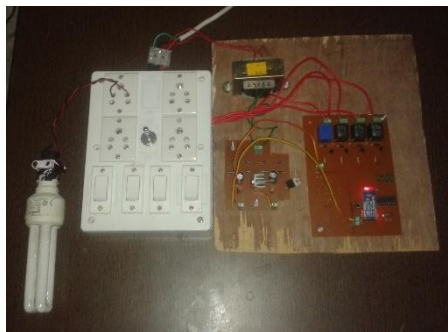


Fig 7.2

It shows hardware part.

Which contains power supply section,
Microcontroller section, driver section
And electric board.

Here on electric board one DPDT switch is provided to switch the mode.

There are two modes

1. Automatic i.e. switching through mobile
2. Manual i.e. traditional switching method.

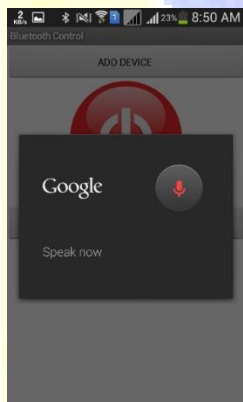


Fig. 7.3

When tap to speak button is pressed

Google voice pops up

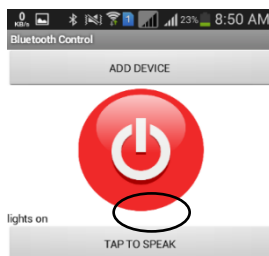


Fig 7.4

As user says lights on, android app recognize it and gives written feedback as shown in fig.



Fig. 7.5

In hardware four sockets are provided in which 1st is for lights, we can change it as per convenience.

8. Applications and Advantages:

1. This project can be used for controlling Home Appliances
2. We can control device from a long distance without any electrical contact.
3. Faster operation and efficient.
4. user does not need to carry separate remote or any other controlling unit.

9. Future work

As we are controlling appliances with our voice, in future if such sensors available which can decode thoughts or brain pulses then we can control objects by thinking or by seeing that object.

10. Conclusion

Here, after implementing this project, we found that online Android speech recognition is efficient than offline speech recognition. For offline speech recognition. It requires US English accent .To switch any appliance we need to connect our android phone to hardware via Bluetooth. Overall performance of operation is fast and efficient.

11. References

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