Voice controlled Home Appliances using Arduino
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Introduction

• Remote control of home appliances getting common these days
• Remote control using voice commands possible through voice applications in Smartphone
• Smartphones have in-built Bluetooth
• An extra Bluetooth module used at receiving end
**Bluetooth**

- Wireless LAN technology
- A specification for short-range radio links
- Low cost, low power radio frequency technology
- Communicates on 2.45 GHz frequency
Hardware requirements

• Arduino Uno microcontroller

• Bluetooth Module - HC-05

• 12V Relay

• Relay driver - ULN2003

• Power Supply
Arduino Uno Features

- ATmega328P microcontroller
- Input voltage - 7-12V
- 14 Digital I/O Pins (6 PWM outputs)
- 6 Analog Inputs
- 32k Flash Memory
- 16Mhz Clock Speed
Atmega328P

- 32K bytes of In-System Programmable Flash
- 1K bytes EEPROM
- 2K bytes SRAM
- 23 general purpose I/O lines
- 32 general purpose working registers
- three flexible Timer/Counters with compare modes, internal and external interrupts
- a serial programmable USART
- a byte-oriented 2-wire Serial Interface, an SPI serial port
- a 6-channel 10-bit ADC
- a programmable Watchdog Timer with internal Oscillator
- five software selectable power saving modes.
Bluetooth Module (HC-05)

- For the communication between mobile phone and microcontroller Bluetooth module (HC-05) is used

- Low Power 1.8V Operation, 1.8 to 3.6V I/O.

- Serial port Bluetooth module have a Bluetooth 2.0+EDR (enhanced data rate), 3Mbps modulation with complete 2.4GHZ radio transceiver and baseband.

- Using Bluetooth profile and android platform architecture different type of Bluetooth applications can be developed.
12 V Relay

- Relay is basically an electromagnetic switch which can be turned on and off by applying the voltage across its contacts.
How Relay works?
Relay driver – ULN2003
Why Relay Driver?

• Relay safely driven by ULN2003 IC

• Protect microcontroller from relay kick back using integrated clamping diodes.

• Has 7 high current Darlington arrays each containing 7 open collector Darlington pairs with common emitters.
Power Supply

230 V AC
50 Hz

12V step down transformer

Bridge rectifier

Filter (470μF)

5v Regulator

5V DC

Transformer 12-0V
Bridge Rectifier (+12V)
Voltage Regulator

230V A.C.
0-12V

1N4007
1N4007
1N4007
1N4007

805
7805
GND

R40 330R
C11 470u
D41 LED-RED

GND 20
(+5V) 40
Android

• Android is an open-source operating system which means that any manufacturer can use it in their phones free of charge.
• It was built to be truly open.
• Android is built on the open Linux Kernel. Furthermore, it utilizes a custom JAVA virtual machine that was designed to optimize memory and hardware resources in a mobile environment.
Android Application on Mobile Phones

• An android app is meant for phones with an android based operating systems. They can be downloaded from the android app Market which is pre-loaded on every android phone.

• Blue control APP and Bluetooth Spp APP are some examples.
The Android platform includes support for the Bluetooth network stack, which allows a device to wirelessly exchange data with other Bluetooth devices.

The application framework provides access to the Bluetooth functionality through the Android Bluetooth APIs.
Voice controlled android application - AutoVoice
Software requirements

• Tool
  Arduino IDE

• Programming Languages
  Embedded C/C++
Advantages and Disadvantages

Advantages
• Code compatibility and expandability across different Arduino boards
• Cost is less as Arduino is open source
• The schematic of Arduino is open source. So for future enhancement of the project, the board can be extended to add more features
• Bluetooth does not require a clear line of sight between the synced devices. This means that the devices need not be facing each other

Disadvantages
• The battery usage during a single transfer is negligible, but when the device is let switched on Bluetooth consumes more power
Conclusion

• Bluetooth based voice control of appliances proves to be a better remote controlled operation

• Android based voice control applications comes handy in home automation
References

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