CONTROLLING OF HOME APPLIANCES USING VOICE COMMAND

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Abstract— electronically control of household activities has long been explored in various ways. From electronic remote control using infrared sensor to voice controlled application, we are continually trying to find a better way to control electrical and electronic devices to ease our daily life. This paper present the development of low cost remote home control system using speech recognition module HC05. The system focused on controlling fan, lamp and other electrical appliances. The voice command is analog input. The main control unit accept voice command from the user and fed to Arduino. Arduino senses the input signal, processes it and give instructions to the relay which in turn turns on/off the electrical loads.

Keywords— Arduino uno, voice recognition module HC05, voice command, relay.

I. INTRODUCTION

The main objective of this project is to control the home appliances automatically by using human voice and Arduino uno. If everyone's home is automatized, it can make community more futuristic and cities will look smarter. This project is designed to utilize human voice command to control electrical appliances. The voice command is analog input. This analog signal is processed and fed to Arduino. Arduino senses the input signal, processes it and give instructions to the relay which in turn turns on/off the electrical loads. Arduino Uno is a multipurpose microcontroller board based on the ATmega328p.It has 14 digital i/p & o/p pins and 6 analog inputs. Each of the digital pins on the Uno can be used as an input or output. An Arduino Uno board can either be powered via USB connection or with external power supply.

The main aim of the project is to control the home appliances with the help of voice commands from the user. This project is beneficial for handicapped and aged people who face difficulty in walking to operate the switches to turn on/off of home appliances. This principle can be used for domestic as well as industrial application.

II. BLOCK DIAGRAM AND CIRCUIT DIAGRAM DESCRIPTION

Assemble the home automation circuit as shown in the circuit diagram. Open Arduino IDE and compile the above program. Upload the sketch to Arduino board. Switch on the power supply to Arduino by connecting it to 5V power source. Pair Bluetooth module with your Android phone. Type password '1234' (default password) of Bluetooth module. Click Bluetooth Image on the app to connect it with the Bluetooth module. It automatically connects and displays as Connected in the app.

You are now ready to control the appliances using the app. You can touch the icon to ON/OFF so to control the appliances. You can control more electrical appliances by increasing the number of channels in the relay. For instance, using an 8-channel relay, you can control up to eight devices. For this, you need to alter the source code by adding input commands.
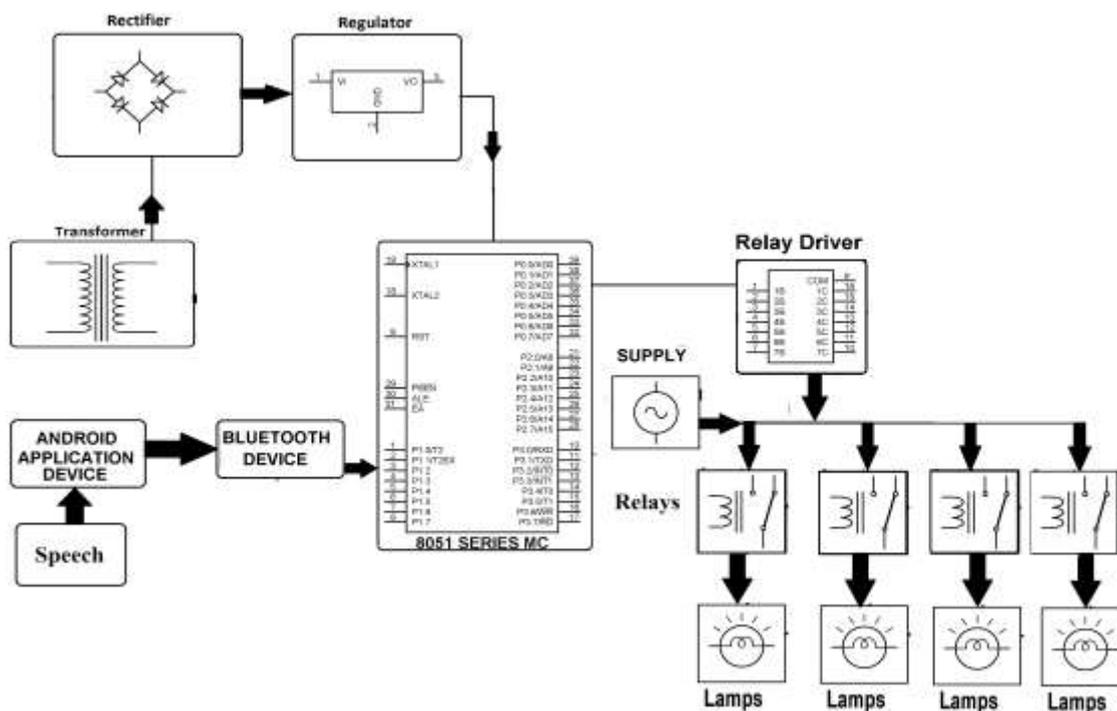
fig 1.   Block diagram of voice controlled home automation

III. METHODOLOGY

The total project consists of four important sections
1.   Arduino Uno
2.   Bluetooth Module (HC-05)
3.   Channel / 8 Channels Relay Module (5 or 12 V)
4.   Software
5.   Android App (be installed on the smartphone to control the appliances)
6.   Arduino IDE (used for programming the Arduino Uno)

IV. ARDUINO UNO

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

Arduino Uno is based on ATmega328 microcontroller (MCU). It consists of 14 digital input/output pins, six analogue inputs, a USB connection for programming the onboard MCU, a power jack, an ICSP header and a reset button. It is operated with a

16MHz crystal oscillator and contains everything needed to support the MCU. It is very easy to use as you simply need to connect it to a computer using a USB cable, or power it with an AC-to-DC adaptor or battery to get started. The MCU onboard is programmed in Arduino programming language using Arduino IDE

Figure 1.1: ARDUINO UNO BOARD

V. BLUETOOTH MODULE (HC-05)

Bluetooth module used in this project is HC-05 (Fig. 4), which supports master and slave mode serial communication (9600-115200 bps) SPP and UART interface. Using these features it can communicate with other Bluetooth-enabled devices like mobile phones, tablets and laptops. The module runs on 3.3V to 5V power supply. It has got 6 pins.

Figure 2.1: BLUETOOTH MODULE HC-05

VI. RELAY MODULE

A relay allows you to turn on or turn off a circuit using voltage and/or current much higher than what Arduino could handle. Relay provides complete isolation between the low-voltage circuit on Arduino side and the high-voltage side controlling the load. For this project a 4 channel, 5V relay channel has been taken. This 5V 4-channel relay interface board and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller.

Figure 2.2: 4 CHANNEL RELAY

VII. SOFTWARE

7.1 Arduino Software (IDE)

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board.

7.2 Android App

An android app is used to control the appliances wirelessly. The app can be downloaded from the Google Play or can be made from MIT App Inventor 2 (creating android app online). The screenshot shown below is made by the MIT App Inventor 2. This app is now in developer stage and hence can be improved with some improvements and modifications.

VIII. RESULTS AND DISCUSSIONS

Power on Arduino board using a 9V DC battery (or any USB 5V DC power supply) to enjoy wireless control of your home appliances via speech. Upload Bluetalk.ino sketch into Arduino board and install Bluetalk.apk on your Android phone.

Pair your Android's Bluetooth to HC-05 module. It will prompt you to enter a password. Default password is 1234. Open the app and connect to HC-05 again. Your system is ready to work.Touch 'Speak' icon on the app, say 'Turn On' in front of your smartphone to turn the appliance on and 'Turn Off' to turn it off.
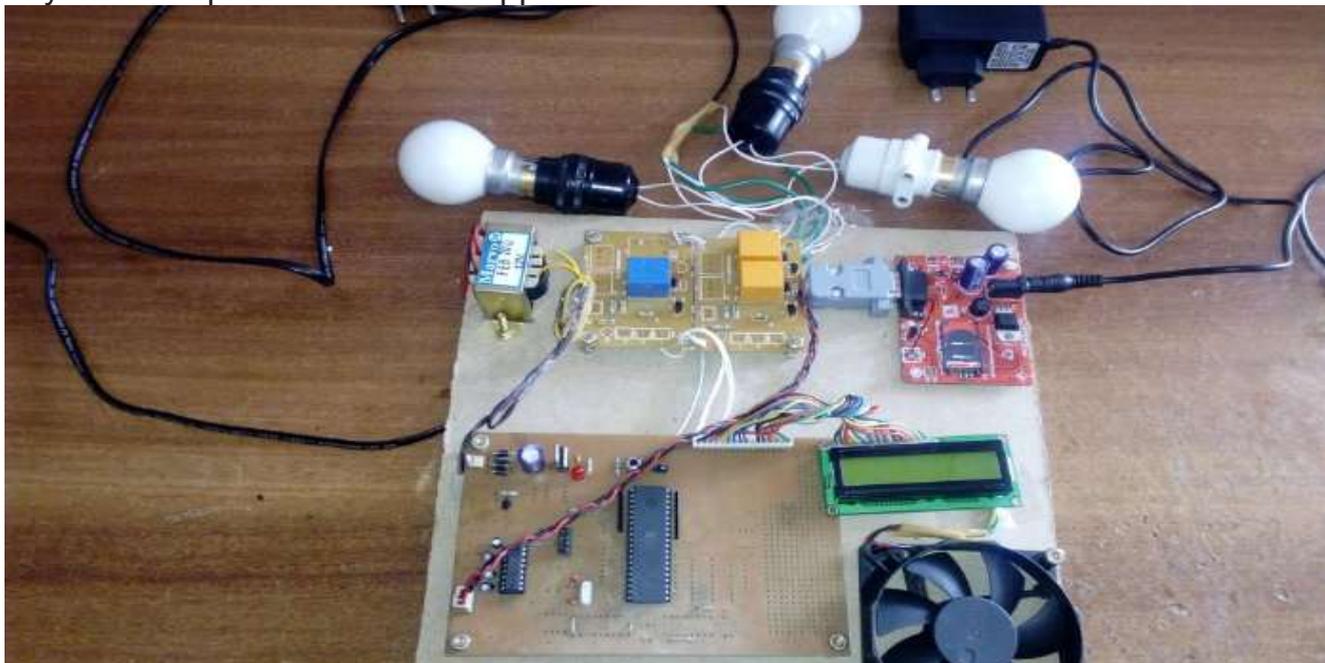

Figure 5:- Circuit Model of voice controlled home automation

IX. CONCLUSION AND FUTURE APPLICATIONS

Implementing voice recognition technique for home control system can make our life easier. This type of control system can be applied to the situations where it is not feasible to manually control the home appliances. It can help disabled and elderly living at home.

The effectiveness of the system depends on several factors, which are the user pronunciation, the level of noise in the room where the system is set up and the distances between the transmitter and receiver modules. The system could be further improved by using better performance RF transmitter and receiver.

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