Voice Controlled Home Automation System

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Abstract – Home automation system helps in providing support for the elderly and disabled. Home automation system must comply with house standards and convenience of reducing the power consumption. The home automation system controls all lights and electrical appliances in a home or office using voice commands. This paper is about home automation system which would use a smartphone to enable any naive user to operate all the appliances. The system has three main components: an Arduino microcontroller for connecting the appliances, a Bluetooth module HC05 for signal transfer, and a smartphone running the Android application. The smartphones interacts with the Arduino via Bluetooth and decodes the user's voice command. The main aim of the system development is low cost and scalable according to requirements.

Index Terms – Arduino Uno, HC-05 Bluetooth Module, Home Automation, Smartphone, Voice Control.

1. INTRODUCTION

The project Voice controlled home automation project helps to control the electrical loads based on Bluetooth input signal. The Bluetooth device receives this input signal from android device. This system is especially beneficial in case of handicapped or aged people who find it difficult to walk and operate the electrical switches to turn on or off the loads. This system solves this issue as now the user just has to give voice commands to turn on or off the loads. Here 4 loads are used to demonstrate light, fan, heater and AC. All these loads can be individually turned ON/OFF or all loads at the same time.

This system solves the issue by interfacing a unit with home appliances that switches these loads based on the input received from android device. The Android app also provides an effective GUI for providing this functionality.This system makes use of 8051 microcontroller. The Bluetooth receiver is interfaced with microcontroller in order to accept the commands and then react accordingly. It operates the loads through a set of relays using a relay driver IC. Relays are used between loads and the control unit.

This system thus can be used in many domestic applications and in industrial setups. The power supply setup of the system contains a step down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. Capacitive filter is used which makes use of 7805 voltage regulator to regulate it to +5V that will be needed for microcontroller and other components operation, in order to remove ripples. Bascially in home automation system we have a wireless switch to control different devices. But In this project we can control devices over our voice using Arduino. Mega have 54 digital pins so we can connect vast number of devices using this board. This project will be helpful for Physically challenged people who can use their voice to control anything.

This paper focuses on the development of a voice command system based on the offline Google speech recognition engine. The system's user interface is a cell phone Android Application which interacts with an Arduino board to execute the commands.

2. RELATED WORK

All the related works that have been done by other researchers that are related to the current research problem are summarized in this section.

- Voice control of home appliances using Android
- Design of an Intelligent Voice Controlled Home Automation system
- Home Appliances Control using Android App
- Voice control of home appliances using Android

This paper presents the development of home appliances based on voice command using Android. This system has been designed to assist and provide the support to elderly and disabled people at home. Google application has been used as voice recognition and process the voice input from the smartphone. In this paper, the voice input has been captured by the android and will be sent to the Arduino Uno. Bluetooth module in Arduino Uno received the signal and processed the input signal to control the light and fan. The proposed system intended to control electrical appliances with relatively user-friendly interface and ease of installation. We have demonstrated up to 20 meter of range to control the home appliances via Bluetooth.

2.2. Design of an Intelligent Voice Controlled Home Automation System

With the development of modern technology, smart phones have become a necessity for every person on this planet. Applications are being developed on Android systems that are useful to us in various ways. Another upcoming technology is

natural language processing which enables us to command and control things with our voice. Combining all of these, our paper presents a micro controller based voice controlled home automation system using smart phones. Such a system will enable users to have control over every appliance in his/her home with their voice. All that the user needs is an Android smart phone, which is present in almost everybody's hand nowadays, and a control circuit. The control circuit consists of an Arduino Uno microcontroller, which processes the user commands and controls the switching of devices. The connection between the microcontroller and the smart phone is established via Bluetooth, a widespread wireless technology used for sharing data.

2.3. Home Appliances Control using Android Application

Effective and reliable predefined Arduino programming. And then it control the switching of the Home Appliances. Here the microcontroller and smart phones are connected via Bluetooth modules, which are present in both the smart phones and in the controlling circuit. The Bluetooth is a wireless technology used for sharing the data in between the Android phones and the Arduino board. The Bluetooth module with Arduino is used to control the home appliances wirelessly and Arduino and the relay drivers are used to switch the devices like switching lights.

3. PROJECT SCOPE

By using voice commands, a user shall be able to switch on and off home devices such as lights, fan , multimedia etc. A key feature of this system is it's flexibility to adapt to different scenarios and devices, as the user is able to add, delete and edit rooms, user accounts and devices. For security purposes, the system requires login to access it and there are two kinds of users the admin user and the common user. From a technical point of view, the system utilizes a local network in which the UI and the Arduino have different roles.

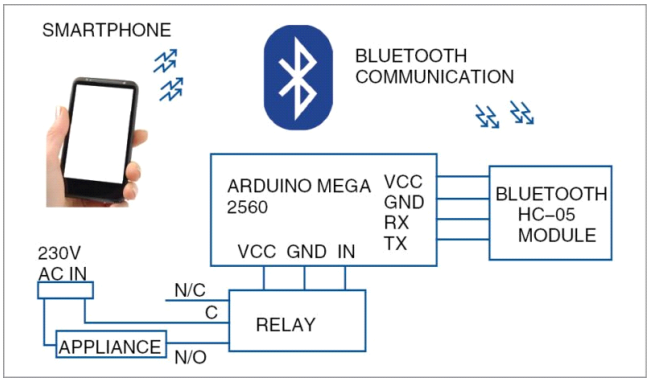

Fig 1 Block Diagram

The UI is a cellphone Android application client in the wifi network, and its main role is to provide the user the means to interact with the system. It also processes the user's voice commands through a third party artificial neural network system from Google and the outcome of that is sent to the Arduino via socket in the local wifi network. At last, it has a database to store data from the server, so the server does not need to be consulted every time, and it has a simple cryptography system to protect the data integrity in the system. The Arduino is the server in the wifi network, and its main role is to process and manage all the client requests sent to it, execute the requests and send a reply back to the client.

4. TECHNOLOGIES USED

Arduino UNO R3

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins.

Bluetooth Module HC-05

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This 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 AFH (Adaptive Frequency Hopping Feature).

Fig 2 Bluetooth Module

Microcontroller:- Microphone and Voice Recognition Module The microphone used to get voice commands to the voice recognition module is a simple collar type microphone with 3.5 mm jack. Elec house voice recognition module v3 is used for the voice recognition process . The voice recognition module needs to be trained before it can be put to actually recognize the voice commands. The speech input from the

microphone is given to the voice recognition module and there the input speech is compared with the previously trained voice commands and if there is a match then control action through control circuit is taken.

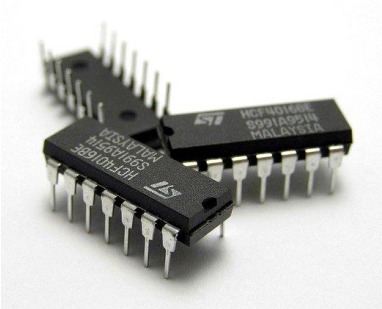

Fig 3 Microcontroller

5. PROPOSED MODELLING

The software implementation part of voice recognition based home automation system implemented using the Arduino controller. It consists of training of voice recognition module. The voice recognition module needs to be trained first with the voice commands before it can be put to recognizing function. The voice recognition module training program is loaded into the Arduino and then trained with the voice commands. This shows the training process of voice recognition module using the Arduino IDE. The main code for the home automation system is written in C++ language in Arduino IDE. Upon successful recognition of voice command the control action corresponding to that command is taken.

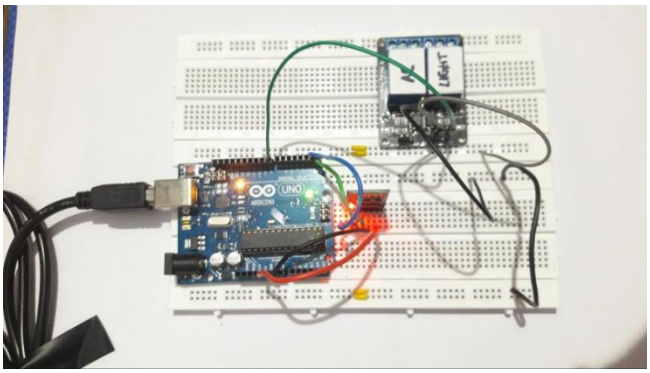

Fig 4 Voice Controlled Home Automation System

6. CONCLUSION

The entire project design will be carried out with the large and real database connection and thus will enhance the whole project. Bluetooth module can be replaced with another component that can provide wider range of accessibility

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