



Automation of Home Appliances Using Bluetooth

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ABSTRACT:

Automation is a trending topic in the 21st century making it play an important role in our daily lives. The main attraction of any automated system is reducing human labour effort, time and errors due to human negligence. 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 smartphone, which is present in almost everybody's hand nowadays, and a control circuit. When the first computers came around, achieving the level of sophistication so as to narrate commands using voice to a machine was only realised in science fiction. However with tremendous breakthrough in the field, we are at the precipice of truly using voice to interface with devices.

KEYWORDS; Home Automation, Bluetooth, Android.

1. INTRODUCTION

The voice controlled smart home automation system helps to control electrical appliances by using voice commands. The system uses Bluetooth module for transmitting data for controlling functioning of electrical loads[2]. The Bluetooth can receive input signal from any a device which have Bluetooth compatibility such as smartphone. The smart home automation is most beneficial for handicap or aged people. The system solve the problem of switching on/off electrical appliances because when user just have to give voice command to control the appliance or electrical loads. The system is designed in such a way user can control all appliance at once or can control each separately. The system works by interfacing the on/off switches of electrical appliance or loads by using mechanical relay or solid state replay, after connecting relays in system the electrical switch works as two way switch. The voice command is sent by using a software designed for controlling the system, a built in microphone and voice recognition system implemented in device such as Samsung's Bixby. A micro-controller (Arduino Uno) is implemented in system [the micro controller receives input signal from user device and sent signal to respective relay for turning on/off electrical appliances connected with system such as bulbs, fan, air conditioner unit etc. The system works on 12V DC power which is converted from 220V AC power by using step-down transformer, rectifier for converting AC into DC and capacitive filter making fluctuating DC into pure DC power. This paper focus on the development of voice controlled based upon speech recognition system. The systems user interface device is a smartphone and software which interface with Arduino Uno to execute commands of user.

2. LITERATURE REVIEW

[1]. System consists of three main components; web server, which presents system core that controls, and monitors users' home and hardware interface module (Arduino PCB (ready-made), Wi-Fi shield PCB, 3 input alarms PCB, and 3 output actuators PCB), which provides appropriate interface to sensors and actuator of home automation system. The System is better from the scalability and flexibility point of view than the commercially available home automation systems. The User may use the same technology to login to the server web based application. If server is connected to the internet, so remote users can access server web based application through the internet using compatible web browser. The application has been developed based on the android system.

[2] An interface card has been developed to assure communication between the remote user, server, raspberry pi card and the home Appliances. The application has been installed on an android Smartphone, a web server, and a raspberry pi card to control the shutter of windows. Android application on a smartphone issue command to raspberry pi card. An interface card has been realized to update signals between the actuator sensors and the raspberry pi card. Cloud-based home appliance monitoring and controlling System. Design and implement a home gateway to collect metadata from home appliances and send to the cloud-based data server to store on HDFS (Hadoop Distributed File System), process them using MapReduce and use to provide a monitoring function to Remote user.

[3] It has been implemented with Raspberry Pi through reading the subject of E-mail and the algorithm. Raspberry Pi proves to be a powerful, economic and efficient platform for implementing the smart home automation.

[4] Raspberry pi based home automation is better than other home automation methods is several ways. For example, in home automation through DTMF(dual tone multi-frequency), the call tariff is a huge disadvantage, which is not the case in their proposed method. Also, in Web server based home automation, the design of web server and the memory space required is ejected by this method, because it simply uses the already existing web server service provided by G-mail. LEDs were used to indicate the switching action. System is interactive, efficient and flexible. Shih-Pang Tseng et al.

3. COMPONENTS

A. Bluetooth Module(HC05)

HC-05 Bluetooth Module The HC-05 is an easy to connect and easy to used Bluetooth module, which is designed for wireless serial connection. The Bluetooth module can be used as master or slave configuration, making it best solution for wireless connection or communication. This module is version 2.0 Bluetooth communication technology which is great for transferring and receiving data in fast rate

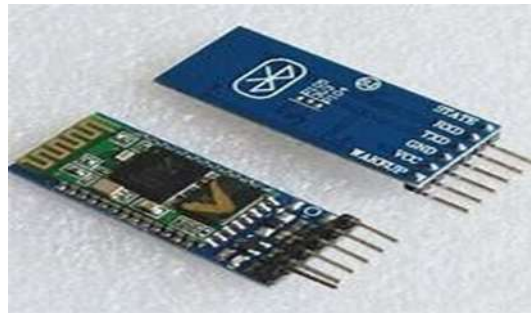


Figure 1: HC-05 Bluetooth module

B. L298N Dual Motor Controller Module

The L298N dual motor controller module is a popular and versatile electronic device used to control DC motors. It supports up to two motors and can handle a maximum current of 2A per channel. The module is easy to use and is compatible with a wide range of microcontrollers, including Arduino and Raspberry Pi. It uses a standard H-bridge configuration to control the direction and speed of the motors. The L298N also has built-in protection circuits, including over-current and over-temperature protection, to ensure safe operation. Its ease of use, compatibility with popular microcontrollers, and built-in safety features make the L298N an ideal choice for motor control applications.



Figure 2. L298N Dual Motor Controller Module

C. Node MCU ESP8226 and IoT

Node MCU ESP8266 was a microcontroller in the form of an electronic board with an ESP8266 chip with the ability to run microcontroller functions and a Wi-Fi internet connection. The Node MCU has several I/O pins, so this microcontroller became famous for monitoring and controlling applications in IoT systems. Node MCU can be programmed with the ArduinoNANO compiler, named Arduino IDE Software. Node MCU was a USB port for easy programmed Internet of Things (IoT) is a network of objects connected by the internet and communicates independently without human intervention.

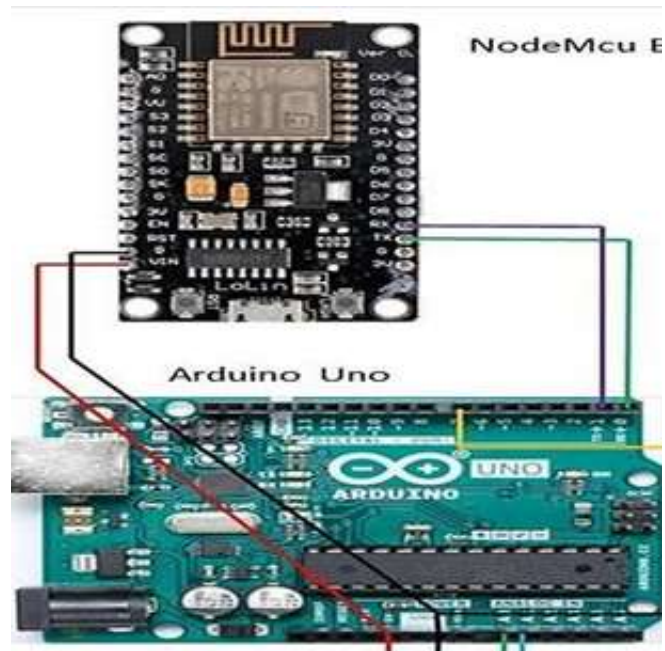


Figure 3. Node MCU ESP8266 module

TABLE I. SPECIFICATIONS OF NODEMCU ESP8266*

No.	Specification	NodeMCU
1	Microcontroller	ESP8266
2	Board Size	57 mm x 30 mm
3	Input Voltage	3.3 – 5 volts
4	GPIO	13 pins
5	PWM channel	10 channels
6	Flash memory	4 MB
7	10-bit ADC pin	1 pin
8	Clock Speed	40/26/24 MHz
9	Wi-Fi	IEEE 802.11 b/g/n
10	Frequency	2.4 GHz – 2.5 GHz
11	USB Port	Micro USB
12	Card Reader	Unavailable
13	USB to Serial Converter	CH340G

D. Lead Acid Battery

The lead-acid battery is a type of rechargeable battery that is commonly used in various applications such as automobiles, uninterruptible power supplies (UPS), and backup power systems.

It has a nominal voltage of 12V and a capacity of 1.2Ah, which refers to the amount of charge it can store and deliver. The lead-acid battery uses lead plates and sulfuric acid electrolyte to generate electricity through a chemical reaction.



Figure 4. Lead Acid Battery

It is a relatively low-cost and reliable technology, but has limitations in terms of energy density, weight, and maintenance requirements. Nevertheless, the lead-acid battery remains a popular choice for many applications due to its durability and affordability

. RESULT AND DISCUSSION

The system is designed by using three main components, first is microcontroller Arduino Uno, second is Bluetooth module HC-05 and third is mechanical relay. Firstly user gives the command to microcontroller by using speech recognition system of smartphone and system software application via Bluetooth module HC-05. The microcontroller acts accordingly to the command give user and control the functionality of mechanical relay. The Arduino Uno is programmed using Arduino IDE which is software, the user interface application is designed using VOT app inventor platform.



Figure 4: Smart Home automation system

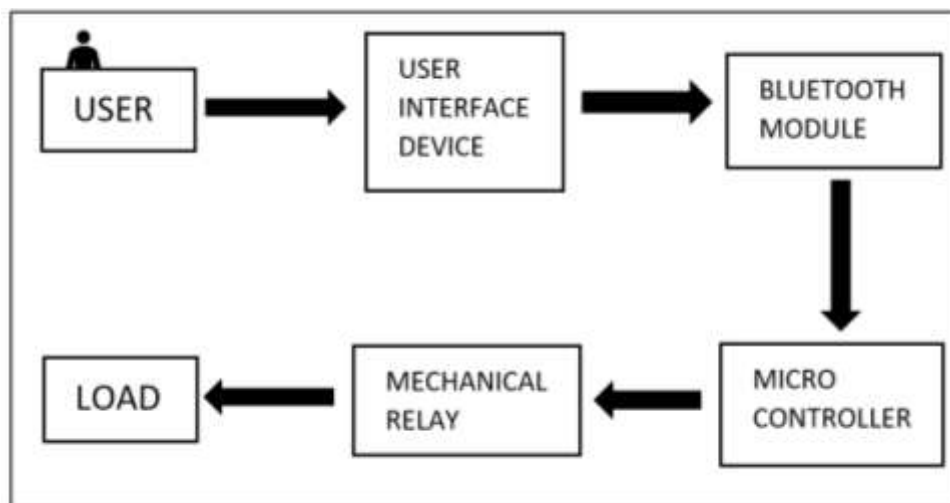


Figure 5: Block Diagram of system

5. CONCLUSION

The project is designed by keeping in mind needs of all consumers for performing operation of turning on and off electrical appliance by using user interface device by giving voice commands wirelessly. The Bluetooth module can be removed and instead of Bluetooth module high range communication device can be implemented in system for better and reliable use of system.

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