IoT Based Home Automation System through Voice Control Using Google Assistant

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Abstract - *Technology has brought everything to happen in the hand. We are using technologies to controlling and monitoring electrical appliances using voice control app with the help of internet connection. So it gives a more space at a home, university and industrial controlling electrical appliances anywhere in the world. By using Internet of Things we can control many devices such as light, power plug, Fan, computer, security system and etc. It will reduce human effort and power efficiency. A home appliance is a device or instrument designed to perform a specific function, especially an electrical device, such as a refrigerator, for household use. The words appliance and devices are used interchangeably. Automation is today's fact, where things are being controlled automatically, usually the basic tasks of turning ON/OFF certain devices and beyond, either remotely or in close proximity. But the fact is monitoring less devices and safety is less. More power consumption. So we have use automation with less power here we proposed a system That consist of a computer server with internet connection, an IOT Ethernet shield used to connecting the server to the external network, There. An Arduino microcontroller with a hardwired application connected to the devices. The prototype system supports two-level devices that only need to be switched on or off. An IOT based home automation system focuses on controlling home electronic devices whether you are inside or outside your home. Save the electric power and human energy.*
Key Words: *Internet of Things, Blynk, Home Automation, Android Smartphone, Arduino*

I. INTRODUCTION

The smart home automation system using voice control helps to control electrical appliances by using voice commands. The system EsP8266 module for transmitting data for controlling functioning of electrical loads[2]. The module receive input signal from any a device which have voice commanding and with blynk app. 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 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 blynk app for controlling the system, a built in microphone and voice recognition system implemented such as AMAZON alexa. 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. Here we see about 1)devices we have used 2) voice control app 3) controlling electrical appliance app (Blynk) 4)how we control the device

1) devices we have used:
1) arduino uno
2) ESP8266
3) relay

Arduino uno

Arduino Uno: is a hardware which have a programmable IC Atmega328P and programmed by using computer software Arduino IDE. The device have multiple input and output pins for controlling multiple unit and sensors, also for receiving input for multiple sensors and different input devices

1)figure of arduino uno board.

2)ESP8266

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

3) Relay

The relay have capability for acting as switch for turning on and off electrical loads. They Woks simply byroviding small electrical power in form of electrical signal. This allow high power loads controlled by usingsmall amount of power. The mechanical relay uses electromechanical coil to open and close the circuit. When small amount of current passes through coil it excites the coil and generates magnetic field and either pull the bar or release the bar which is used for opening and closing the circuit, here opening and closing means restricts flow of current and vice versa

4)   Image of relay APP used blynk

Blynk is a Platform with IOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets.The most popular IoT platform to connect your devices to the cloud, design apps to control them, and manage your deployed products at scale.

II.   OBJECTIVE

• To learn about arduino and itsfeature
• To learn about blynk datatransmission
• Learn about how does blynkworks
• Function of voice control app usingblynk
• Study of realy how it is connected with the homeappliances
• To learn about the advantages ofarduino
• To know about voice control using bluetooth vs blynkapp

III.   PROPOSED SYSTEM:

A home appliance is a device or instrument designed to perform a specific function, especially an electricaldevice, such as a refrigerator, for household use. The words appliance and devices are used interchangeably. Automation is today's fact, where things are being controlled automatically, usually the basic tasks of turning ON/OFF certain devices and beyond, either remotely or in close proximity.But the fact is monitoring less devices and safety is less.more power consumption. So we have use automation with less power here we proposed a system**.**That consist of a computer server with internet connection, an IOT Ethernet shield used to connecting the server to the external network, There an Arduino microcontrollerwith a hardwired application connected to the devices. The prototype system supports two-level devices that only need to be switched on or off. An IOT based home automation system focuses on controlling home electronic devices whether you are inside or outside your home.Save the electric power and human energy

PROPOSED MODEL
Working description:

The system is designed by using three main components, first is microcontroller Arduino Uno, second is wifi module ESP8266 and third is mechanical relay. Firstly user gives the command to microcontroller by using speech recognition system of smartphone and system software application via esp8266 connected with blynk . 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, we have to connect the google voice recognition for response our command. To add comments we have add applet in google assistant program manager.
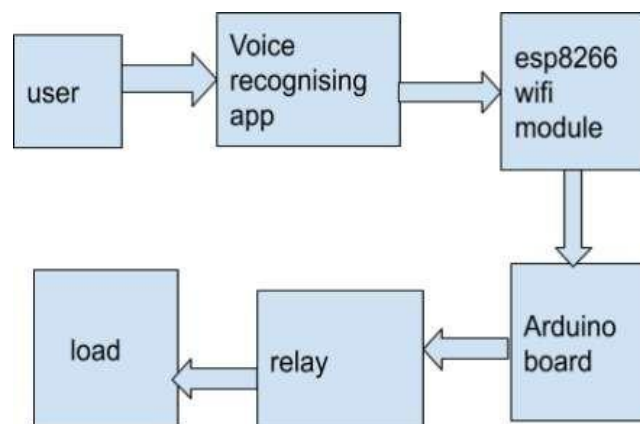
The steps involved in the processing of the above described model are as follows:
1. Voice recognised by the mobileapp
2. Which set the blynk app connected device from '0' to'1'
3. Thenthewifimodulegetsonwhichsetstherelaytobeonbyusing arduino microcontroller
4. Once relay gets on the load set from '0' to '1' that is off to on position..

While we give the voice comment as off the device are set from on to off WORKINGFLOW in system the electrical switch works as two way switch. The voice command is sent by using a voice recognition app , a built in microphone and voice recognition system implemented in device such as google voice assistant. 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 5V DC power which is converted from 220V AC power by using step-down transformer[4], 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.

HARDWARE USED
- Arduino uno Esp8266
- wifi module Mobile
- Esp8266 wifi module

This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes- style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted.The very lowprice and the fact that there were very few external components on the module, which suggested that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, the chip, and the software on it, as well as to translate the Chinese documentation

Procedure:
- Install Blynk mobile app on your phone. It is available for both iOS and Android. You will need to create an account on the application
- Create a New Project in Blynk. You will receive an email in which you will your Auth Token. We will be needing this later in this tutorial.
- Set the device to NodeMCU & connection type to WiFi.
- Drag two Buttons from the Widget Box to the project. Simply touch on the Button Widget and it will be added to our project.
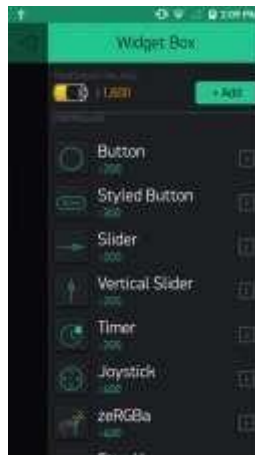
- Drag two Buttons from the Widget Box to the project. Simply touch on the Button Widget and it will be added to your project.
- Configure the buttons according to the following two screenshots:

- Connect the ESP8266 and ARDUINO UNO with your computer through a Micro-USB cable.
- Open Arduino IDE. Set the board to NodeMCU 1.0 and set the respective port. If you don't know how to do it, follow

our tutorial to Setup Arduino IDE for NodeMCU

- Enter the code given above in Arduino IDE
- Replace 'YourAuthToken' with the Auth token that you received through your email.
- Replace 'YourWiFiNetwork' with the actual name of your Wi-Fi installed at your place.
- Replace 'YourWiFiPassword' with your actual Wi-Fi password.
- Upload the code and Run the project in Blynk by pressing the Run button on the top right corner of the application

Theory:

This IoT project utilizes Relays to switch electrical appliances on and off when the ESP8266 triggers it to switch. Microcontrollers are a sensitive piece of hardware that cannot handle 220 Volts so we cannot just control our home appliances directly with the microcontroller and Relays are the perfect solution for that. A relay is basically just a switch that which is triggered with a small electrical signal. It consists of a lever and a core with a copper wire wrapped around it, known as the Armature. There are two states in a Relay, Normally Closed (NC) and Normally Opened (NO). The appliances are connected between NO and Ground as the relays are initially in the NC state. When the Microcontroller provides the trigger function, the armature becomes an electromagnet and pulls the lever to NO closing the circuit as a result.

As the Relay used in our project is 2 channel, it means we can control two appliances with it. The trigger pins of the Relay i.e. IN1 and IN2 are connected to the digital pins of the NodeMCU. We use Blynk_Write() function to get value from Blynk at virtual pins V1 & V2 using param.asInt(). When the button is pressed in Blynk, a string with a number "1" meaning HIGH is sent to NodeMCU and the switch is turned on. When the button is pressed again in Blynk, it sends another string with a number "0" meaning ESP8266 and the switch is turned off.

IV.   RESULT:

This study presented the design, fabrication, and implementation of a portable, user-friendly, and low-cost automation system for SHs based on IoT. The developed IoT Home system can be easily implemented in a real house to allow real-time monitoring of home conditions and control of home appliances. Several sensors and

actuators were connected to the NodeMCU controller, which updated the data to the IoT server. The obtained data from the sensors(temperature, humidity, motion, gas, and RFID) can be monitored via MQTT Dash mobile application and Adafruit IO Web via laptops/PC Control of home appliances can be easily and efficiently conducted by using MQTT/Adafruit IO GUI or through voice commands using Google Assistant. The results of this study are promising, and the developed system can increase the safety, security, intelligence, and comfort of users.

REFERENCE:

[1]. Wan-Ki Park, Chang-Sic Choi, Jinsoo Han and Intark Han, "Design and Implementation of ZigBee based URC Applicable to Legacy Home Appliances", IEEE International Symposium on Consumer Electronics (ISCE 2007), Irving, TX, June 20-23, 2007, pp.1-6.

[2]. 4. Jinsoo Han, Haeryong Lee and Kwang-Roh Park, " Remote-controllable and energy-saving room architecture based on ZigBee communication", IEEE Transactions on Consumer Electronics, Vol.55, No.1, Feb. 2009, pp.264-268.

[3]. M. Spencer et al., "Demonstration of integrated micro-electromechanical relay circuits for VLSI applications," in IEEE Journal of Solid-State Circuits, 2011

[4]. A. Paul, M. Panja, M. Bagchi, N. Das, R. M. Mazumder, and S. Ghosh, "Voice recognition based wireless room automation system," in 2016 International Conference on Intelligent Control, Power and Instrumentation, ICICPI 2016, 2017

[5]. H. A. Shu'eili, G. Sen Gupta, S. Mukhopadhyay, "Voice Recognition based Wireless Home Automation System", Proc. 4th IEEE International Conference on Mechatronics (ICOM), May 2011

[6]. A. Ghosh, R. Mitra, S. Mohalanobish, S. De, S. Bhattacharjee, S. Bardhan, "Wireless Irrigation System", Proc. 2018 IEEE International Conference on Recent Innovation In Electrical Electronics & Communication Engineering ICRIEECE-2018, 2018.