

Smart Home Automation using a Voice-Bot

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Abstract

Through ongoing years, electronic devices identified faster development in area of IoT along with remote Home automation system. Be that as it may, the high use of these devices limits numerous clients to utilize highlights of these advancements. In this paper, the proposed system can control the Home appliances with help Alexa Voice Services that has cloned with Raspberry Pi over the internet. Initially voice is recorded through microphone and the commands are sent to the IFTTT open cloud server which in turns connects to the webpage webhooks. Then the commands will be passed to Blynk server which passes the information to Node MCU microcontroller unit for the controlling the operation. So by this using the Relay switches the loads can be homated remotely. Which is nearly less expensive over purchasing the industrially accessible devices. Our work encourages users for investigate the Internet of Things without going through a lot of cash. By this proposed system we can achieve the Home Automation from the distance of 2 meters depending upon the sensitivity of the microphone.

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1. Introduction

Smart home a demonstration about utilizing services and by programming an application to regulate house apparatuses as personal satisfaction. Home automation has become over the top expensive comfort that numerous individuals in India and different nations can't bear[8]. There can be a time when you don't want to step out of the bed or there may be someone handicapped living on his own, who would want a helping hand with the operations[1]. The ease to switch on and off the device without putting any extra effort has been the main motto of this device. The target of our work about building up speech regulated device utilizing Raspberry Pi with either speakers which facilitate home automation task. Will build the system onto the Raspberry Pi from cloning with Amazon Alexa Skills Package. When total means were finished, there will be a completely working Amazon Echo which reacts for our input orders. It listens for our auditory instructions and

work accordingly[3]. We will have the option to utilize Alexa companion application that can adjust Alexas environment, also can have the option for introduce similar abilities that we can on a real Amazon echo. We can likewise construct an entire voice-controlled home automation framework over attaching it for globular, indoor regulators, fans and so forth. The voice-controlled Raspberry pi will help with the home automation in a way that it will listen to the keywords that have been fed into it and will follow the commands[3]. This home automation system can be very usefull for quadriplegia or paraplegia patients who will be on bed rest to help those patients by automating bed that this the bed elevation can also be done[10].

The Alexa Voice Service(AVS) is made up of logically grouped interfaces that correspond to client side capabilities, like speech recognition, audio playback, volume control and notifications support[6]. The Capabilities API in AVS library is the

recommended method for declaring which capabilities your products supports at the individual device level. But u can also still enable some capabilities listed below by the using selector option:

- Named Timers and Reminders
- Bluetooth
- Multi-Room Music(MRM)
- Display Cards with media and text
- Touch-initiated
- Hands-free
- Far-field

2. Literature Review

A. Home automation system by Android application In such method, customer sends a signal for arduino board through the use of an android program, and a Wireless module connected to the arduino board receives this signal and then sends it to arduino to power smart devices using relay board. Arduino system is used as this technique is operated by the core. We use the relays to perform the "On" and "OFF" operations. This technique is useful for people who have not often been able to switch from one location to another to monitor home appliances[9].

B. Voice Enabled Appliances Management system Through this proposed work, any appliances are frequently controlled efficiently from any location to apparatus via the aid of artificial intelligence (AI) speech colleagues by the web utilizing server in cloud innovation. Essentially, voice caught over artificial collaborator, delivered to the open cloud server IFTTT that point interfaces with anWebhooks. At that point send data for blynk application that progressively passes to ESP8266 enabled microcontroller module along that in end, gives the data for hand-off association unit for change over devices. Practically 100percent exactness was acquired over advised framework upon defer time 0.99 secs. A proposed framework has just been effectively tried from a separation of 10 meters[2].

C. Zigbee Based Voice Controlled Wireless Smart Home system This paper contributes voice-controlled remote home automation that has been introduced for older and handicapped persons. A purposed work have 2 fundamental factors to consider (a) voice acknowledgment design, (b) remote design. LabView coding was used for upgrade its mechanism for acknowledging speech. On the other hand, for upgrade the remote system, ZigBee Wireless Plugins is used. The objective over strategy to direct appliances by utilizing input orders. A purposed framework will perceive input orders, reform into the predefined design, then passes the information via remote translator, maintains got information at remote collector identified by appliances wanted to exchange tasks were exhibited. A purposed work

might be a minimum effort with cheap because ZigBee is utilized[11].

D. Controlling Home Appliances Remotely via Voice Command This paper talks about two strategies for controlling home appliances one is via speech to content SMS and the other is to utilize the portable as a remote control, this strategy will give an advantage to the old and cripple individuals and furthermore to those that are unconscious of composing an SMS. The portable application converts the voice into the "LOFF1E" message and attaches it to the SMS payload and accordingly, the comparable procedure rehashes. The target of this work is to frame such a device that controls the house appliances remotely[12].

E. Home Automation through Chatbot application This papershows an implementation of smart home automation with the use of Raspberry, Chatbot applicationthe Google Maps API. An event procedure is cut with extra operations such as expected arrival time, interaction and other protected activities was integrated. Most significantly, despite needing an architecture renovation and certain complexities, these smart home system will extensible yet flexible. And also they can be accessed from anywhere with all devices connected to the network can monitor your household appliances[4].

F. Home Automation System Using Voice Recognition Module for physically handicapped The proposed work is a completely hands-free automation system for special people with a hand disability and they can use this technique by voice recognition. This is regularly for the most utilized framework by handicapped and older folks who are influenced by hands defect or those that can't move their parts every now and again. And this is frequently a sensible, simple to utilize the framework. At first, the framework accepts contribution as voice signals and stores these voice signals inside the frameworks memory. At that point, the client needs to manage a chose devices then framework again take voice information and contrast the info and the effectively spared index and if matches, at that point PIR sensor actuated for checking the nearness of any human if human nearness test passes, at that point it initiates the hand-off that is at risk for to perform client proposed activity[5].

G. Voice Enabled Smart Home management system The paper aims with the automation which focuses on voice command processing and uses data transmission interfaces with low-power RF together with controller. A device is designed using voice commands that monitor both lighting and electronics within a residence and workplace. Output Of the system provides 100percent relaibility out of 3 for 10 commands and the 99percent for other seven. This indicates out of 100 voiced instructions 99 was read and understood in the previousexample[7].

3. Problem Description

The proposed framework allows us to use Amazon's applications which are capable of recording and executing voice commands. The commands will be sent to a Raspberry Pi Microprocessor local web server. The Raspberry Pi's GPIO pins can be managed by the assistance of Python code by obtaining the commands. Users can use speaker connected over Raspberry Pi 3, and the blynk device installed on smartphones to monitor their smart home network. The components of Smart Home Automation using a voice bot are listed below:

- Raspberry Pi 3 Model B+.
- Amazon Developer Console
- Blynk smartphone Application
- IFTTT server
- Webhook
- NodeMCU
- Arduino IDE

Objective of the paper is as follows:

The objective of our paper is to allow the users to make use of their natural voice to control and manage their non-smart home appliances by a inexpensive way.

4. Methodology

Configuring the Raspberry Pi 3.

The main component of system is that the Raspberry Pi 3 Model B which is shown Figure.1. Raspberry Pi 3 may be a single-board computer with wireless LAN and Bluetooth connectivity.

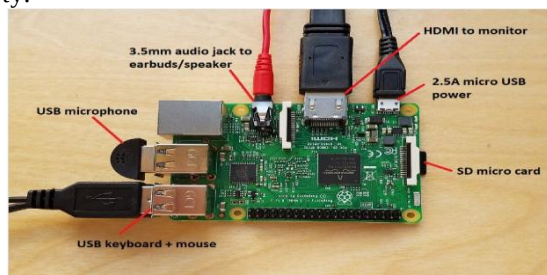


Figure 1: Raspberry Pi Model B.

To put Raspbian on Pi was the first thing possible. It's done via NOOBS download. NOOBS is a basic Raspbian OS-installer. This also offers a number of other OS, which are downloaded and updated through network. To bring in NOOBS 16 gb micro SD card was preferred. The current edition of the NOOBS is regularly downloaded in the precise Raspberry Pi website. A SD card gets formatted, and the NOOBS is then transferred to the SD card. As shown within Fig.1, Raspberry Pi is connected for the mouse, the keyboard, the external monitor. The Pi can also be reached via an SSH (Secure Shell Network)[3]. The Pi will boot after attaching it to the electricity supply as well as a screen under a collection of different

platforms to access must open. The method might start selecting Raspbian, and the Raspberry Pi can run via its configuration phase. The Raspberry Pi configuration interface will load as soon as the installation process is complete. Again we'll set the region's time and date and make a Raspberry Pi camera board, or can build users. The standard Raspbian authentication is user-id pi along with raspberry as key. When booted, the Raspberry Pi are mostly access much like a Linux-based OS via the terminal. Java is necessary to program and run the Java Sample App when Raspbian is configured over Pi[3].

A. Creating an Amazon Developer Account

The first phase to install Alexa and sign up on Amazon as a Developer, and generate a system profile. Upon registering has developer in amazon, new device is created through the Alexa link. You can choose any name, and fill in the rest of the detail. The further move would be to build a Security Template also to write down the Product Id, Client id and Client Secret for tracking purposes[3]. Amazon's Alexa responds to four different wake words "Computer", "Echo", "Alexa", "Amazon" and following are the steps to setup them.

1. Open the Amazon Alexa app on your device.
2. Click on More icon which is on the upper left corner of the screen.
3. Click on Setting
4. Select the device whose wake word you want to change and click on wake word setting.
5. Select the new wake word from the drop down list.

When the setup is completed, you will get a wake word changed prompt, along with the instructions on how to use it.

B. Blynk app and IFTTT server

Blynk is a strong Internet of Things app to iphone and android which lets you monitor your cell phone's Arduino, Raspberry Pi or microcontroller. The software lets you create your own monitoring system without complicated coding. It runs on the specified computer (Raspberry Pi) and manages all of the Online interaction among the two. The Blynk project designed on your phone has a unique identifier assigned to it. When you start your internet connected device (Raspberry Pi) the Blynk program connects to the Blynk server using that same unique identification[1]. The server then lets the app on your phone know it is connected, and creates the connection. IFTTT "if this then that" is a free IOT web-based service that allows to send trigger from one device/thing, and allow that trigger to make something happen.

5. Architecture of Proposed System

Architecture design of system is shown in the Fig.2. The Raspberry Pi Model B is connected with external speaker and microphone which supports Audio jack of 3.3mm. And the external power supply of 5V is provided externally. Finally the AVS library providing all the necessary Alexa Skill Set is built on the Raspberry Pi through Wifi. The controller part of the system consists of the NodeMCUWifi based microcontroller module are linked directly to an additional electric supply and simultaneously with the Blynk device. Then relay board is attached to the NodeMCU microcontroller unit in which weights are attached to the one link wire and another with the AC power supply. To be identified in the Wifi network, the program has to be imported to the microcontroller node by typing the unique ID and password in the Blynk app. Hence the overall configuration of the system component is full.

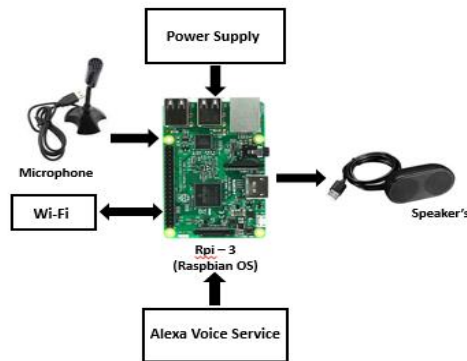


Figure 2: Raspberry Pi – Alexa setup

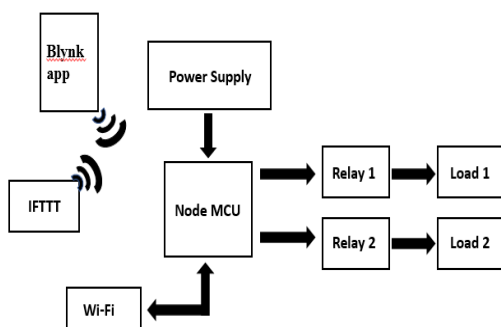


Figure 3: Controller part

A device operates based on that voice which is recieved as command with the client via the Raspberry Pi – Alexa setup and is compiled via IFTTT server and the aid with unique identification of the Blynk app, Then transmit an information for Webhooks that will search the configuration of the relay pins for turn on specific loadas the user demanded. When setting up IFTTT server, the user should not forget to insert the NodeMCU module's matching GPIO pin, because when Blynk app

transmits information to the Wifi board, assumed to be sending it as shown in Fig.3.

6. Proposed System Implementation

The segment Raspberry Pi Alexa collects a voice instruction, performs this by transmitting a data to a blynk server and, after proper determination, switches on the relay module, that in turn sends information to the microcontroller for computing which allows its relay module automatically switch on again and intiate on the required appliances. A blynk application performs a major role in communicating with the devices to the blynk server along Wifi unit in during that whole process. A blynk app seems to have a unique ID that allows to recognize the individual person to interact with each other and their applications. A main component included in this paper is the NodeMCU microcontroller module that received the user-specified information as a voice command. The segment Raspberry Pi Alexa collects a voice instruction, performs this by transmitting a data to a blynk server and, after proper determination, switches on the relay module, that in turn sends information to the microcontroller for computing which allows its relay module automatically switch on again and intiate on the required appliances which is shown in Fig.4. A blynk application performs a major role in communicating with the devices to the blynk server along Wifi unit in during that whole process. A blynk app seems to have a unique ID that allows to recognize the individual person to interact with each other and their applications[2].

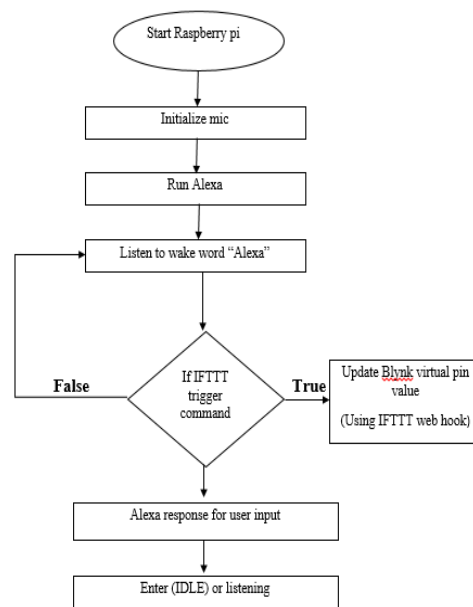


Figure 4: Flowchart of the Voice response system

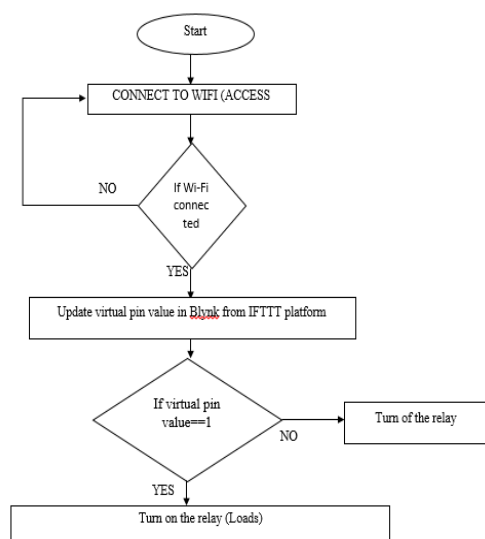


Figure 5: Flowchart of the controller system

A main component included in this paper is the NodeMCU microcontroller module that received the user-specified information as a voice command feed[2]. The Amazon voice assistant Alexa is addressed when implementing remote voice automation. In addition, relay board was used to turn on / off home appliances that can gather required data from microcontroller module NodeMCU which can be seen in Fig.5. Then, the IFTTT server must be setup via logging onto IFTTT web page with a Google users login, as well as the user must configure the Amazon voice device by inserting commands that client wishes to submit and at another side. The Webhooks has to be configured, as <http://blynk.com/Auth/update/v1> to the update of the appliances for switch on and off. Before this the values on each load or appliance is stored in the Blynk server through coding. Now both the values get compared and then respectively performing switching on/off of the appliances. To do that, the external modules shall be linked to Webhooks server for the simultaneous collection and transmission of information. To configure the Webhooks server, submit the unique Blynks ID, a host server to create the connection, e.g. 188.166.208.43 and the GPIO pin number (which is identical for NodeMCU module). That way the whole system is incorporated. And now Blynk setup must be done such that details can be accessed from Webhooks. So to do that in Raspberry Pi one must download the Blynk app then build a profile by using the email ID and password again and clicking onto a new project in Blynk app to restore it[2]. Giving a name and select Raspberry Pi system and form Wifi connection. An Auth token is allocated and this will be sent to the email address. The Auth token is

being used for attaching a new project plugin via Raspberry Pi.

7. Experimental Results

The experimental observations are shown in the table below:

Table 1: Experimental Observations

Voice Command	Digital output	Relay Condition	Appliance status
Trigger On	High	On	On
Trigger Off	Low	Off	Off

The Table.1 provides the information which is observed with the Real time experiment done. Here in the table whenever there is a trigger from the voice command the digital output from the NodeMCU will be HIGH or LOW. Followed by the relay conditions the connected Appliances status will be On or Off.

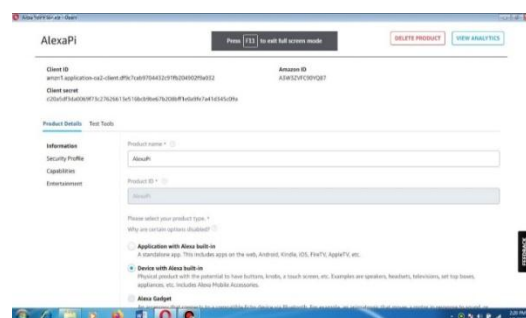


Figure 7a: Creating a profile



Figure 7b: Practical hardware set up

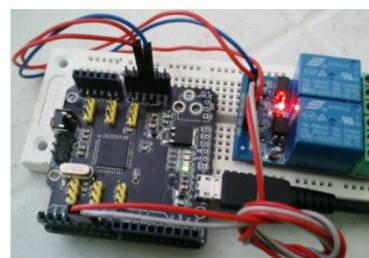


Figure 7c: NodeMCU Wi-Fi based microcontroller with relay unit

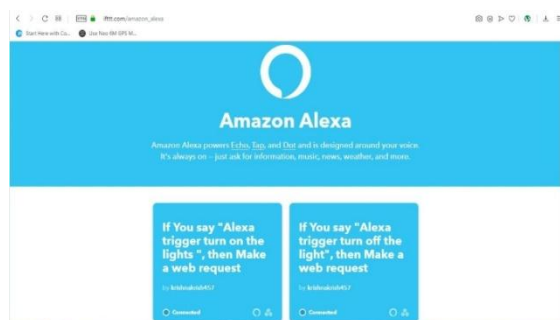


Figure 7d: Webhooks server configuration set-up

From Fig 7a to 7d describes the results of the proposed system working which is connected in turn at first in Fig 7a shows the Amazon window of profile creation, second Fig.7b shows the hardware setup of the proposed system, next is relays switches connected to NoceMCU microcontroller finally Webhooks server configuration to activate IFTTT trigger.

8. Conclusion

By this proposed system we can achieve the Home Automation from the distance of 2meters depending upon the sensitivity of the microphone. By this automation framework we can use cloud server and internet to monitor any appliance from anywhere using a wireless medium. The designed voice activated automation system supplies the microcontroller with a voice command that manages the system according to the provided command. The above paper focuses on creating a cost-effective implementation for Amazon Echo Dot, weakening inexpensive Amazon Echo Dot generally present in the Indian market around Rs.1300.

9. Future Work

Upcoming projects on improving the smart home automation program to support a wider range of people, such as smart edge classes and smart institutes, could be done. Developing a smart hospital system to older persons to notify the family that Alexa does not start receiving any answers from the client for quite long time, or a requested assistance. And by integrating the GSM or mobile servers the proposed sysem can function within a longer distance and also a wearable devices for voice commands and gestuemovements[1].

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