

Home Automation Using Voice Via Google Assistant

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ABSTRACT:

Home automation technologies introduced over these years from Zigbee automation to Amazon Echo, Google Home and residential from Apple. it's become a craze lately . Google Home price is costly with an additional cost of the devices to be connected to, the entire cost of the system reaches to peaks. Apple Home Kit too is pretty costlier than the Google Home only for a basic setup. Philips Hue, a sensible light which is controlled by the Google Assistant, Amazon Echo and Siri, voice assistant by Apple. So, overall we will see here that to form our home smart we'd like to take a position quite lot. What if we will automate our house with less investment and may control up to eight appliances using Google Assistant? Well, this paper describes the implementation of such a system. Here it is implemented using regular household appliances tongue voice commands are given to the Google Assistant and with the assistance of IFTTT (If This Then That) application and therefore the Blynk application the commands are decoded then sent to the microcontroller, the microcontroller successively controls the relays connected thereto as needed, turning the device connected to the respective relay On or OFF as per the client need to the Google Assistant. The microcontroller used is Node MCU (ESP8266) and therefore the refore the communication between the microcontroller and the application is established via Wi-Fi (Internet).

Keywords: Node MCU, Automation, IFTTT, Arduino microcontroller, Artificial Intelligence

OBJECTIVE:

Makes tasks more convenient:

Many tasks that are repetitive in nature are often accomplished automatically or with fewer steps using home automation [1]. rather than turning off or dimming four different lights once you want to observe a movie, home automation allows you to accomplish this task with one button.

Save money on utilities:

Utilities can amount to many thousand per month. Home automation can close up lights or lower the thermostat automatically once you aren't using them and simply lower your utility bills by 10% to 25%.

Increased home safety:

Many accidents happen within the home due to poor lighting. Home automation can automatically turn lights on in closets, stairways, and other dark places once you enter and reduce the prospect of accidentally tripping or running into things.

Home security:

Although home security is a priority for everyone, huge installation cost or monthly monitoring and controlling charges make security systems cost prohibitive for many homeowners. Home automation provides an inexpensive solution to home security.

Good for the environment:

In a time when we are all becoming more environmentally aware, home automation provides a good solution to help preserve our natural resources [2]. Home automation applications can be low power consumption and automatically turn off lights and appliances when they are in idle mode.

Peace of mind:

Using home video surveillance cameras and an internet connection, you can check on the status of your home or kids from any remote location even in the world using a PC or web-enabled phone [3].

Learning experience for children:

Technology is contemporary ever green it needs updating frequently for upcoming technology the better prepared they are for the future [4]. The prototype is for better from the scalability and flexibility point of view than the commercially available home automation systems.

1. INTRODUCTION

Most of the people think home automation, means smart home: having One remote controller for every household appliance, cooking the food automatically, switching on or off air conditioner automatically, heating water for bath automatically and shading the window automatically when night comes. To some extent home automation equals to smart home. They both bring out smart living condition and make our life easier, convenient and fast, much simpler.

We proposed the development of an Internet-based system to allow monitoring of important process variables from a distributed control system (DCS) [5]. Here we proposed hardware and software design considerations which enable the user to access the process variables on the DCS, remotely and effectively [6]. suggested the use of speech to interact remotely with the home appliances to perform a particular action on behalf of the user [7]. The approach is inclined for people with disability to perform real-life operations at home by directing appliances through speech. Voice separation strategy is selected to take appropriate decision by speech recognition [8].

2. SYSTEM DESIGN

2.1 Hardware System Design:

A) NODEMCU ESP32 CONTROLLER:

Here we use regular household appliances any dialect language voice commands can be given to the Google Assistant PDA and with the coordination of the Blynk application the commands are decoded and then sent to the microcontroller [9], The microcontroller in turn controls the relays connected to it as required, turning the device connected to the respective relay On or OFF as per the users request to the Google Assistant [10].

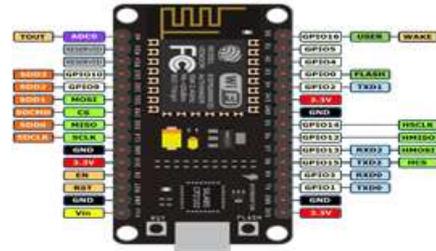


Fig A : Node MCU

B) RELAY CIRCUIT:

Relay is nothing but it is the electromagnetic switch [11]. Relay which makes the circuit and breaks the circuit. Relay is used when we want to use a low voltage circuit to turn ON(active HIGH) and OFF (active LOW) the device which required high voltage for its operation. For example, 5V supply connected to the relay is sufficient to drive the bulb operated on 230V AC mains.



Fig B : Relay 4 channel

C. DC MOTOR

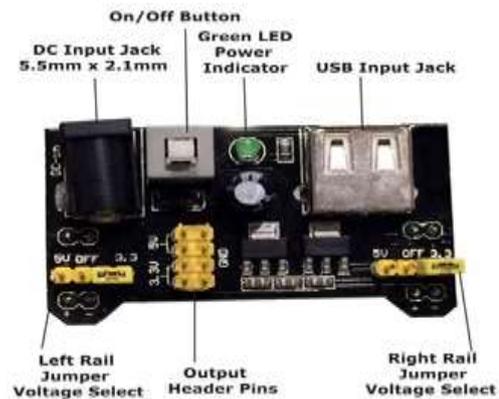


Fig C : DC Motors

A Direct Current (DC) motor is a rotating electrical device that converts direct current, of electrical energy, into mechanical energy [12]. An Inductor (coil) inside the DC motor induces a magnetic field that causes rotary motion as DC voltage is given to its terminal. Inside the motor there is an iron shaft, wrapped in a coil of wire. This shaft contains two fixed, North and South, magnets on both sides which cause both a repulsive and attractive force, in turn, producing torque.

D) Light:

The colour of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor [13]. White light is produced by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor devices.

E) Breadboard Power Supply:

This is a working under 3.3V/5V MB102 Breadboard Power Supply Module which is readily available provides a dual 5 V and 3.3 V power rails and has a multi-purpose female USB socket. The 3.3V/5V MB102 Breadboard Power Supply Module securely fits in a standard 400 or 800 tie points breadboard it also features reverse polarity protection, the module can take 6.5V to 12V input and can produce 3.3V and +5V.



Fig E: Breadboard Power Supply

F) USB cable:

Universal Serial Bus (USB) is an communication industrial standard that establishes specifications for cables and connectors and protocols for connection, communication and power supply between computers, peripheral devices and other computers [14], the USB standard is currently maintained by the USB Implementers Forum (USB-IF).

G) AC to DC adapter:

Most mains-powered electrical equipment, though it's going to specify one nominal voltage, actually features a range of tolerance above and below that time . Thus, devices usually are often used on either any voltage from approx. 100 to 120 V, or any voltage from approx. 210 to 240 V. In such cases, voltage converters need only be specified to convert any voltage within one range, to a voltage within the opposite , instead of separate converters being needed for all possible pairs of nominal voltages (110–220, 117–220, 110–230, etc.)

3. Software components:

1) Blynk android application:

Microcontroller needs a program to operate and execute the process associated with proposed design [15]. It is easy to verify and compile after writing the code. Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, vizualize it and do many other cool things.

2) Google Assistant:

Google Assistant is an personal digital assistant(PDA) which works with artificial intelligence-powered virtual assistant developed by Google which is already primarily available on mobile and smart home devices [16].

3)Arduino IDE:

The open source Arduino Integrated Development Environment (IDE) is a best cross- platform application (for Windows, macOS Linux) which can be written in the programming language Java,embedded C. It is used to do programming and upload programs to Arduino compatible boards, but also, with the help of 3rd party proprietary cores, other vendor development boards like OEMS. The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a special software library from the Wiring project, which provides many common input and output procedures and routines [17].

4. BLOCK DIAGRAM:

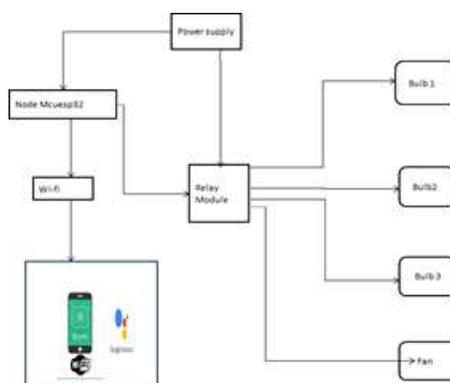


Fig 4: Home Automation Using Voice Via Google Assistant

Setup any web application (in this project we have used blynk. They are many 3rd party applications which can be used). Sign in to any valid user id. Choose node mcu device. As node mcu has a Wi-Fi option, choose Wi-Fi from connection type. The generated auth token will be used to access the firmware. Add switches to your application to setup the application as a remote to your firmware. In the switches, on state should be zero and off state should be one.

Install the Arduino IDE. Connect your firmware to your system. Choose any port from the list of ports available. Setup your web application libraries in Arduino IDE main folders. (I installed blynk application so that I have setup the library for blynk application.)After setting up the libraries code the program for switch on or off in Arduino IDE.

Install blynk library in arduino ide and write the code given below:

```
#include <BlynkSimpleEsp8266.h>

// get auth token in the Blynk App
//Go to the project settings.

charauth[] = "ENTER AUTH
TOKEN";

//Your WiFi details

//Set password to.
charssid[] = "WIFI USERNAME";
charpass[] = "WIFI PASSWORD";
voidsetup()
{
// Debug
Serial.begin(9600);

Blynk.begin(auth,ssid,pass);
Blynk.syncAll(); //This will sync the
last state of your device.

voidloop()
{
Blynk.run();
}
```

5. ADVANTAGES

The interests of home automation typically fall into a various domains, including monitoring, quality, savings, safety, convenience, and control. Additionally, mainly consumers utilize home automation for comfort and peace of mind. It provides home automation for.

- Savings
- Safety
- Convenience
- Control
- Comfort:
- Peace of mind

DISADVANTAGES

- Installation
- Complex technology
- System compatibility

6. FUTURE SCOPE:

Future home is a space for the digital natives. With the perspective of lots of automation innovations featuring IOT and AI, home automation has become a reality. Any One can implement several of their tasks with just a single vocal command of verbal instructions. These technologies can used to build fully functional home automation system which monitors and controls smart home devices including smart lights, connected thermostats, and various appliances.

There are several new technologies which can become a part of home in the near future:

- Increased efficiency, control, and customization
- Integration of Smart home devices Smart spaces outside homes

7. RESULT



FIG 7a) : Switches When Turned On



FIG 7b) : Switches When Turned Off

References:

- Allen, James F., et al. "Interactive complex task teaching system that allows for natural language input, recognizes a user's intent, and automatically performs tasks in document object model (DOM) nodes." U.S. Patent No. 7,983,997. 19 Jul. 2011.
- Kelly, Sean Dieter Tebje, Nagender Kumar Suryadevara, and Subhas Chandra Mukhopadhyay. "Towards the implementation of IoT for environmental condition monitoring in homes." IEEE sensors journal 13.10 (2013): 3846-3853.
- Hsi, Sherry. "Conceptualizing learning from the everyday activities of digital kids." International Journal of Science Education 29.12 (2007): 1509-1529.
- Johnson, Elaine B. Contextual teaching and learning: What it is and why it's here to stay. Corwin Press, 2002.
- Tan, Kok Kiong, Tong Heng Lee, and Chai Yee Soh. "Internet-based monitoring of distributed control systems-An undergraduate experiment." IEEE Transactions on Education 45.2 (2002): 128-134.
- Gummalla, Mr Sridhar, and Ganesh Mani. "A REVIEW OF INTERNET OF THINGS-IOT BASED ON AVR MICROCONTROLLER."
- Khiyal, Malik Sikandar Hayat, Aihab Khan, and Erum Shehzadi. "SMS based wireless home appliance control system (HACS) for automating appliances and security." Issues in Informing Science & Information Technology 6 (2009).
- Ramirez, Javier, et al. "Efficient voice activity detection algorithms using long-term speech information." Speech communication 42.3-4 (2004): 271-287.
- Makhija, Hina, Atul Mathur, and Manish Kumar. "Voice-Controlled Home Automation System." (2019).
- Mozer, Todd F., and Forrest S. Mozer. "Information access and device control using mobile phones and audio in the home environment." U.S. Patent No. 8,825,020. 2 Sep. 2014.
- Gurevich, Vladimir. Electric relays: Principles and applications. CRC Press, 2018.
- Hong, Yin Rong, and Alex Horng. "Brushless DC motor fan driven by an AC power source." U.S. Patent No. 6,278,248. 21 Aug. 2001.
- Nozik, Arthur J. "Spectroscopy and hot electron relaxation dynamics in semiconductor quantum wells and quantum dots." Annual review of physical chemistry 52.1 (2001): 193-231.
- Milley, Nicholas A., Thomas Lianza, and Carl David Lutz. "External display peripheral for coupling to a universal serial bus port or hub on a computer." U.S. Patent No. 6,738,856. 18 May 2004.
- Koutroulis, Eftichios, Kostas Kalaitzakis, and Nicholas C. Voulgaris. "Development of a microcontroller-based, photovoltaic maximum power point tracking control system." IEEE Transactions on power electronics 16.1 (2001): 46-54.
- Shahbaaz, Mohammed, Syed Zainuddin, and M. Satish Yadav. "SMART HOME USING GOOGLE ASSISTANT (IFTTT)." (2019).
- Ramon, Manoel. Intel Galileo and Intel Galileo Gen 2: API Features and Arduino Projects for Linux Programmers. Apress, 2014.