

# Design and Implementation of Domotics Applications using Voice Assistant and Smart Phone

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## ABSTRACT

Considering how everything is being available to us on our fingertips through our smartphones nowadays, and the major contributor to this is the home automation industry which is growing rapidly; this is fuelled by the need to provide supporting systems for the elderly and the disabled, especially those who live alone and along with that because of its ability to ensure security and safety. This paper details the overall design of a home automation system using voice assistant and smart phone. The automation centres on recognition of voice commands which are given to the Google Assistant app and the given commands are decoded and then sent to the microcontroller with the help of the IFTTT App (If This Then That) and the BLYNK app. The home automation system is intended to control all lights and electrical appliances in a home or office adding with the protection from the risks like gas/smoke leakage, theft (main entrance security). The system has been tested and verified, connection has been made using Node MCU, Arduino, Relays, Ultrasonic sensors, Gas sensor, Flame sensor, GSM module.

**Keywords:** Arduino, Node MCU, GSM module, IFTTT, Blynk App.

## I. INTRODUCTION

Every day modern people expect a new device and new technology to simplify their day-to-day life. From the 2000s Internet connectivity become a part for many applications to provide access to information and this has only increased with time, the human interaction and monitoring through apps and interface is still developing frequently over years. In this era where everyone shows how gadgets (smart phones) work, so it is easy to use for our household need and security. Due to the increasing popularity of smart devices and internet connectivity designing of home automation are going to become simple and more popular. This project is based to minimise the work load and risk through minimising the effort

required. As we look around most of the active members of every family are either busy working or they leave their houses for various personal/professional purpose and there is their parents/grandparents who are left alone at their own, it is difficult for them to manage all inhouse duties by themselves specially when that person is sick or have any kind of disability, the bare minimum activities start bothering them and only old aged these automated technology has helped every age group in managing their time, increased productivity and provided different security measures for all.

The future scope of the project is actually boundless. We have only created an automation on a basic ground level with every day appliances like bulb, fan and chargers. What can be done in the future lies entirely on the ability to connect various other devices. Use of CCTV cameras, body alarm, water alarm, fire alarm, IoT locks for doors, and also heat and CO2 detection for sensing presence. The future of the project is as mentioned is boundless and in fact, if we take the rate of advancement of Technological Process into consideration, we can easily assume that.

The system setup can be categorized as follows:

1. The hardware system-It acts as a control unit which can be used to switch ON/OFF the appliances in the home. The hardware system and the router can be connected.
2. The Software System-Blynk App, IFTTT App and the Google Assistant App constitute the design of software system and these applications can be controlled by using the Android device.

The control unit consists of the ESP8266 (NodeMCU) and the board of 4 Channel Relay. Using ULN 2803 IC, the relay board controls the relays. On a Smartphone, Blynk App communicates with the NodeMCU and sends the signal through the internet. The digital output pins of NodeMCU and Relay board pins are connected. Finally, each channel of Relay is connected to each device used for controlling.

## Hardware And Software Description

### Arduino UNO

Arduino is a microcontroller designed for the student to develop different types of project. In this project, Arduino works as a main brain which controls all the Hardware component with the help of Software. There are various types of Arduino

Lily Pad Arduino, Red Board, Arduino Mega and Arduino UNO. In this project, Arduino Uno has following specification Microcontroller - Atmega328p (8-bit AVR family microcontroller). Input Voltage -7V to 12V, Flash memory 32 kB (0.5 kB for bootloader), Operating voltage- 5V, Analog pins- 6 Digital I/O pin-14, frequency (clock & speed)-16MHz and SRAM-2KB.



FIG : ARDUINO UNO

### ESP8266 (NodeMCU):

NodeMCU known as a Node Microcontroller Unit is one of the Hardware development environments and also a open source software. ESP8266 contains all the key elements present in the modern computer such as Operating system, Wi-Fi, CPU, RAM etc. In this project

NodeMCU ESP8266 has following specification Microcontroller: Tensilica 32-bit RISC CPU Xtensa LX106, Operating voltage: 3.3V, Input voltage: 7-12V, Digital I/O pins(DIO): 16, Analog input pins(ADC): 1, UARTs: 1, SPIs: 1, I2Cs: 1, Flash memory: 4 MB, SRAM: 64 KB, Clock Speed: 80 MHz, PCB Antenna.



Fig : ESP8266(Node MCU)

### RELAY BOARD:

A relay board is normally used as an ON / OFF switch or automatic switch type. There are various types of relays that operate at different voltages. The voltage required to trigger must be analysed when a circuit is built. The relay circuit is used in the system to turn ON and OFF home

appliances. The microcontroller NodeMCU supplies the high and low signal. When the relay is supplied with a low voltage, it turns off the connected appliance and when the relay is supplied with a high voltage, it turns on the connected appliance. The 4-channel relay circuit used in the home automation system to drive four devices is

shown in Figure 2 below. The number of devices can be changed depending on the need of the user.

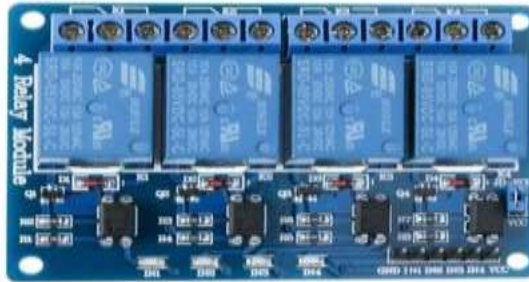


Fig : Relay Board

**GSM Module:**

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is a widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operate at the 850MHz, 900MHz,

1800MHz, and 1900MHz frequency bands. GSM technology was developed as a digital system using the time division multiple access (TDMA) technique for communication purposes. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has the ability to carry 64 kbps to 120 Mbps of data rates.



Fig:Ultrasonic sensor

**Ultrasonic Sensor:**

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object. While some sensors use a separate sound emitter and receiver, it's also possible to combine these into one package device, having an ultrasonic element alternate between emitting and receiving signals. This type of sensor can be manufactured in

a smaller package than with separate elements, which is convenient for applications where size is at a premium. While radar and ultrasonic sensors can be used for some of the same purposes, sound-based sensors are readily available—they can be had for just a couple dollars in some cases—and in certain situations, they may detect objects more effectively than radar. If you need to measure the specific distance from your sensor, this can be calculated based on this formula:  
 Distance = ½ T x C (T = Time and C = the speed of sound)



Fig: Ultrasonic Sensor

#### Gas Sensor:

A Typical human nose has 400 types of scent receptors enabling us to smell about 1 trillion different odours. But still, many of us do not have the capacity to identify the type or concentration of gas present in our atmosphere. This is where Sensors comes in, there are many types of sensors to measure different parameters and a Gas sensor is one which comes handy in applications where we have to detect the variation in the concentration of toxic gases in order to maintain the system safe and avoid/caution any unexpected threats. There are various gas sensors to detect gases like oxygen, Carbon Dioxide, Nitrogen, methane etc. They can also be commonly found in devices that are used to detect the leakage of the harmful gases, monitor the air quality in industries and offices etc.

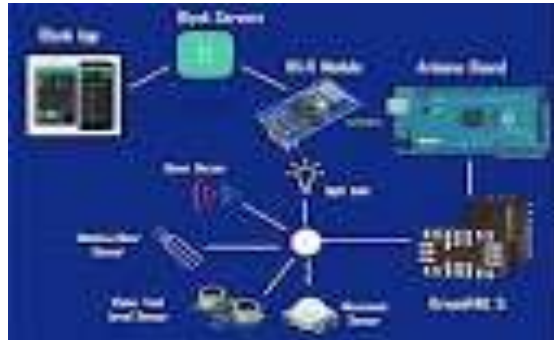


Fig : Gas Sensor

#### Blynk Application:

Blynk application is an important platform that is incorporated with the iOS and other automation apps in order to adjust the Arduino, Raspberry Pi and therefore the advantages over the web keep on increasing. Blynk App is used as a platform for controlling various controllers like Arduino, Raspberry Pi, NodeMCU and also other internet modules with iOS and Android applications. Blynk application is mainly designed for IoT based applications. It can control hardware, display sensed data, store data, view the stored data, and perform many other operations. Primary setup is required for Blynk Application; set it up according to project requirements. First create a project, and then select the microcontroller that was used in the project. After that the toggle buttons are created for each relay which is associated with the microcontroller's digital pins used. Once done, Blynk application sends a token of authentication for the particular project to the registered email Id.

The authentication token is noted down. When coding NodeMCU and setting up IFTTT server, the auth-token must be used.



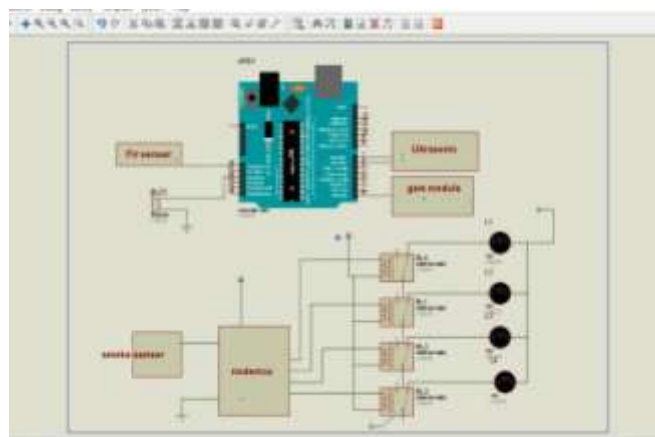
### Ifttt Application:

IFTTT is derived from the conditional programming statement "if this then that." IFTTT is used for both a website application and a mobile application. The IFTTT provides a common software platform which connects various applications, services and devices to provide one or more automations involving those applications, services and devices. The IFTTT app is used to build a bridge between Google Assistant and Blynk app. First, we have to log in into account before entering the IFTTT application, then the applet should be created, click "This" option from the menu, select the Google Assistant which is used in this project and type down the commands that the Google Assistant should respond to. It should control the appliances according to the user's command. Goggle Assistant's response command can also be typed. To set up the application's "That" after configuring the trigger. Click the "That" button and select the webhooks option and click the link. Webhooks will help the users to send commands to server of Blynk App. Then enter the Blynk App server's IP address in the URL, now enter the Auth- token from Blynk App and then enter the pin number of the microcontroller to which the device is connected. Then click GET option and choose \_Putin the method option and select the content type as Application / JSON'[8] and write [—0"] to turn ON & [—1"] to turn OFF. Now, the Trigger actions are created. The actions are simply done by sending a command to either switch ON/OFF the connected device. Once, the signal from the Blynk App is received, the microcontroller is coded with the operations as commands which it needs to be performed. Blynk App and the microcontroller are interfaced and the communication should be made through the desired network once it is plugged in. The C language is used for programming the microcontroller using Arduino IDE.

### Working of Proposed System

The home automation system was controlled in Google Assistant using Smartphone by the Wi-Fi network in the Blynk android application and voice control. By using the command in the Blynk application, the,Home automation system can be easily on and off. Using Wi-Fi Internet technologies, the home automation system can perform different tasks. Home appliances can be controlled from anywhere in the world using Blynk application. The NodeMCU is connected to a relay based on an optocoupler and programmed with the application code of Blynk. It's really a very simple knowledge and there's no need for programming. Once the interface has been completed, the microcontroller is connected to the internet connection and made online mode. Check it in the application for Blynk. Google assistant opens the phrases in the configuration followed by ' Ok Google' on the smart phone. If the user says ' Turn ON Light,' the answer will be ' Ok, Turning ON Light' and NodeMCU's Light connected to D0 pin will turn on. All the devices are operated connected to D0 pin will turn on. All the devices are operated and controlled similarly. When a voice message or typed message is given in Google assistant app automatically the fan or light will turn on or off according to the instruction.





## II. RESULT

The outcome of Home Automation system was positive and also cost efficient. The system responds well to the order given in the Google assistant. The response of the system was fast. The prototype setup of Home Automation system was shown in the Figure-6.

## III. CONCLUSION

The main objective of this project was to propose a cost-efficient voice-controlled home automation system for controlling all the home appliances Google Assistant Controlled Home Automation system and the control of home appliances using Blynk application was successfully implemented. The system is user-friendly for elder people who find it difficult to reach the switch for the ON/OFF devices. The future scope for this project of automation will be high. There are also many features that can be added to make this system smarter and more powerful. It is possible to use the private Blynk server to make the process faster.

## IV. ACKNOWLEDGMENT

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