Home automation (Controlling electrical home appliances by mobile, google assistant and ultrasonic sensors)

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Abstract: This project is based on a proposal for home automation using voice via Google Assistant. We saw many home automation technologies introduced over these years from Zigbee automation to Amazon Echo, Google Home and Home from Apple. It has become a craze these days. Google Home price is around 150$ (USD) with an additional cost of the devices to be connected to, the total cost of the system reaches over 250$ (USD). Apple Home Kit too is pretty more expensive, Siri, voice assistant by Apple is priced around 145$ (USD). Similarly, Belikin's Wemo light is priced around 44$ (USD) per unit and this can be controlled both by Siri and Google Assistant. So, overall we can see here that to make our home smart we need to invest quite a lot, let's say some 250$ (USD) for a basic setup. What if we can automate our house within (cost of the Smartphone is not included as it is assumed to be owned by every individual these days) 10$ (USD) and can control up to 8 appliances using Google Assistant? Well, this project describes the implementation of such a system. The system is implemented using ordinary household appliances Natural language voice commands are given to the Google Assistant and with the help of IFTTT (If This Then That) application ,also the Blynk application the commands are decoded and then sent to the microcontroller, 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. The microcontroller used is NodeMCU (ESP8266) and the communication between the microcontroller and the application is established via Wi-Fi (Internet).and we can also control the electric consumption by using ultrasonic sensor and relay ,when ultrasonic sensors detect an object with a certain distance the electric bulb will glow and till when that object moves away from ultrasonic sensors the bulb will automatically off after certain amount of time and if Ultrasonic sensors will detect an object again it will glow again, so that we can save lot of energy.

Key Words: Home Automation, NodeMCU (ESP8266), IFTTT (If This Than That) Application, BlynkApplication,

Internet of Things (IoT), Google Assistant, Voice Control, Smartphone. Relay and Ultrasonic sensors SYSTEM DESIGN AND IMPLEMENTATION The system design is broken down into two main categories, i.The hardware-It has the capability to connect to the router. It would also be able to turn on/off specified devices, such as lights and fans. It is called the 'Control Unit'.
,ii.The Software-The Blynk app, the IFTTT app and the Google Assistant constitute the software of the design and these applications would be integrated in the Android device.The Control Unit comprises of the microcontroller-NodeMCU and the 4/8 Channel Relay board. Relay board uses ULN 2803 IC to control the relays. The Blynk app on an Android device communicates with the microcontroller and sends the desired signal via the internet.
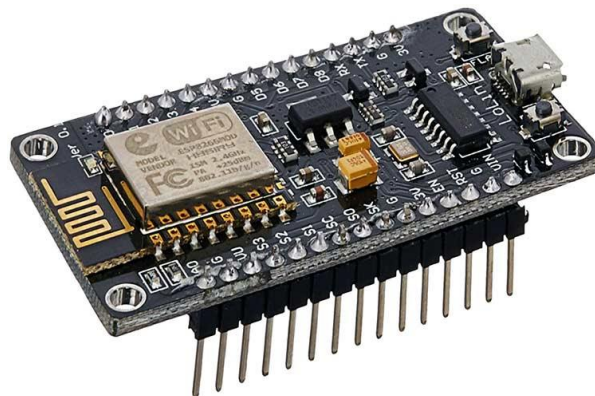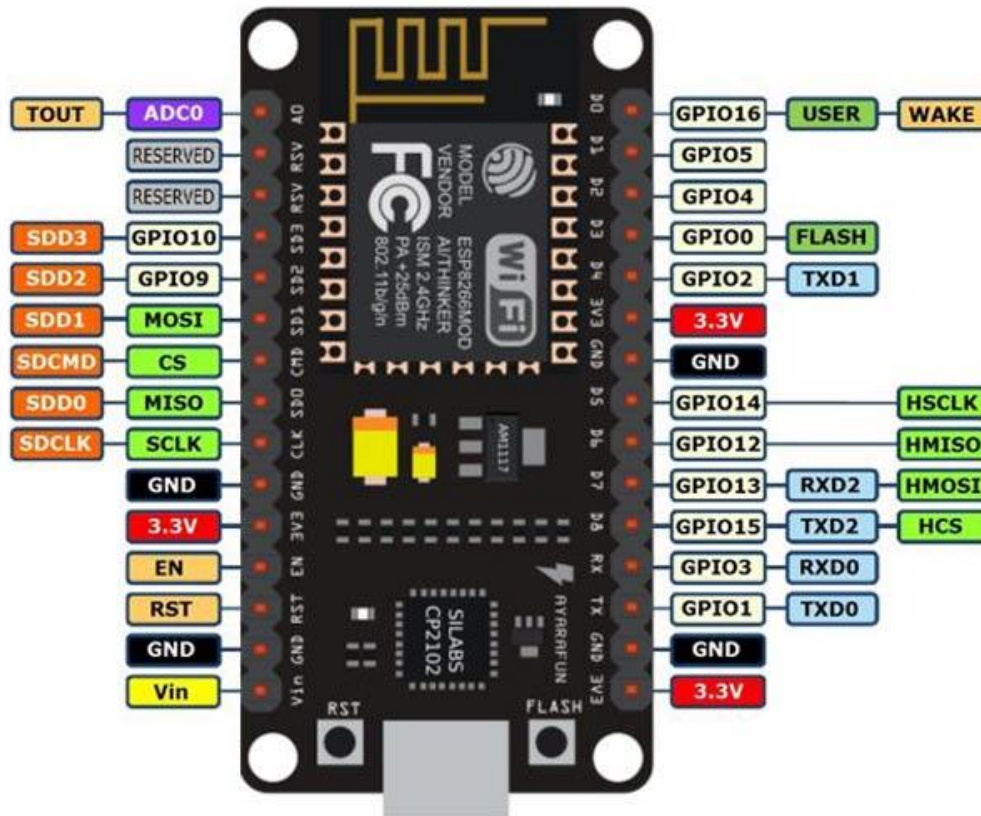
NodeMCU is an open-source Lua based firmware and **development board** specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module.

NodeMCU Development Board Pinout Configuration

Pin Category	Name	Description
Power	Micro-USB, 3.3V, GND, Vin	**Micro-USB:** NodeMCU can be powered through the USB port **3.3V:** Regulated 3.3V can be supplied to this pin to power the board **GND:** Ground pins **Vin:** External Power Supply
Control Pins	**EN, RST**	The pin and the button resets the microcontroller
Analog Pin	A0	Used to measure analog voltage in the range of 0-3.3V
GPIO Pins	GPIO1 to GPIO16	NodeMCU has 16 general purpose input-output pins on its board
SPI Pins	SD1, CMD, SD0, CLK	NodeMCU has four pins available for SPI communication.
UART Pins	TXD0, RXD0, TXD2, RXD2	NodeMCU has two UART interfaces, UART0 (RXD0 & TXD0) and UART1 (RXD1 & TXD1). UART1 is used to upload the firmware/program.
I2C Pins		NodeMCU has I2C functionality support but due to the internal functionality of these pins, you have to find which pin is I2C.
Relay		

Pin definition
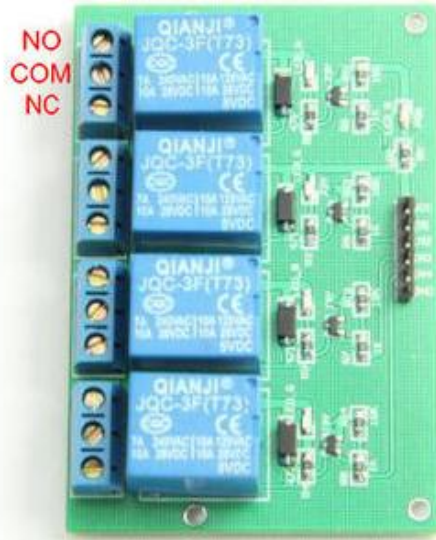
- COM- Common pin
- NC- Normally Closed, in which case NC is connected with COM when INT1 is set low and disconnected when INT1 is high;
- NO- Normally Open, in which case NO is disconnected with COM1 when INT1 is set low and connected when INT1 is high.
  Terminal 2-4 is similar to terminal 1,except that the control port is INT2-4
- INT 1-4: Relay 1-4 control port

How Blynk Works

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.

There are three major components in the platform:
- **Blynk App** – allows to you create amazing interfaces for your projects using various widgets we provide.
- **Blynk Server** – responsible for all the communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
- **Blynk Libraries** – for all the popular hardware platforms – enable communication with the server and process all the incoming and outcoming commands.

What is IFTTT?

IFTTT derives its name from the programming conditional statement "if this, then that." What the company provides is a software platform that connects apps, devices and services from different developers in order to trigger one or more automations involving those apps, devices and services.

Here are just three *if this, then that* automations you can run with IFTTT:

* *If* you make a call on your Android phone, *then* a log of that call is added to a Google spreadsheet.

* *If* you add a new task to your Amazon Alexa to-dos, *then* it will be added to your iOS Reminders app.

* *If* the International Space Station passes over your house, *then* you'll get a smartphone notification about it. (Yes, this is an actual IFTTT applet.)

Currently, there are 90 million activated applet connections, according to IFTTT.

CONCLUSION AND FUTURE WORK

The aim of this poject was to propose a cost effective voice controlled,mobile controlled and sensors object sensing technology (Google Assistant) home automation controlling general appliances found in one's home. This system is highly reliable and efficient for the aged people and differently abled person on a wheel chair who cannot reach the switch for the switching ON/OFF the device and are dependent on others. There are many fators to improve on to make smart home more powerful, intelligent, scalable, and to become better overall for home automation. For example, controlling the speed of the fan, more number of devices can be integrated, like a coffee machine, air conditioner etc.

To make the system respond more faster own private Blynk server can be made. Well, no system is ever perfect. It always has a scope for improvement.

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