

# Voice Recognized Smart Home Automation System Using IOT

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**ABSTRACT:** Advancement in IOT based application has become the state of the art technology among the researcher due to the availability of internet everywhere and anywhere at any time. To make the application more user friendly, web-based and android-based technologies have gained their importance in cutting edge technology. In this paper, home automation system by using IoT is proposed that can access and control the home equipments from every corner of the world. For this system, internet connectivity module is attached to the main supply units of the home system which can be accessed and controlled through the internet. For wireless connectivity the static IP address is used. Smart home automation is based on multimodal application that can be operated using voice recognition of the user using the google assistant or through a web based application. Thus, main aim of this work is to make our home automation system more secure and intelligent.

**KEYWORDS:** Home automation, Relay, Node MCU(ESP8266), IFTTT, Adafruit, Smartphone Google Assistant, Internet of things(IOT), Voice Control.

## I.INTRODUCTION

Human machine interaction has become the more realistic in day-to-day life due to the advancement in the technology. Today, Human Machine Interaction research has moved one step ahead and switched onto the IoT. The objective of Internet of things(IOT) is to connect any thing through the internet that can be attainable from everywhere. IoT are not limited to one particular field. It has shown the significant contributions from small to large scale application. Internet of things has provided the application to turn non-smart device into smart devices, which allows the users to access these device through the internet and provide a more robust method of controlling the home automation system. For security purpose we have provide the user access code that can be asked by Google Assistant to verify which will prevent unauthorized smart home access. By develop IOT based home automation system which uses voice as well as web-based service for controlling the home appliance.

Though, we have received tremendous improvement in the technology, but still power consumption is the one of the largest issue all over the world. To save the power consumption we have proposed the home automation system using IOT (reducing the electricity bills) and at the same time provide the safety and security of the home equipment by using this Internet of Things based application. It provided the boom for old-aged people and the person having some sort of disability. This allows the users to control the home automation device such as fan, bulb, charger etc without even making any physical connection. Build an IOT based home automation with the help of Google Assistant (Artificial Intelligence). Also making the system more intelligent that can turn on the light and fan of the room as soon as it detects the presence of the person

## II.RELATED WORKS

The Google Assistant is Artificial intelligence(AI) based voice command service which is available on Smartphone. Automation play a key role in human life. Home automation allows us to control household electrical appliance like lights, door, fan, system etc., It also provides home security and emergency system to be activated. The implementation of home automation system can monitor and control home appliances via Android phone. Most of the previous system based on these techniques is either based on Dual Tone Multi Frequency (DTMF) or Bluetooth system. The problem with Dual Tone Multi Frequency based home automation requires dedicated Public Switch Telephone Network (PSTN) channels for communication between main supply units and controlling device. On the other hand,

Bluetooth is useful for shortest range communication that requires operating appliances in their range. Home automation using MQ Telemetry Transport is presented for sending / receiving the data from sensor. For this Raspberry pi is used as a gateway for accessing the data from the sensor which is used to measures the temperature, humidity of the room. Another home automation system is presented based on Raspberry Pi. With the help of the Raspberry Pi based Home Automation the users can control their home appliances using the web based interface. The next implementation of the smart home automation technology using Global System for Mobile Communication (GSM) modem to control home appliances within the limited area.

### III. EXISTING SYSTEM

The design and the implementation of a Zigbee based novel tangible smart home interface can be implemented by using low cost, hand-held wireless device called Sense Pods. Sense Pods can be interact with a smart home using simple gesture like rubbing, tapping or rolling. The same device can be used to control multiple curtains in the room. The device is only 4.5cm long, forms an ad-hoc hand-held wireless network using ZigBee Protocol can be easily interfaced to existing home management system using Universal Serial Bus (USB)port. The gesture in each device can be programmed to control various object of the smart home system. The coordinating device can forwards a appropriate code for various object / appliance to the smart home system that takes an appropriate actions either through wired or wireless interfaces. The sense pods can be very easily integrated with the any smart home system because only the Universal Serial Bus(USB)interface is required. The hardware for the Sense pod was designed around three chips available in Quad-Flat No Lead Packaging, a three-axis accelerometer, a ZigBee Network Controller (ZNC) and USB bridge. The ZNC incorporate a low power 2.4GHz radio frequency transceiver and the 8-bit microcontroller unit contains 60K of flash and 18KB of RAM and supports the 802.15.4 MAC and zigbee network stack. The RF transceiver is a 802.15.4 standard compliant radio include low noise amplifiers and supports full spread-spectrum encoding and decoding. Each Sense Pods has two Micro Universal Serial Bus(USB) ports that can be utilized for programming and interfacing with the additional external devices, home management system. An additional, I/O port interface is used to provide 4 surface mount Light Emitting Diode, four pad switches, a reset pad switches for each Sense Pods. The LED can be optionally programmed to provides additional information like low battery warning etc. Additional sensor like an ambient light sensor, for example can also be interfaced through the Input and Output ports to sense when the light is OFF and send OFF a beeping LED signal to allow a homeowner to locate the device. Temperature and gas sensor can be added via the I/O interface to detect a unusual event like a heat or ac breaking or to detect and report a fire. Once the hardware and software are implemented the platform was evaluated on the initial set of gestures that would be easy and convenient to use.

Gestures that did not requires significant cognitive or motor control were selected for an initial evaluation. In specific, rolling, tapping, rubbing gestures were chosen. Rolling involves a user rolling the device on any horizontal surface. The rubbing gesture consists of user rubbing the device against the horizontal surface in one of two directions. Along the device's orientation and across it. Finally various types of tapping was considered. The existed device is based on the ZigBee protocol which is one of the industry standard for smart home. The existed system can be seamlessly integrated with smart home system that supports a USB interfaces. Advantages of the system is the low power consumption and reduce cost. Sense pods represent the unique and easy, convenient way for user to interact with their smart home.

#### ZigBee Protocol Characteristics:

- ❖ Technological Standard Created for Control and Sensor Network
- ❖ Based on the IEEE 802.15.4 standard
- ❖ Operates at ISM 2.4GHz frequency
- ❖ Low data rate
- ❖ Low power consumption
- ❖ Code Comparability and expandability across different Arduino board
- ❖ Small packet device

**BLOCK DIAGRAM**

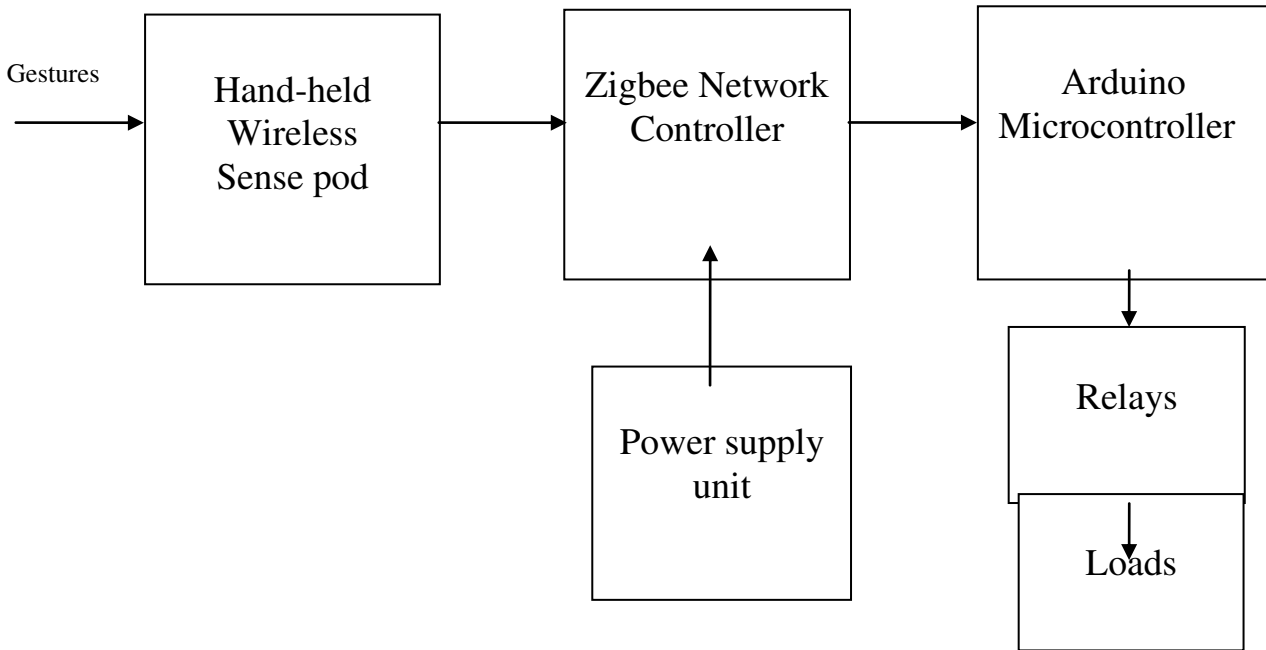


Figure 1: Block Diagram of Existing System

**IV. PROPOSED SYSTEM**

Speech is one of the most important inputs used for man-machine interaction. Therefore to make smart home more user friendly, Google Assistant along with web-based application can be used to control the home system. For this ESP8266 Node Microcontroller Unit (MCU) is used as a gateway that is connected with the set of relays. The function of relays is used to control the high voltage using very low voltage as an input. Finally, with the help of Google Assistant, based on the user command the home appliances can be turned ON / OFF with the help of the designed system. We can access our smart home easily from anywhere by using IOT connectivity. For this project the ESP8266 with Wi-Fi shield is used. To communicate with the google assistant on our mobile phone we have used the IFTTT services, which configure the google assistant to listen for a particular command and trigger a link if the commands is received. Now, as you might already know the ESP8266 Node MCU can read information from the internet only through API calls, so we need platform which can provide us this API option this is where firebase comes in. Basically the voice command given to google assistant changes the value of a field in our Firebase channel accordingly. While the ESP8266 Node MCU periodically check the value of this field using API calls and send this values to Arduino using serial communication. The Google Assistant is an AI powered virtual assistant that is primarily available on touch phone. It allows user to activate and modify a vocal shortcut command in order to perform actions on their device. This feature of the speech recognition is available in English, among other languages. Smart home automation using google assistant gained support for multiple actions is controlled by a single voice command. To communicate with the ESP8266 module, microcontroller needs to use set of AT command. Node MCU development board is featured with Wi-Fi capability, analog pin (A0) and digital pins (D0-D8) and serial communication protocols (i.e. UART, SPI, I2C). A relays is connected with Node MCU ESP8266. It is an electrically operated switch. It isolate the input side from the output side, it uses an electromagnet to turn the switch on or off. For this smart home automation system only using four channel relays which can control four devices at a time. The initial requirement is the internet connectivity to access your Smart Home.

After successful connection, user will be able to access their smart home appliances using an If This Then That statement command. It will be accessed through the Adafruit for creating the connectivity between the Google Assistant and the Node MCU which is the main control unit of the smart home automation. The home appliances is connected to the Microcontroller unit(MCU) the set of relays. The function of these relays are to act as an

ON/OFF switch on the main control unit. Finally, with the help of Google Assistant, based on user command the home appliances can be turned ON/OFF with the help of the designed system.

**V.SYSTEM DESIGN AND IMPLEMENTATION**

Therefore, to make smart home user friendly, the Google assistant along with web-based application can be used to control the home system. The main advantage of multimodal is that in presence of the noisy background surrounding the performance of the Google assistant degrades. Hence in such scenario web-based applications can be helpful in controlling the appliances of the system. Thus the proposed model is designed to provide flexibility and it also making the system more robust. The smart home can be implemented with the main controller unit that is connected with the 24-hour available Wi-Fi network. To ensure that the Wifi connection do not turn off, the main controller is programmed to establish automatic connection with the available network and connected to the auto-power backup. Further, the sub-units are connected with the MCU so that devices which are not smart (here in this case we are referring to the home appliance system) can be turned into smart appliance. Thus user can controlled their smart home using Google assistant and the web-based service using an IOT based application that uses Adafruit and IFTTT services to maintain the communication link.

**System Requirement**

- ❖ Node MCU(ESP8266)
- ❖ If This Then That(IFTTT) and Adafruit

**BLOCK DIAGRAM**

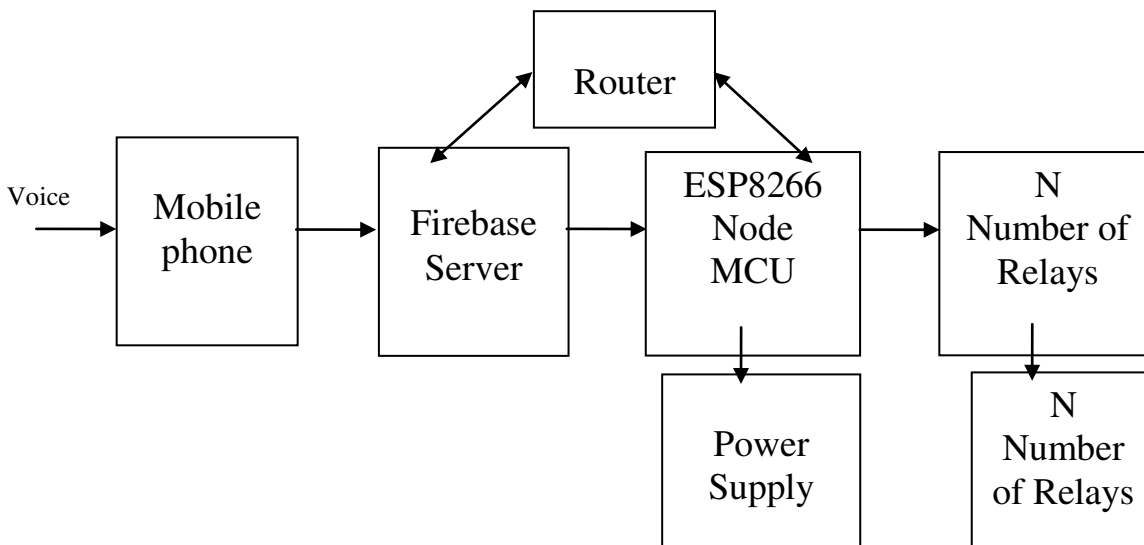


Figure 2: Block Diagram of Proposed System

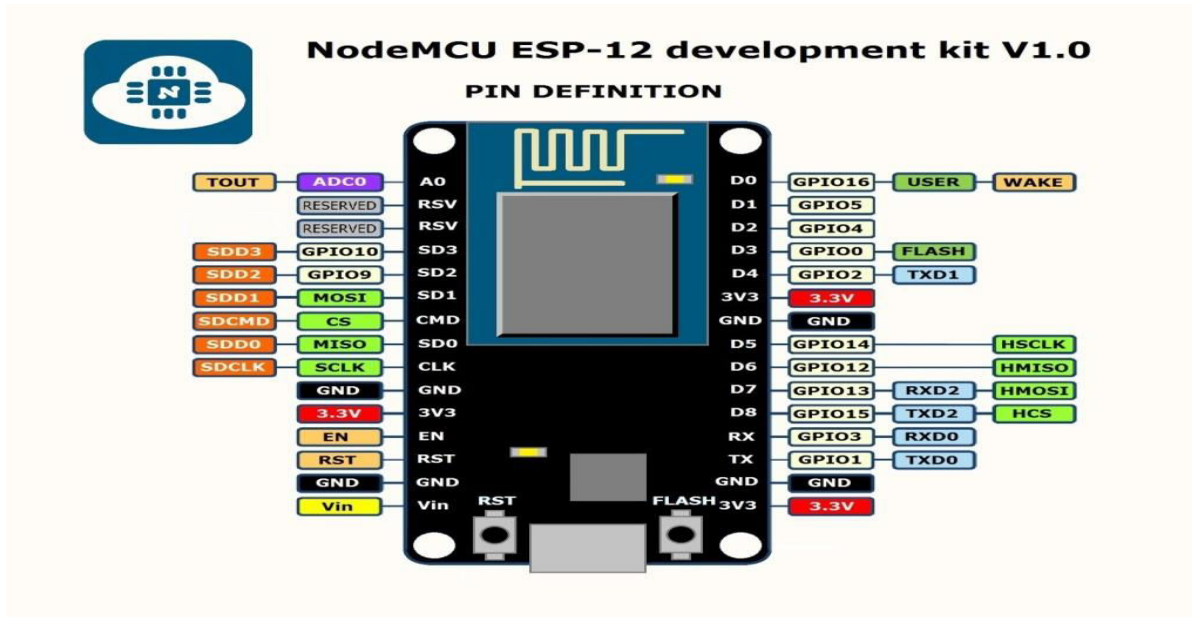


Figure 3: Pin Diagram of Node MCU ESP8266

**BLOCK DIAGRAM OF NODE MCU**

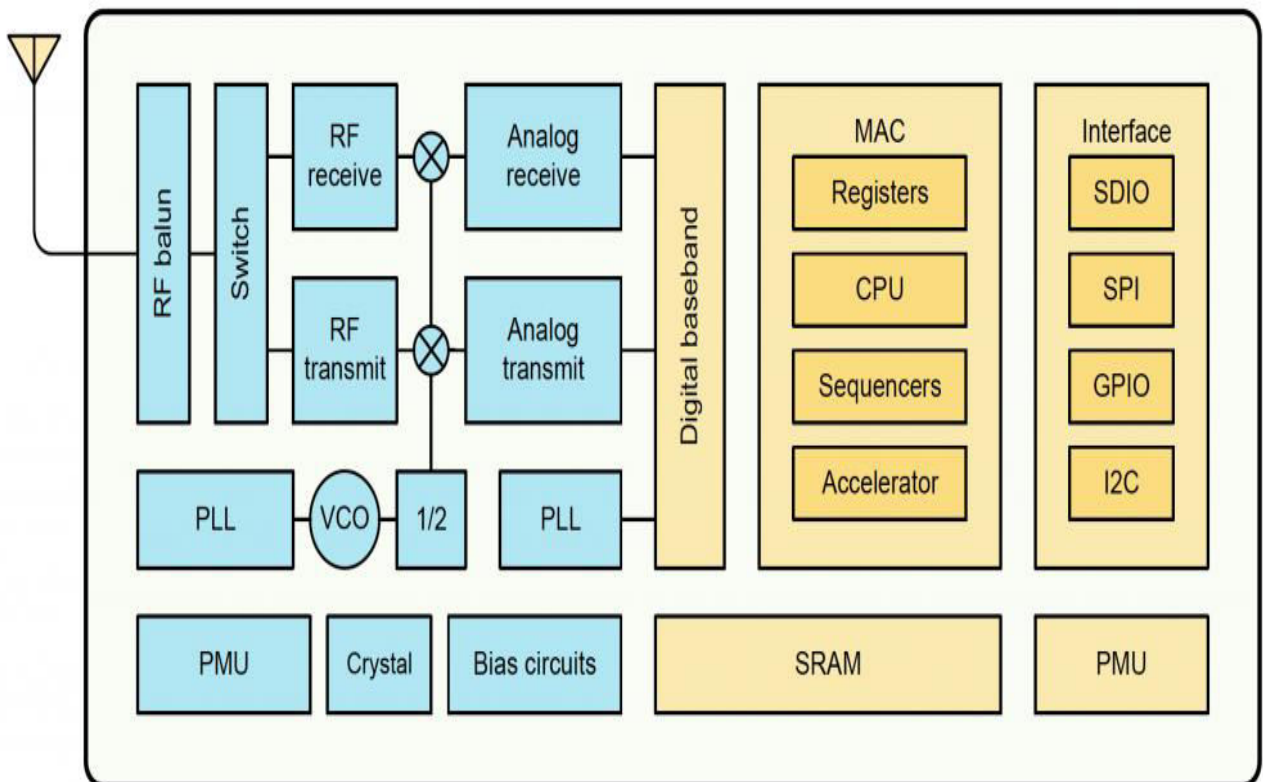


Figure 4: Block Diagram of Node MCU



## VI. CONCLUSION

With the help of the design control unit, home appliance can be converted into a smart and intelligent device using IoT. The working of the proposed model was experimentally shown with help of connecting the four various loads. Proposed system has two advantages. First, using the IoT connectivity, we can monitor and access our smart home easily from anywhere, which will definitely will prove to be energy efficient. Secondly, it act has a helping hand for the old age and differently abled person. For future work we would like to add up more controlling units that can make our smart home more intelligent that can be practically deployed in the real time situation.

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