Google Assistance Based Home Automation

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Abstract- *This paper presents a home automation controlled by using Google Assistant system. Now present day most advancement of Automation technologies that makes humans life is simpler and easier in all aspects. In present world the automatically devices are used over manually by iot. The wireless technology can operate anywhere in the world by using the iot, an automated home is called a smart based home. It saves the electricity and manpower. In this work the paper shows designs diagram and prototype of the automatic Home controlled system. The main device is Node MCU has inbuilt Wi-Fi module, that's why it will help to control devices over the internet. Iot is main objective to control all over the internet. The automation means the control devices or system automatic with less human helps or efforts. Today the wireless technology is growing fast day by day. Now a day, wireless technology plays most important role in automation technology. It means the automation makes the technology free from human interruption. Home automation is one of the technologies emerging these days. This work can use in home appliances like lights, fan, TV, college, school, and labs. It also provides better security and good surveillance by using this technology.*

Keywords- IFTTT (If This Than That) Application, BLYNK Application, Internet of Things, Google Assistant, Voice Control, Smartphone, Temperature and Gas sensor, Node MCU (ESP8266), relay.

I. INTRODUCTION

"Home automation" refers to the automatic and electronic control of household features, activities, and appliances. The utilities and features of our home can be easily controlled via Internet. There are three main elements of a home automation system: sensors, controllers, and actuators. Having day to day developing technology is a proud moment to the whole world. The foremost aim of the technology is to increase the efficiency and to decrease the effort. In this trending world, Internet of Things is being given extreme importance. In that, Automation, leads to have less effort and much efficiency. By using IoT, we are successful in controlling the appliances in various areas, in which one of them is to control the home automation by using Node Microcontroller. We can also use other boards like raspberry

pi, beagle bone etc.In the present- day technology, the whole work is done through communication so the effective way of communication can be done through voice. Even though the technology is developing in our day to day life, there is no help coming into existence for the people who are physically not good on the basis of technology. As the speech enabled, home automation system deploys the use of voice to control the devices. It mainly targets the physically disabled and elderly persons. The home automation will not work if the speech recognition is poor. The speech given by the user will be given as input to the Microphone. Microphone recognizes the speech given by the person and sends it to the recognizing module. It searches for the nearest word even if there are any disturbances in it. If the command (ON/OFF) is given, the action is done. Similarly, the line following robot functions with respect to the speech commands given to it. The line following robot moves forward and backward with the help of sensors and a motor driver board. Home is the place where one desires to be rest after a long tiring day. People come home exhausted after a long hard-working day. Some are way too tired that they find it hard to move once they land on their couch, sofa or bed. So, any small device/technology that would help them switch theirs lights on or off, or play their favourite music etc. on a go with their voice with the aid of their smart phones would make their home more comfortable. Moreover, it would be better if everything such as warming bath water and adjusting the room temperature were already done before they reach their home just by giving a voice command. So, when people would arrive home, they would find the room temperature, the bath water adjusted to their suitable preferences, and they could relax right away and feel cozier and rather, feel more homely. Human assistants like housekeepers were a way for millionaires to keep up their homes in the past. Even now when technology is handy enough only the well to do people of the society are blessed with their new smart home devices, as these devices costs are a bit high. However, not everyone is wealthy enough to be able to afford a human assistant, or some smart home kit. Hence, the need for finding an inexpensive and smart assistant for normal families keeps growing.

II. LITERATURE SURVEY

Nikhil Rathod, Dr. P. D. Paikrao [1] explained the proposed working of A Survey on Home Automation by Using Voice Command Based on IOT. It will increase the efficiency of this application. We control the entire home appliance over the internet.

Aayush Agarwal [2] explained the model for Home Automation System Using Google Assistant. By implementing this type of system we can ensure that the energy conservation can be done.

Rajeev Piyare [3] proposed the Smart Home-Control and Monitoring System Using Smart Phone. Any Android based Smart phone with built in support for Wi-Fi can be used to access and control the devices at home.

Vinay sagar K N [4] has suggested to the home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement, for example switching on the light when it gets dark.

D.Swathi [5] explained Home Automation Based on IoT Using Google Assistant. The designed system processes according to the requirement, for example switching on the light when we give the command. This will help the user to get an overview of various parameters in the home anytime anywhere. Low cost and flexible home Automation system using Node MCU microcontroller is proposed and implemented.

Sujan Fernandes [6] has suggested the Home Appliances Control Using Android ADK. The design consists of Android phone with home automation application, Arduino Mega ADK. User can interact with the android phone and send control signal to the Arduino ADK which in turn will control other embedded devices/sensors.

Anjum Ara [7] explained Node MCU (ESP8266) Control Home Automation using Google Assistant. The home automation utilizing IOT has been experimentally demonstrated to work attractive by connecting simple appliances to it and the appliances were effectively controlled remotely through internet using voice commands. This will help the users to monitor the condition of various home parameters in the home anytime anywhere.

Manish Prakash Gupta [8] proposed the Google Assistant Controlled Home Automation. The approach discussed in the work was successful as GACHA's (Google Assistant Controlled Home Automation) design was successfully implemented. 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.

Shilpa Patil [9] has suggested the Smart Home System using Internet of Things over WiFi. The home automation using IoT has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuates a process according to the requirement with the support of inbuilt WiFi module, for example switching on the light when it gets dark. It also stores the sensor parameters in the database in a timely manner which helps the user to analyze the condition of various parameters in the home.

Ms. Poonam V. Gaikwad [10] designed Bluetooth Based Smart Automation System Using Android. Its purpose is to develop such application is not only for common man but will be boon for elderly and disabled. System allow user to monitor and control household appliances like lights, fan. It involves auto off lights at night by setting time. We can also able to see current temperature. It secures home by alerting people when smoke detected or gas is leaked. In terms of security, doors and windows are secured by setting alarm in case of any kind of thief movement. Our project is feasible because the cost is very less as compared to other systems and easy to handle, freely available.

Jackson Jerald.J a, Kirthish Kumar.Sb, Mr.L. Jerart Julusc [11] proposed Light Fidelity Based Indoor Car Parking System. As the electromagnetic spectrum shrinking continuously the Li-Fi system will going to provide a greener, safer, better and healthier future for communication system. When this system will be developed each light source can be used as a Li-Fi AP means where a light there is an Internet. Also it will shapes the better future for human kind by reducing the energy consumption, data as well as light at low cost, minimal cellular infrastructure and creating the employments opportunities at large scale. In short the Li-Fi system will be going to change the scenario of wireless communications in many greener ways.

S.Meera1, M.Ramya2, L.Megala3 [12] has designed Smart Hospitals Using Internet of Things (IoT). In this project, Smart hospital using Internet of Things (IoT) has been

successfully designed. This project is highly energy efficient as it uses arduino board having microcontroller (AT mega Atmel 328PU) which having low power utilization. It also uses MQTT networking protocol which is a light weight protocol and helps in power saving. We do not need to manually turn ON or turn OFF the switch of the light. It is possible to control the switch from a webpage or from the mobile application. This system is a time consuming. It will save patient from the risk of "AIR EMBOLISM" .It is user friendly system. Maintenance of this project is not costly.

Saleem Ibraheem Saleem1, Subhi R. M. Zeebaree2, Diyar Qader Zeebaree3, and Adnan Mohsin Abdulazeez4 [13] has suggested the Building Smart Cities Applications based on IoT Technologies: A Review. IOT can be implemented in different sectors such as Healthcare monitoring, Managing Smart Parking, Monitoring and Controlling House electric devices, Waste management, Burst Detection in Intermittent Water Distribution network, or monitoring soil humidity, etc. Because of that IoT has an observed effect on developing the technologies related to the smart cities applications, so these technologies been compared, including different features, as illustrated in section three. For the overall benefits of the proposed systems for various applications and detailed structure of their smart functionality and due to the uses of smart devices and analyzed with software, showing the desired results and high rate of success.

L.Megala1, B.Devanathan2 [14] develop the Remote Operation and Monitoring of Power plant Equipment using IOT Environment. IOT is used to control the ESP and its equipment from the remote area. By using this technology we used to reduce the problem and distortion occurs in cable/wires due to reduce the cable installation. Hence monitoring and controlling of process can be performed through the PC right from the desk. Moreover Internet of things requires low maintenance cost, problem can be easily identified and more flexible can made in the system without terminating the process.

Mohd Parvez Ali, S Shiva Kumar, S Bhavani, M Vijaya Bhargavi, S.V. Altaf [15] was proposed the Health Care System Using Embedded System and IOT. This project provides the smart health care system which could be used not only hospitals but also in homes. Using this system patient's health condition can be monitored and necessary medication can be provided if necessary.

M.Abila Mary1, B.Pavithra2, R.Sangeetha3, Prof.T.C.Subbu Lakshmi4 [16] was develop the GSM Based Wireless Notice Board Using ARDUINO. The prototype of the GSM based display toolkit was efficiently designed. The SMS is deleted from the SIM each time it is read, thus making room for the next SMS. The major constraints incorporated are the use of * as the termination character of the SMS and the display of one SMS as a time.

In the year may2019, C.Mani Barathi1, Nadar Shashikant Ashok2, Y.Nesan Jose Rajan3, T.Anto Theepak4 [17] proposed the system IOT Based Smart Energy Meter. This proposed system is flexible has low operating costs and less man power is required. This system is well suited for smart cities.An attempt has been made to make a practical model of 'IoT Based Smart Energy Meter.' The propagated model is used to calculate the energy consumption of the household, and even make the energy unit reading to be handy. Hence it reduces the wastage of energy and bring awareness among all. Even it will deduct the manual intervention.

Riya Jacob1, Anju Babu2 [18] was designed the IOT Based Last Meter Smart Grid with Energy Theft Detection. In this sense, this proposition has one of a kind focal points and components of oddity regarding the best in class, it is client driven, it limits the arrangement of specific shrewd lattice framework, and it use perhaps accessible brilliant home applications, sensors, and systems. This is key for a far reaching acknowledgment of keen lattice applications and hardware to be sent at home.

1R.Devi, 2V.Ramya [19] they develop the IoT Based Riceplant Disease Monitoring and Controlling Using ESP Module. The ESP8266 MODULE is capable of sending information to user and then user retrives the data from Thinkspeak cloud platform. Extension of system in such a way that it will be capable to detect and identify abnormalities on the other parts of plants.

K.Tamilselvi1, E.Jananandhini2, N.Vijayakumar3 [20] they have successfully completed the Design and Implementation of IOT Enabled Smart Solar Power Monitoring System. The general purpose of system is to store historical data about a solar power system, and present it in such a way that allows for long term system analysis to be conducted. Such a system will accomplish this task by periodically calling the monitoring device, collecting the data received in the form of DTMF, decoding these tones, and storing them in a database.

Homera Durani, Mitul Sheth, Madhuri Vaghasia, Shyam Kotech [21] has successfully completed Smart Automated Home Application using IoT with Blynk App. This paper has introduced a home management system. This system mainly focused on overcoming everyday problems

faced by the people in world where regular power cut-off, unmanaged urbanization, lack of manpower in agriculture and farming, etc. are blatantly evident. Our prototypical system is applicable to real-time home security automation, monitoring and controlling of remote systems.

Bhavna1, Dr. Neetu Sharma2 [23] proposed the development of SMART HOME SECURITY SOLUTIONS BASED ON INTERNET OF THINGS (IOT) USING WIFI INTERFACE. The user will get this notification irrespective of whether the phone is locked or unlocked or even if any other app is opened at the moment. This was the main objective of the project, which is the user feels safe and not worry about any intrusion or break-ins when he is away from home. This setup can also be used in commercial offices where some areas are restricted for certain personnel, such a system will immediately inform the administrator of any unauthorized personnel trying to access such an area. Therefore the extensibility and applicability of such a system is only limited only by the imagination...

Nidhi Singh1, Prof. Ashish Manusmare2 [26] was proposed the system of Intelligent Assistant for Controlling Iot Devices. It considered successfully because all IOT devices can be controlled by using smartphone and chatbots. Development in the field of IoT has been phenomenal in recent times. Similarly, Chatbot systems are also becoming more intelligent and sophisticated as the days progress. By using this technologies a common device can be turned into an intelligent devices, with domestic control throughchatbots and IOT; thiscan be achieved with a low budget and resources available in the majority of houses around the world. Proposed the development of an Internet-based system to allow monitoring of important process variables from a distributed control system (DCS). It proposes hardware and software design considerations which enable the user to access the process variables on the DCS, remotely and effectively rent designations.

Potamitis, Georgila, Fakotakis, and Kokkinoss, G. [33] (2003) suggested the use of speech to interact remotely with the home appliances to perform a particular action on behalf of the user. 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. In the year 2006, S. M. Anamul Haque, S. M. Kamruzzaman and Md. Ashraful Islam [34] proposed a system entitled "A System for Smart-Home Control of Appliances Based on Time and Speech Interaction" that controls the home appliances using the personal computer. This system is developed by using the Visual Basic 6.0 as programming

language and Microsoft voice engine tools for speech recognition purpose. Appliances can be either controlled by timer or by the voice command.

Jawarkar, Ahmed, Ladhake, and Thakare [35] (2008) propose remote monitoring through mobile phone involving the use of spoken commands. The spoken commands are generated and sent in the form of text SMS to the control system and then the microcontroller on the basis of SMS takes a decision of a particular task. Prof. Era Johri [36] in (2001) have successfully completed the project on "Remote Controlled Home Automation".

Within is a consumer Electronics Company is the leader in the connected health revolution. The Home camera alerts the user to many motion or noise while out of the House. It also tracks the indoor air quality, notifying the user if dangerous levels of voltaic organic compounds are detected. It has taken security, privacy and home health to the next level through a partnership with IFTTT, a service that allows rule-based actions and triggers between a range of devices and services. Users can enhance their Home, a HD security camera equipped with environmental sensors, by connecting with IFTTT app to make household automation a reality. The comprehensive Home monitoring solution was first presented at Consumer Electronics Show in 2014. Home is one of the most comprehensive home monitoring solutions on the market, allowing users to stay connected to their home and family from anywhere. The camera can be used with the IFTTT app to create a number of recipes between connected services and the camera, such as turning it on when user's phone is using geo-location or when the door is locked, or making it turn on the air purifier when bad quality is detected. Parents can take comfort in having superior features such as Baby Monitor Mode, which has continuous monitoring, alerts and interactive push-to-talk.

III. SYSTEM DIAGRAM AND IMPLEMENTATION

Fig.1. shows the block diagram of Google assistance based home automation. It contain controlling device which is connected with the Wi-Fi module. It contains android devices with some applications and control unit which has node MCU and relay driver. This module will be connected with the microcontroller .The operator and controller will give the required command to the relay board. The relay board acts as switch between the circuits. The external devices are connected to the relay board. And these devices can be controlled over the internet of thing.
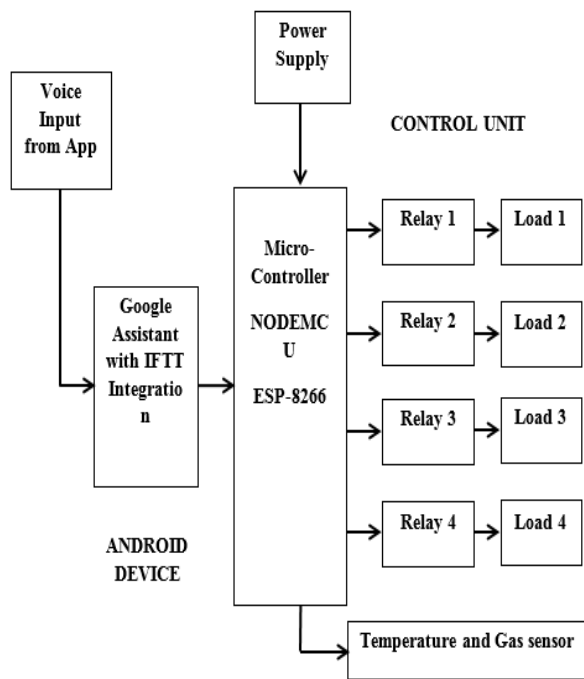
Figure 1:Block diagram of Google assistance controlled Home Automation

3.1 Node MCU (ESP8266)

The node MCU is a low cost Wi-Fi chip with full TCP/IP protocol stack and microcontroller unit. It is a small module which is easy to handle and easy to construct. This module allows microcontroller to connect to a Wi-Fi network and make simple TCP/IP connection using Hayes style commands, The ESP8266 with 1MiB of built in flash, allowing for single chip device capable of connecting to Wi-Fi. Fig.2 shows the device of node MCU. The Node MCU (Node Microcontroller Unit) is open source software and hardware development environment that is built around a very inexpensive System-on-a-Chip (SoC) called the ESP8266. The node MCU (ESP8266) is designed and manufactured by Express contains all conclusive elements of the modern computer: CPU, RAM, networking (Wi-Fi), and even a modern operating system and SDK.

Figure 2.Node MCU (ESP8266)

3.2 ULN 2803 IC (Relay Driver)

Relay is electromagnetic switch. It is electrically operated switch. Different types of relay use an electromagnetic to mechanically operate as a switch. It is used where it is needed to controlling the circuit by a separate low power signal, or where several circuits must be controlled by one signal. It is used to turn the system on and off. In this system, the relay is used to turn ON/OFF the appliances. The signal is supplied from the Node MCU microcontroller may be high/low. Relay calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power system these functions are performed by digital instruments still called "protective relay".
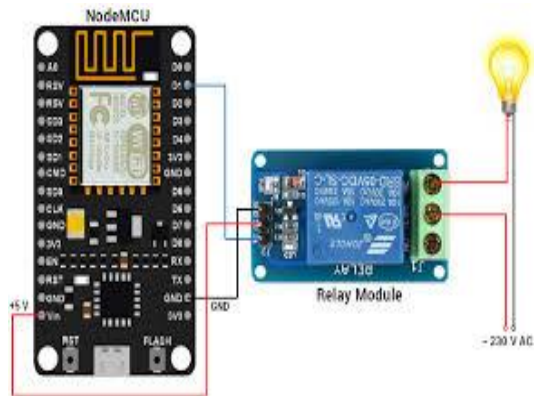

Figure 3. Relay Board

Fig.3 shows circuit diagram of relay board. Most of the Chips operates with low level signals such as TTL, CMOS, PMOS, and NMOS which operates at the range of (0-5) V and are incapable to drive high power inductive loads.

3.3 Temperature sensor (LM 35)

Figure 4. Temperature sensor

Fig 4: LM 35 (Temperature sensor) shows the Temperature sensor device is a precession Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C.

3.4 Gas sensor (MQ-2)

Figure 5. Gas sensor

Fig 5: MQ-2(Gas sensor) shows the circuit device of gas sensor. The *MQ-2* Gas *sensor* can detect or measure gasses like LPG, Alcohol, Propane, Hydrogen, CO and even methane. The module version of this *sensor* comes with a Digital Pin which makes this *sensor* to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas.

3.5 Buzzer

Figure 6. Gas sensor

Fig 6: shows the buzzer device. A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

IV. SOFTWARE

It contains the Blynk Application and the IFTTT application.

4.1 Blynk Application

Blynk is Android apps to control Arduino, Raspberry Pi, Node MCU and several other boards all over the Internet. Fig.6 shows the Functioning of the Blynk Application. It was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, and it can store data, visualize it and do many other cool things. Its setup is required as per the requirement. After which we create the toggle

buttons for each relay associated with the digital pins of the microcontroller. Once this is done, it sends an authentication token to the registered email id for this particular project. This token should be noted and saved for its use while programming the NodeMCU and setting up the IFTTT application. We can use the Blynk Cloud or run private Blynk server. Its open-source, could easily handle thousands of devices. Now imagine every time we press a Button in the Blynk app, the message travels to the Blynk Cloud, where it will find its way to our hardware.
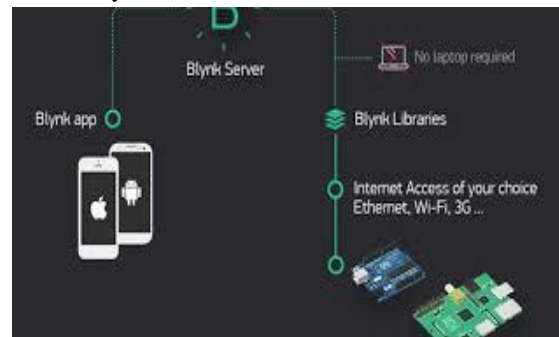

Figure 7. Functioning of the Blynk Application

4.2 IFTTT Application

IFTTT stands form "if this, then that". IFTTT is both a website and a mobile app. The IFTTT can be used to automotive everything from your favourite apps and websites to app-enabled accessories and smart devices. Fig.7 shows the Screenshot of the IFTTT Application after Creating Several Applets. The company provides 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, IFTTT application is used to bridge the gap between the Google Assistant commands and the Blynk app. The response command from the Goggle Assistant can also be typed in as desired. This is decided by setting "That" of the app. We click "That" and then select web hooks and click connects. Web hooks will allow us to send commands to the Blynk Server.

Figure 8. Screenshot of the IFTTT Application after Creating Several Applets

4.3 Google Assistant

The Google Assistant is software which allows the users to control the all apps in their device by using voice commanding mode. It allows the users to control and command most of the apps in their devices using voice commands. This provides more convenience to the people as they only have to command the Google assistant thorough voice command.
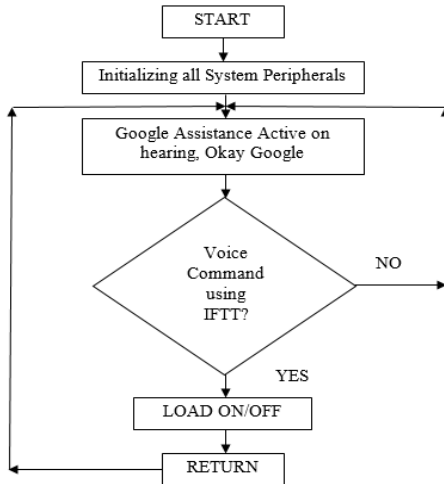
4.4 Flowchart

Figure 9: flowchart of project

V. IMPLEMENTATION SETUP

The output for Google assistant controlled Home automation is shown below. Fig 6. Shows the complete prototype implementation of the proposed system.
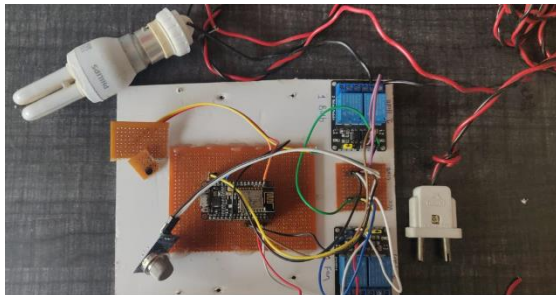
Figure 10. Experimental setup of Connections of Google Assistant controlled Home automation
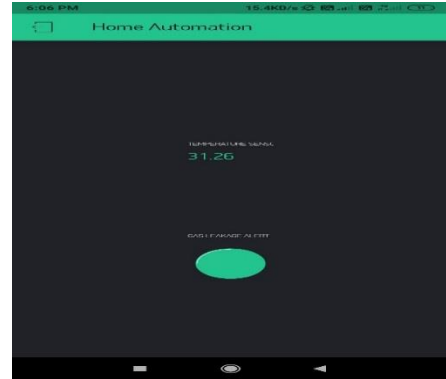
VI. RESULT

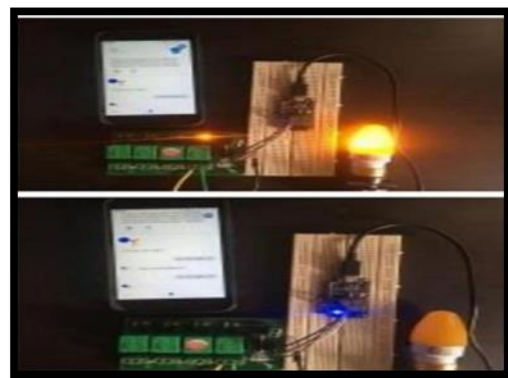**Figure 11. Screenshot of Blynk Server app to check condition and monitoring of sensors**

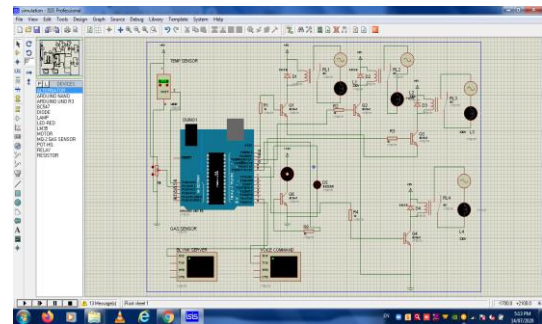**Figure 12. Light turning on and off**

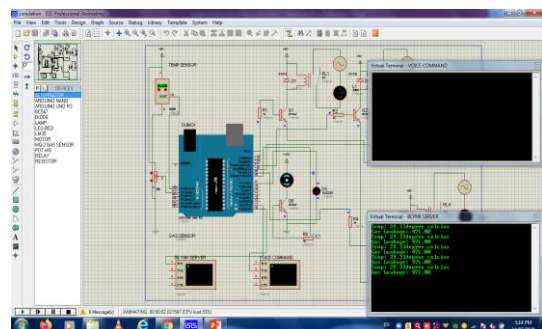**Figure 13.1. Screenshot of Simulation of Project When Off Condition**

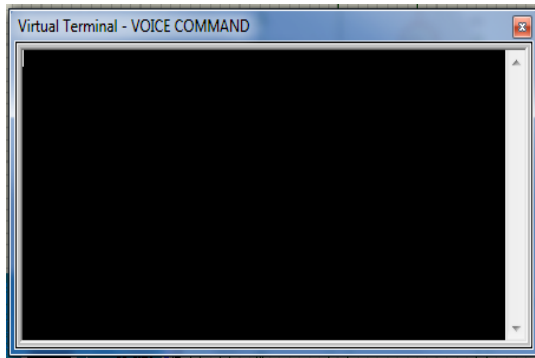**Figure 13.2. Screenshot of Simulation of Project When On Condition**

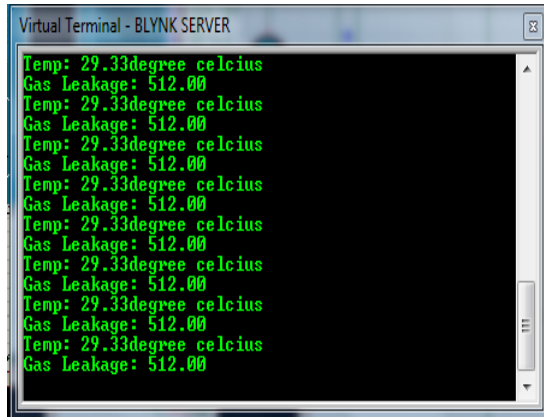**Figure 13.3. Screenshot of voice command vertical mode**

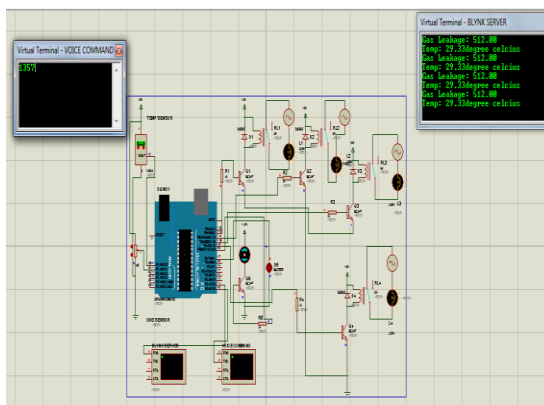**Figure 13.4. Screenshot of Blynk server vertical mode**

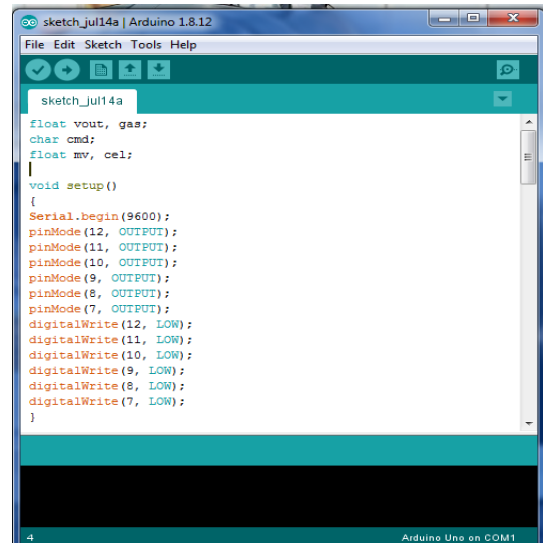**Figure 13.5. Screenshot of all output on condition by using voice command**

Figure 13.6. Screenshot of coding run on Arduino

Table 1: Comparison of different system is mentioned below

Sr. no.	Methods	Author name	MCU	Sensors	Monitoring achieved	Feedback achieved	Voltage (V)	Current Consumption (A)	Power Consumption (watt)
1	(proposed system)	----	Node MCU	Temperature And Gas Sensor	Achieved on Google Assistance and Blynk app	Achieved on IFTT and Blynk App and Google Assistance	3.3 v to 5 V	15 µA and 400 mA (around 0.5 µA)	1.65 µw (It consume the power between 0 to 0.5 % only)
2	Home Automation System Using Google Assistant	Aayush Agarwal [2]	Arduino	Not used	Google assistance	Google Assistance	5 V	50 mA to 200 mA (around 50 mA)	250 mw (It consumes the power 1 to 1.5%)
3	Home Automation System Using Google Assistant	Rajeev Piyare1 [3]	Arduino	Not used	Web page	Web page	5 V	50 mA to 200 mA (around 50 mA)	250 mw (It consumes the power 1 to 1.5%)

Figure 14. Table of different system comparison

VII. CONCLUSION AND FUTURE WORK

Conclusions

In this paper, the architecture are low cost and flexible home Automation system using advanced version of Arduino microcontroller is proposed and implemented. Overall Arduino is easy to understand & its coding is easy. By implementing this type of system we can ensure that the energy conservation can be done. It will increase the efficiency of this application. We control the entire home appliance over the internet. This will Increase the comfort ability of human being and it will reduce the Human efforts.

Future Work

There are a variety of enhancements that could be made to this system to achieve greater accuracy in sensing and detection.

a) There are a lot of other sensors that can be used to increase the security and control of the home like pressure sensor that can be put outside the home to detect that someone will enter the home.

b) Changing the way of the automated notifications by using the GSM module to make this system more professional.

c) A smart garage that can measure the length of the car and choose which block to put the car into it and it will navigate the car through the garage to make the parking easy for the homeowner in his garage.

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