

IoT Framework For Smart Home Using Google Assistant

Dr. Amali.C

Department of Electronics and
Communication Engineering
SRM Valliammai Engineering College
Kattankulathur, India
amalic.ece@srmvalliammai.ac.in
Orcid ID: 0000-0001-6246-1433

Ksheeraja S

Department of Electronics and
Communication Engineering
SRM Valliammai Engineering College
Kattankulathur, India
ksheerajasricharanyan@gmail.com

Menaga B

Department of Electronics and
Communication Engineering
SRM Valliammai Engineering College
Kattankulathur, India
menagab62@gmail.com

Lakshmi Priya.S

Department of Electronics and
Communication Engineering
SRM Valliammai Engineering College
Kattankulathur, India
lakshmiPriya.s489@gmail.com

Abstract— *The objective behind the proposed work is to provide a voice controlled home automation system using a Wi-Fi technology and IoT, which rely on smart phone for controlling operations . Adafruit IO is a free IoT web server which implements cloud computing technology, is used for virtualizing switches . It is linked to IFTTT webpage . The control commands that has to be given for Google assistant have been given with the help of IFTTT. The voice commands given using the Google Assistant are processed well and are decoded and then sent to the Node MCU ESP8266 microcontroller. The system is portable and designed to be simple to set up, configure, use, and maintain. This concept enables us to solve the issue that arises when elderly or disabled people are unable to move around on their own and may need outside assistance.*

.Keywords- Wi-Fi, Internet of Things ,Google Assistant, IFTTT, Adafruit IO , Node MCU ESP 8266

I. INTRODUCTION

IoT (internet of things) technology is advancing significantly in the post-revolutionary world. Utilizing IoT in daily life significantly minimizes the challenges. It aims to automate the home by managing and keeping track of various appliances that communicate with one another and the control device, such as a computer, wirelessly, to share information. For example, we can find homes where we can turn on appliances with our phones, change the temperature of the room heater automatically based on the environment, and much more. Some Asian homes have fans that can be controlled by Bluetooth, Alexa-enabled devices, and other technologies. Only Bluetooth and Wi-Fi enabled systems can use this technology, which increases the cost of setup and not everyone can afford it.

After a long, stressful day, picture yourself lying on the corner of your couch, your fan on. We will feel much better if there is technology that helps you with simple daily tasks like turning on the heater or the light in your room while you're sick. Everyone desires this luxury in a bit profitable manner. So, the goal of our project is to automate the home in a quick

and affordable manner. To enable access for even those who require special care, we use voice commands that are offered by Google and supported by Android OS. Elderly and bedridden individuals will find it very helpful. In the end, home After a long and stressful day, everyone appreciates being themselves at home, which is a perfect destination. . Nombulelo CC Noruwana, Pius Adewale Owolawi & Temitope Mapayi (2021) suggested a system for Interactive IoT-Based Speech-Controlled Home Automation System[1] The proposed home automation system which is controlled by voice , underwent experimental studies using numerous scenarios, including comparison between noisy and quiet environments, empty and fully furnished rooms, varying distance, room sizes and various other dimension , and the best results were obtained with full accuracy rates in some of the tested scenarios but Accuracy is very low in noisy environment. Urvi Singh, M. A. Ansari (2019) proposed the Smart Home Automation System Using Internet of Things [2] This paper describes about an application that helps in controlling operations to multiple users present in a house , with devices like smart phones, tablets, and laptops. This system may be extended to operate a variety of household equipment and also handles security and safety purpose of the home as long as the sensors are present on Wi-Fi network coverage.

One of the best method for an energy management System. Majid Al Kuwari, Abdulrahman Ramadan, et. al.(2018) explains the Smart-Home Automation using IOT-based Sensing and Monitoring Platform[3] This proposed system uses battery for operation and if there is a power cut then owner can track the system with the help of Raspberry pi micro processor using internet and a smart phone. This system uses specific technologies and follows a security approach, but it is not possible to offer complete security within the system

Himanshu Singh, Vishal Pallagani and Vekanna.U (2018) proposed the IoT based Smart Home Automation System using Sensor Node [4] proposed the developed a smart home automation system that uses various sensor node. It overlooks the energy used by the various other systems in smart home. Arduino updates the energy used by various system at regular interval.

Ravi Kishore Kodali, Vishal Jain, Suvadeep Bose and Lakshmi Boppana (2016) presented a IoT Based Smart Security and Home automation system [5] . The home security system proposed in this work employs numbers from the keypad that is provided on the smartphone rather using any user-friendly applications or user interfaces. The system looks to be platform neutral, making it accessible from a variety of phones running various operating systems. Neaz Md. Morshed; G.M. MuidUr-Rahman; Md. Rezaul Karim; Hasan U. Zaman (2015) demonstrated a Microcontroller Based Home Automation System Using Bluetooth, GSM, Wi-Fi and DTMF[6] is autonomous, affordable home automation system .Both indoor and outdoor environments are viable options for controlling home appliances. There is also an online module that updates consumers on the status of household appliances via Twitter.

Pavithra.D and Ranjith Balakrishnan (2015) presented the IoT Based Monitoring and Control System for Home Automation[7] offers an achievable IoT implementation that may be used to monitor and operate home appliances like fan, tube light etc. via World Wide Web i.e., WWW. One of the major problems arises when the server goes down. In that case, user can domestically operate the needed appliances. S. Hidayat and S. F. Firmanda, (2015) demonstrated a Scheduler and voice recognition on home automation control system [8] The switch's most recent state could be maintained by the Raspberry Pi's database. As a result, in the event of a system failure, the entire system will be returned to its original state. To control electrical equipment remotely, a web-based interface could be used. A Raspberry Pi voice recognition module in place of cloud-based voice recognition would be another useful updated version.

Rozita Teymourzadeh, CEng, Salah Addin Ahmed, Kok Wai Chan, and Mok Vee Hoong (2015) suggested a system for Smart GSM Based Home Automation System [9] Using the frequency bandwidths, the system allows the individual to regulate the target system away from a residences. It provides a secure infrastructure that provides the highest level of quality and prevents information from being monitored by third parties. Smart homes using advanced wireless technology can be built in near future. Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and Xin Lu (2009) suggested a system for A Zigbee -Based Home Automation system [10] It explains the cause of this poor acceptance and assesses ZigBee's potential to solve these issues by creating and implementing a flexible home automation architecture. The potential for successful coexistence and interoperability of Wi-Fi and ZigBee has been demonstrated using a real home automation system.

IoT opened the door for smart home automation systems like Amazon Echo and Google Home Alexa. Amazon's smart assistant now has a range of features. Aside from controlling the home, the application can order pizza, play trivia games, listen to the news and weather, shop online, play music, add reminders , and even start a two and four wheeler. In addition to helping us control indoor appliances, it also facilitates audio viewing or listening, television and speaker control, and other activities. These advanced gadgets only link up with Bluetooth, Wi-Fi, or any other technologically sophisticated systems.

This work is organized as follows. Section I consist of an introduction to IoT technology and some related works. Section II discusses the proposed system architecture. Section III explains implementation and results and section IV finally concludes the paper.

II.SYSTEM ARCHITECTURE

Given the limitations of the present system, we propose a solution that may effectively turn an ordinary house into a smarter one. In this paper , a 5 V DC relay is acts as a switch . In addition to being cost - effective, node MCU has a number of benefits, such as built-in Wi-Fi network support and consumes less power. Arduino IDE programming software is used to set up the control instructions for the indoor appliances. By using the "Adafruit IO" online platform, the relay code is developed.

The Google Assistant, which is compatible with Android OS, can be used to voice-command the appliances. Google Assistant and Node MCU communicate using Wi-Fi technology. This Internet of Things-based home automation system is targeted at elderly, bedridden, and a significant percentage of working people. After a long day, people feel incredibly worn out. They prefer to stay in their favourite bed spot.. Such circumstances make this system favourable. This prototype makes it possible to turn on and off lights and fans virtually anywhere wherever there is Wi-Fi coverage. We can operate a lot of appliances by putting in place systems of that kind in our house

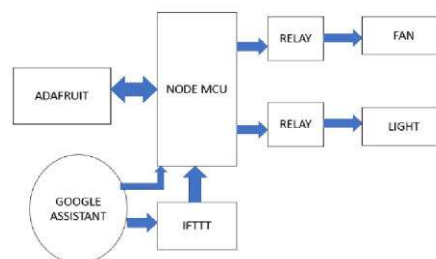
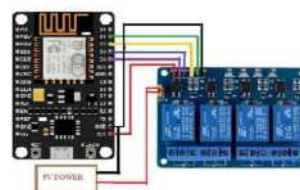


Figure 1 System model



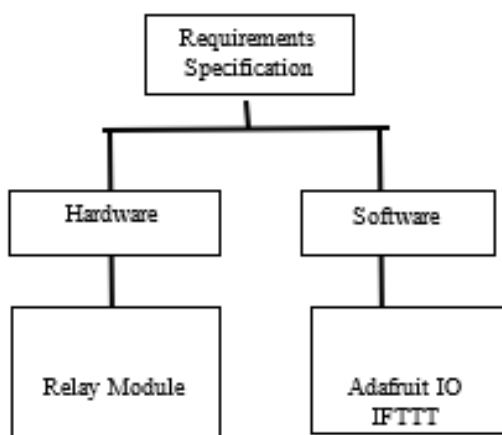


Figure 3 requirement specification

A. REQUIREMENTS SPECIFICATION

The primary requirement to develop the products is determined by the requirements specification phase of the system design, as in the figure 3.

A. NODE MCU ESP 8266.

The Node MCU is a microcontroller with an integrated Wi-Fi module. It is merely a SoC with a Transmission control protocol stack that gives the micro controller access to the internet facility. It can function as a station, an access point, or both simultaneously. It is compatible with a variety of development platforms, including Arduino, and enables serial connection

B. ADAFRUIT IO

Adafruit IO is a cloud platform that is used to show, react, and interact with the data from the prototype. The Internet of Things. when the ESP8266 performs a request, the applet sends three random values to your email. can be accessed by your projects by the simplest method possible. Anyone with an Adafruit account can access it for free. Adafruit IO connects with its peripherals using the MQTT protocol. It is abbreviated as message queue telemetry transmission.

C. ARDUINO IDE

The Arduino Software (IDE), also known as the Arduino Integrated Development Environment, includes a text editor for writing code, a message box, a text terminal, and a toolbar with buttons for frequently used actions. It is linked to the processor using a USB connection so that programmes may be uploaded and that it can interact.

D. IFTTT

IFTTT, which stands for "If This Then That," is a free online tool that enables users create applets, which are generally long chains of simple conditional statements. This means you can trigger an event when something happens.

E. Relay Module

The four-channel relay module is composed of four surface-mounted 5V relays, terminal blocks, BC547 Transistors, PC817 Optocouplers, 1N4148 Diodes, and LEDs. There are 7 pins in this module. The VCC pin, JDVCC pin, GND pin, and four IN pins are among them. We can power the module with the aid of the VCC pin. The module's GND pin serves as the component's ground reference. For the relay module, the JD-VCC pins act as an alternative pin.

III. IMPLEMENTATION AND RESULT

The prototype of the system implemented is given in figure 4 tested for basic operations and the output is observed successfully.

Figure 5 displays the application UI for turning on lights along with the appropriate hardware output.

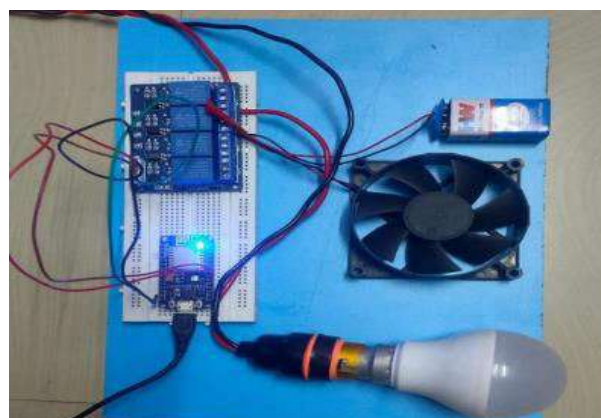


Figure 4. System prototype

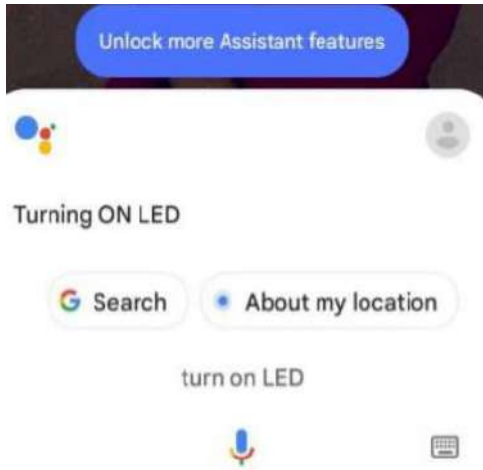


Figure 5 UI interface for turning LED ON

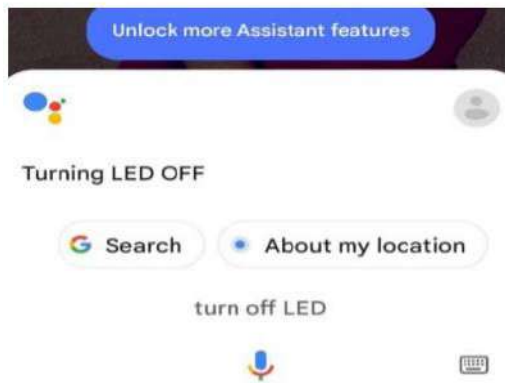


Figure 6 UI Interface for turning LED OFF

Figure 6 provides the directions for turning off light. The creation of virtual switches in Adafruit IO observed in figure 7. The output is observed in figure 8.



Figure 8 Output

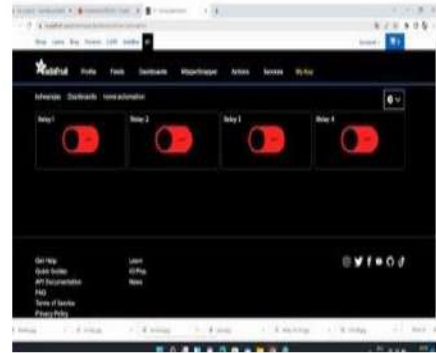


Figure 7 Virtual Switches

IV.CONCLUSION AND FUTURE SCOPE

Multiple devices can be connected to the controller using this technique. Testing under various settings offered has confirmed that the technology is functioning as intended. It can be seen from the model that numerous devices can connect to and be controlled by Wi-Fi. IFTTT is a piece of software that links different suppliers' gadgets and services together. IFTTT is the most significant application used by many IoT-based enterprises to connect with home automation systems. This user-friendly, cost-free application is used to send directions to Google Assistant. Numerous benefits, including cost, security, and flexibility, are offered by this project. This home automation system has excellent commercial potential in the future. The system may be combined with a number of other functions, such as home security capabilities that let you take a photo of a person as they move or wander around the house and save that image and its unique data to the cloud. This will result in less data storage due to the usage of cloud storage and CCTV cameras, which continuously record and store information to give house owners more safety and control. The system can be utilised for energy monitoring or meteorological stations. The System can also be used in businesses where human invasion is either impossible or harmful, like as hospitals for the disabled. It can be used to monitor the environment as well.

REFERENCES

[1] N. C. Noruwana, P. A. Owolawi and T. Mapayi, "Interactive IoT-based Speech-Controlled Home Automation System," 2020 2nd International Multidisciplinary Information Technology and Engineering Conference (IMITEC), Kimberley, South Africa, 2020, pp. 1-8.

[2] U. Singh and M. A. Ansari, "Smart Home Automation System Using Internet of Things," 2019 2nd International Conference on Power Energy, Environment and Intelligent Control (PEEIC), Greater Noida, India, 2019, pp. 144-149.

[3] M. Al-Kuwari, A. Ramadan, Y. Ismael, L. Al-Sughair, A. Gastli and M. Benammar, "Smart-home automation using IoT-based sensing and monitoring platform," 2018 IEEE 12th

International Conference on Compatibility, Power Electronics and Power Engineering (CPE-POWERENG 2018), Doha, Qatar, 2018, pp. 1-6.

[4]H. Singh, V. Pallagani, V. Khandelwal and U. Venkanna, "IoT based smart home automation system using sensor node," 2018 4th International Conference on Recent Advances in Information Technology (RAIT), Dhanbad, India, 2018, pp. 1-5.

[5] R. K. Kodali, V. Jain, S. Bose and L. Boppana, "IoT based smart security and home automation system," 2016 International Conference on Computing, Communication and Automation (ICCCA), Greater Noida, India, 2016, pp. 12861289.

[6] N. M. Morshed, G. M. Muid-Ur-Rahman, M. R. Karim and H. U. Zaman, "Microcontroller based home automation system using Bluetooth, GSM, Wi-Fi and DTMF," 2015 International Conference on Advances in Electrical Engineering (ICAEE), Dhaka, Bangladesh, 2015, pp. 101104.

[7] D. Pavithra and R. Balakrishnan, "IoT based monitoring and control system for home automation," 2015 Global Conference on Communication Technologies (GCCT), Thuckalay, India, 2015, pp. 169-173.

[8] S. Hidayat and S. F. Firmanda, "Scheduler and voice recognition on home automation control system," 2015 3rd International Conference on Information and Communication Technology (ICoICT), Nusa Dua, Bali, Indonesia, 2015, pp. 150-155

[9] R. Teymourzadeh, Salah Addin Ahmed, Kok Wai Chan and Mok Vee Hoong, "Smart GSM based Home Automation System," 2013 IEEE Conference on Systems, Process & Control (ICSPC), Kuala Lumpur, Malaysia, 2013, pp. 306309.

[10] K. Gill, S. -H. Yang, F. Yao and X. Lu, "A zigbee-based home automation system," in IEEE Transactions on Consumer Electronics, vol. 55, no. 2, pp. 422-430, May 2009.

[11]. J. -C. Wang, H. -P. Lee, J. -F. Wang and C. -B. Lin, "Robust Environmental Sound Recognition for Home Automation," in IEEE Transactions on Automation Science and Engineering, vol. 5, no. 1, pp. 25-31, Jan. 2008.

[12]. B. Yuksekkaya, A. A. Kayalar, M. B. Tosun, M. K. Ozcan and A. Z. Alkar, "A GSM, internet and speech controlled wireless interactive home automation system," in IEEE Transactions on Consumer Electronics, vol. 52, no. 3, pp. 837-843, Aug. 2006.