

Cloud Based Home Automation System Using Artificial Intelligence- Google Assistant

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Abstract-This paper is a proposition for Cloud-Based Home Automation Using Artificial Intelligence-Google Assistant, Home Computerization or Home-Automation. We have gone over a few home Computerization advances presented throughout the years, from Bluetooth controlled robotization to Expert-System. Though the Google-Home cost is around ₹ 7,999 (INR) with an extra cost of ₹ 3,999 (INR) for the Gadgets associated concerning Google-Home, the complete expense for the Structure will be ₹ 11,998 (INR). Apple-Home Kit alone is more costly than Google-Home, around ₹ 10,473 (INR) for an essential gadget. A savvy Gadget which is constrained by the Google-Assistant, Amazon-Echo, and Siri, which utilizes voice assistant, for giving directions will cost around ₹ 7,999 (INR). So also, A solitary Smart light is valued around ₹ 799(INR) and this can be controlled both by Siri and Google-Assistant. To Transform home Computerization, we need to contribute, around ₹ 11,999 (INR) for a straightforward setup. Imagine a scenario in which we can Computerize (Automate) our home inside (the Smartphone cost is does excluded as it is possessed by everybody) ₹ 2,999 (INR) and can control up to 4 contraptions utilizing Google-Assistant, in this paper, we depict the Planning and actualizing of such a sort of framework. The procedure includes Natural language handling, NLP (voice direction) which is given through the Google-Assistant with the assistance of IFTTT (If-This-Then-That) versatile application, Adafruit Cloud and the Arduino IDE application the guidance is sent to the Microcontroller, thusly, controls the transfers associated with regarded contraptions as required, turning the gadget (relay) On or OFF directions given to the Google-Assistant. The Micro-controller utilizes Node-MCU (ESP8266) and the correspondence is built up by means of Wi-Fi (Internet).

Keywords: Home Computerization, IFTTT(If-This-Than-That) Mobile-App, NodeMCU (ESP8266), Arduino IDE Application, Internet of Things (IoT), Google-Assistant, NLP-Voice Control, Smartphone.

I. INTRODUCTION

This is a proposition of the Compact framework. It utilizes the Google-Assistant (AI), The IFTTT [1] Mobile-application, The Adafruit [2] Cloud-application and The Arduino NodeMCU [3] Wi-Fi microcontroller are the most essential segments alongside a 4-relay board. Natural Language Processing (NLP) is utilized to offer guidance to Google-Assistant [4]. Every one of the devices is associated through the web utilizing Wi-Fi Connectivity which puts this framework under the classification of IoT [5] ("Internet of Things"). The IoT is the Combination of physical gadget, vehicle, home apparatus, and other installed with hardware, programming, sensor, and Internet availability which empower these things to associate, gather and trade information. IoT can be controlled remotely over the World, in contrast to any brilliant electronic gadget/innovation that would help those switches their lights turn on or off. With a solitary proceed with their voice control utilizing advanced cells (Google-Assistant is an Artificial Intelligence-Powered

Virtual Assistant created by Google that is accessible on smart phones)

This will make their home increasingly agreeable. The primary point of this thoughtful a gadget is to lessen the exertion by the client to control the gadget physically. This framework utilizes Google-Assistant [4] Voice Control given by Google, to speak with the IFTTT (If This Then That) [1] Mobile-application and the client. The client gives a Voice Command to the gadget to control the contraptions in their home, Sense the temperature and Humidity utilizing DHT 11 [6] sensor, and furthermore use it to interface with the smart lights and fans or some other shrewd tech. The IoT is drifting in executing machine to machine correspondence. A large number of gadgets everywhere throughout the world are associated with IoT and they can share data for achieving computerization. The constant investigation of AI, DHT sensors, and implanted frameworks, Wireless Sensor Networks, control frameworks, robotization (incorporates

home and building automation), and others all add to empowering the Internet of things.

II. LITERATURE SURVEY

- **Vamsi Krishna, HariBabuKandala, p Ravi Babu** in the paper 2007 they utilized the Raspberry-pi for coding microcontroller and associated with camera help and sensors to home reconnaissance and robotization framework.

This paper contains focal points of Simplified Living, Convenience factor, and security.

A couple of downsides of Flawless retrofit, and they are costly.

- **Lovely Goyal, AnanthVaibhav** in the paper 2010 they have clarified framework can be constrained by the home machines by getting the messages from that subject identified with the program created dependent on home apparatuses.

This paper gives a few points of interest in Managing gadget from the accommodation factor is tremendous, Flexibility for new gadgets and Appliances, and they have Increased vitality proficiency.

Have a few downsides of Security frameworks are poor and False Alarms.

- **Rajeev Piyare and SeongRo Lee** in the paper 2013 they presented a portable and less price to control home monitoring (survey) system using micro server with IP connectivity to control the devices using Android applications.

This paper provides some list of advantages of customization, Security, and save money and the Environment.

Contains a few drawbacks of Sight Learning Curve, and Reliability factor.

- **Ronnie D. Caytiles and Byungjoo Park** in the paper 2016 they proposed the utilization of versatile IP setup and incorporated and actualized with the savvy home framework. They utilized the standards of IPV6 to give portability on the plan execution and engineering for versatile Smart home.

This paper gives favorable circumstances of Secure the framework, and they are easy to understand, and furthermore Increase Resale Value.

A couple of downsides of Learningbend poor security administrations.

- **Ana Marie D. Celebre** in the paper 2016 utilized Siri innovation fueled by Apple Inc., to control the framework utilizing the inbuilt voice directions given by Siri.

This paper gives leverage to Increasing resale esteem, customization of home frameworks.

A couple of disadvantages are unwavering quality.

III. PROPOSED MODEL

The idea of the project is to integrate the concept of Google Assistant into Arduino IDE Application, Internet of Things (IoT) and control the Appliances in the Home through Internet Google recently released an API for Google Assistant, for platform other than Android, such as Linux and Windows, using Python language. This makes it way easier to program into Arduino, and lighter when compared to other programming languages.

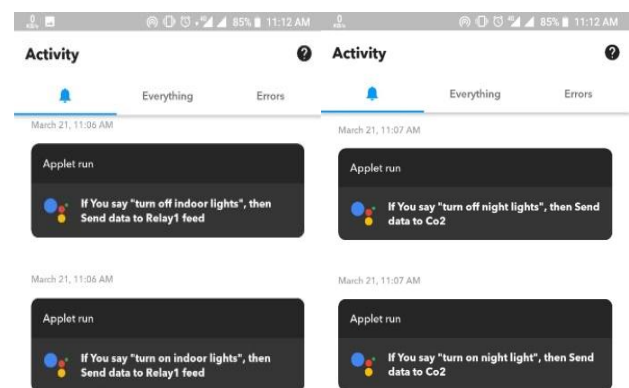
IV. METHODOLOGY

The framework plan and usage is grouped into two noteworthy categories,

- The hardware**-The equipment parts are associated remotely through the switch. Which would likewise have the capacity to turn on/off specific gadgets, for example, lights and fans?Which is in term called as the 'Control Unit'?
- The Software**-the IFTTT Mobile-application, The Arduino NodeMCU application, and the Google-Assistant consolidated the product, the plan and executing these applications would be inside associated with the Android gadget.

The Control Unit incorporates of the microcontroller-NodeMCU 1.0 and the 4 Channel Relay board. Relay board is associated with ESP-8266 to control the transfers switch (On/Off). The IFTTT Mobile-application on an Android gadget speaks with the Adafruit Cloud and sends the ideal flag by means of the web.

Underneath figure 1 demonstrates IFTTT Notifications and Several applets



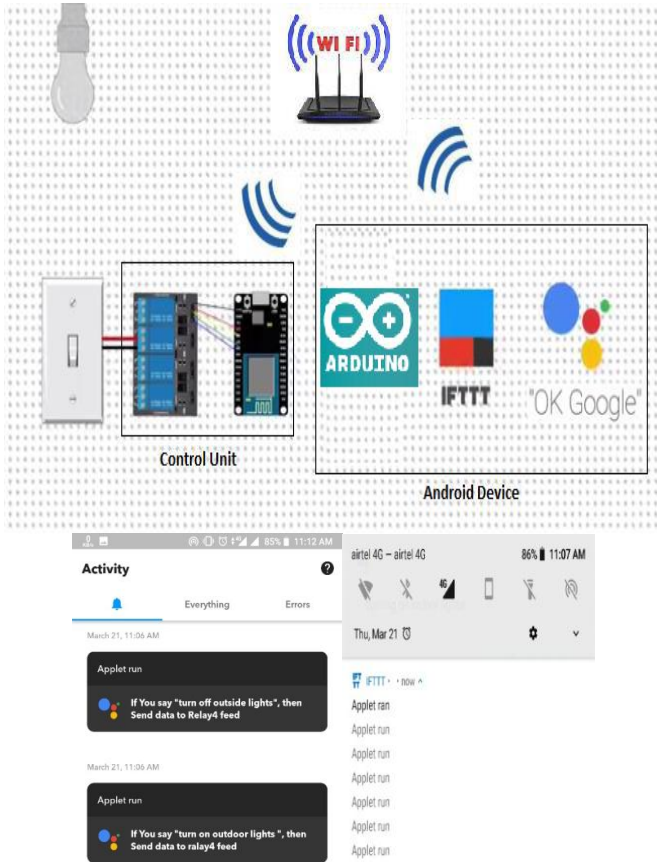


Fig -1: Screenshot and Notification of IFTTT Mobile-App after Creating Applets

4.1 IFTTT APPLICATION- IFTTT ("If-This-Then-That.") Connects the Internet to work for you. The IFTTT [1] robotize everything from your versatile applications and sites to a smart device. The IFTTT is a product stage that associates applications, in wording to impart at least one mechanized gadgets required regarding that application, gadgets, and administrations. Here, IFTTT Mobile-application is utilized to interface the Google-Assistant directions and the Adafruit-Cloud [7] Server. Setting up the IFTTT Mobile-application requires sign in after which we have to make applets "This", the trigger will choose for Google Assistant and afterward we can offer guidelines to the Google-Assistant, will react and to this direction, it ought to likewise control the devices related with relay associated. The reaction order from the Goggle-Assistant will likewise be made as it is wanted to react. In the wake of arranging "This", the application we have to design is "That" is as similar to "This". The Microcontroller is modified with the activities it needs to do once it gets the flag from the Adafruit Cloud application. Prior to that, the Adafruit cloud server and the microcontroller ought to impart by means of the

web and since the microcontroller, NodeMCU accompanies inbuilt Wi-Fi module, it is modified to associate with the saved network once it is connected. To program the controller Embedded 'C' language is utilized in the Arduino IDE.

Fig -2: Basic System Architecture

4.2 Google Assistant –Google-Assistant [4] is an AI-powered Virtual Assistant created by Google that is accessible on portable and brilliant home gadgets. The aide at first appeared in May 2016 as a feature of Google's [8] informing application Allow, and its Voice-activated speaker Google-Home, It is a voice assistant AI for Android device through Natural Language Processing, discourse interface to play out an assortment of assignment. As a voice partner, Google Assistant permits two-way discussion capacities collaborator administration, Google Now, which is a web and content-based administration. Aide use processing, AI and voice acknowledgment innovation. Associate's improvement started in 2016 and was proposed for use with Google's Allow message application and Google Home smart speaker. Beside regular tablets, cell phones, and note pads, Assistant was additionally incorporated with Android Wear 2.0 for wearable innovation, with Android TV and Android Auto reconciliation. As indicated by Google CEO Sundar Pichai, Assistant was intended to be a conversational and intelligent experience. Beneath figure 3 indicates Google assistant communication as for the associated smart gadget.

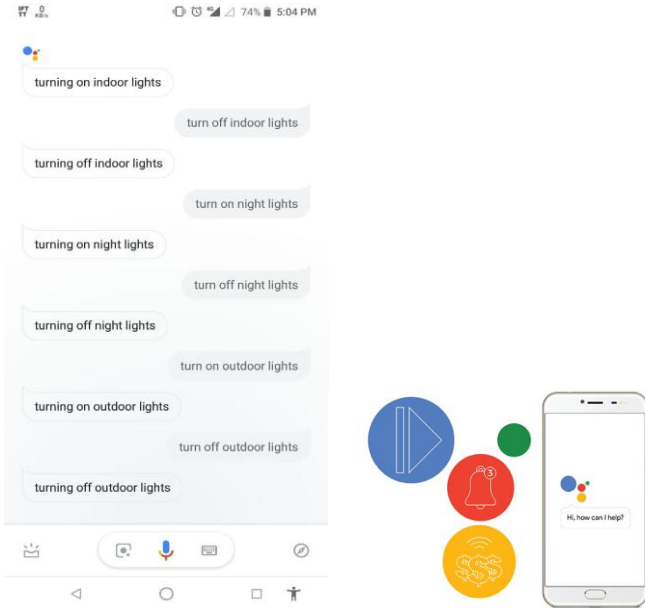


Fig -3: Google Assistant Two- way conversation



Fig -4: NodeMCU (ESP8266) Development Board

4.3 NodeMCU (ESP8266)- The NodeMCU [3]ESP8266 (Node-Microcontroller-unit) is equipment consolidated incorporated programming improvement condition for example based upon a solitary chip around single System-on-a-Chip (SoC) called the ESP8266. The ESP8266 contains all components of the cutting edge PC, CPU, RAM, organizing included (Wi-Fi), and even an advanced working framework. The ESP8266 chip costs just ₹ 599 (INR) [9] for a solitary piece. It has two key components.

- i. An improvement pack board ESP8266 firmware (equipment) that is based over the coordinated chip SDK. The firmware includes a straightforward programming condition dependent on Embedded 'C' which is an extremely basic and quick scripting language with a established network, and to be customized on NodeMCU with IDE.
- ii. The ESP8266 chip on a standard circuit board. The board has a built- in USB port that is as of now incorporated up with the chip, there is equipment reset button and equipment Flash button. Wi-Fi receiving antenna, LED light indicator, and the standard-sized GPIO (General Purpose Input Output) pins that can connect to the associated Gadgets. Figure 4 beneath demonstrates the NodeMCU ESP8266 Board

4.4 Relay board- Relay board is an Electro-magnetic switch. Which gets initiated when a small unit of input current (microampere) is connected to it? At the point when a circuit fabricates the required voltage, the switch will trigger On/Off State (1/0). In this framework, the relay circuit is used to turn the gadget ON/OFF. The (1/0) 1-high, 0-low, the flag is provided through microcontroller NodeMCU. At the point when a low (0) voltage is given to the relay change associated with the gadget, it is turned off and when a high (1) voltage is given it is turned ON. The relay circuit can associate four appliance at the same time in the Home robotization framework is appeared in figure 5.

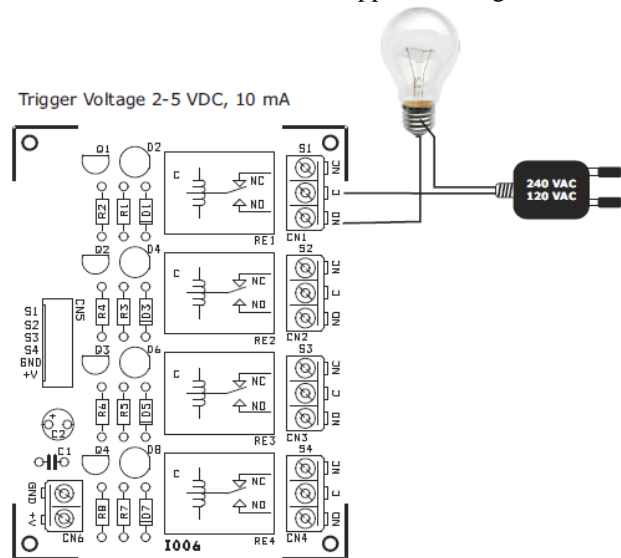


Fig -5: Relay Board Wiring Diagram

4.5 Arduino-IDE- Arduino-IDE[12] is platform for programming circuit board and it is an open source programming, accessible for programming or IDE (Integrated Development Environment) that runs on PC's, It resembles a content manager used to compose and transfer code to the coordinated physical board, The Arduino is an incorporated advancement condition stage application that incorporates the programming language (Embedded 'C'). Projects that are written in Arduino Software (IDE) are called **sketches**. The

sketches are composed of codes and saved with the file extension (.ino). The text editor likewise has an element for cutting/pasting and for searching/replacing text. The compiled message region gives input/error while saving the document. The Serial-monitor shows text output in the IDE, including total error message and other data. The bottom right-hand corner of the window displays the configured board and serial ports of the integrated board. The toolbar catches enable you to include new libraries, change board design, confirm and transfer programs. Beneath in figure-6 demonstrates the Arduino ide platform

4.5.1 Advantages

1. Not much knowledge required to get started
2. Fairly low cost, depending on shields you need
3. Lots of sketches and shields available
4. No external programmer or power supply needed

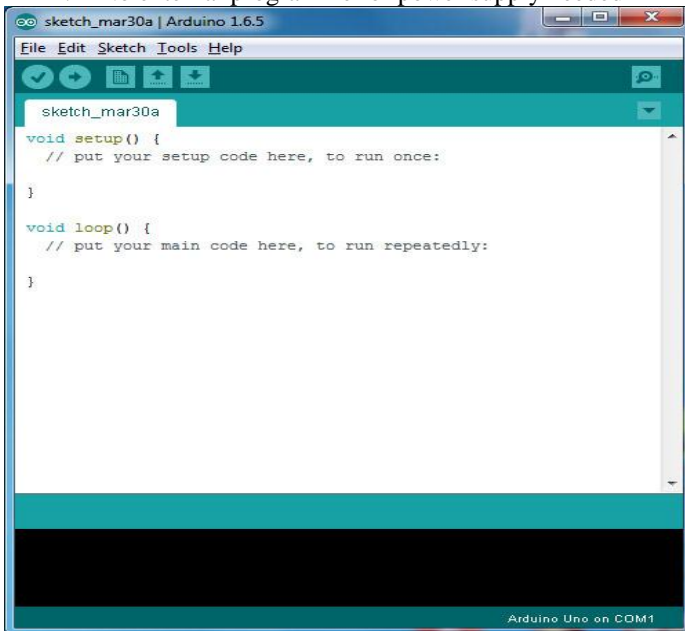


Fig -6: Arduino-IDE Open Source Platform

4.6 Adafruit Industries- Adafruit is open-source programming and equipment, a product organization which is situated in New York City. It was established by Limor Fried in the year 2005. The organization structures assembling and sell electronic segments and items, devices, and embellishments. It even delivers various open doors for learning assets, including live and recorded recordings identified with gadgets, innovation, and programming.

4.6.1 Products- Notwithstanding the item appropriating the parts and sheets, for example, Arduino IDE, [11] Adafruit creates and sells its very own created sensors for educational purpose, specialist. In the year 2016, the adafruit-cloud [2] organization propelled the new Power Boost of 1000C perfect power supply for the

compact undertaking with built-in load-sharing in-build battery charger circuit and to keep our capacity satisfactory task running even while reviving the battery. The first Adafruit Motor shield pack is one of the beloved kits, which is the reason we chose to make something far and away superior. We can overhaul the unit for how might we use it.

4.6.2 Adafruit Learning System-In this learning framework for assembling and for selling gadgets, Adafruit utilizes a significant number of web things and Py-Portal Weather Station and Analog gadgets [10] ADT7410, Adafruit IO, and Circuit Python. Adafruit utilized for GFX Graphics Library. It additionally comprehends Color Sensors. We can find out about Batteries, Automatic Cat Treat Dispenser, we can have an Event Countdown Clock to get the introduction of all circuit associations. Below figure 7 shows the adafruit cloud control

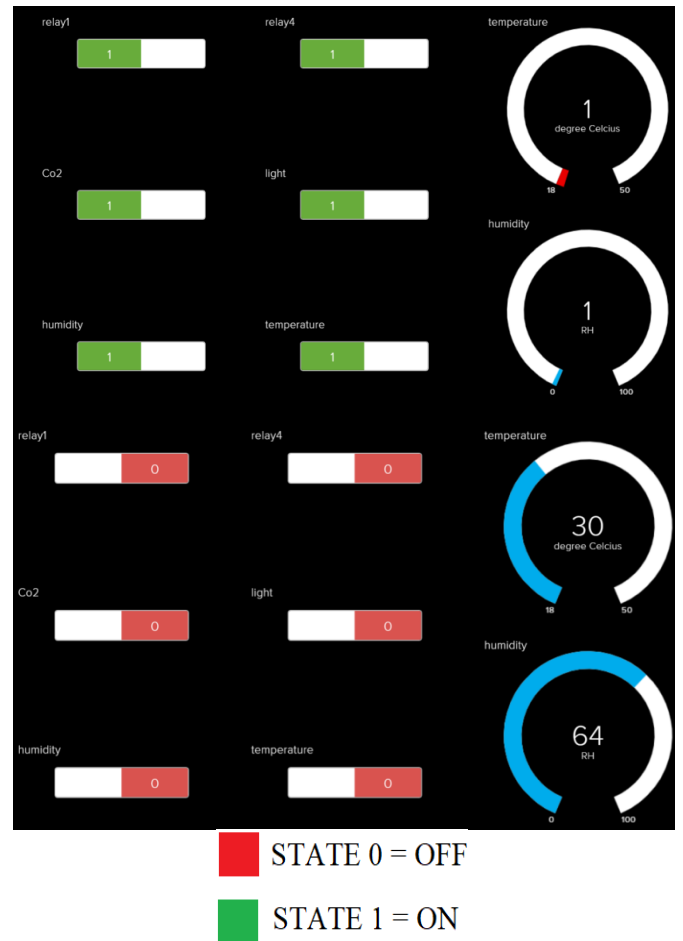
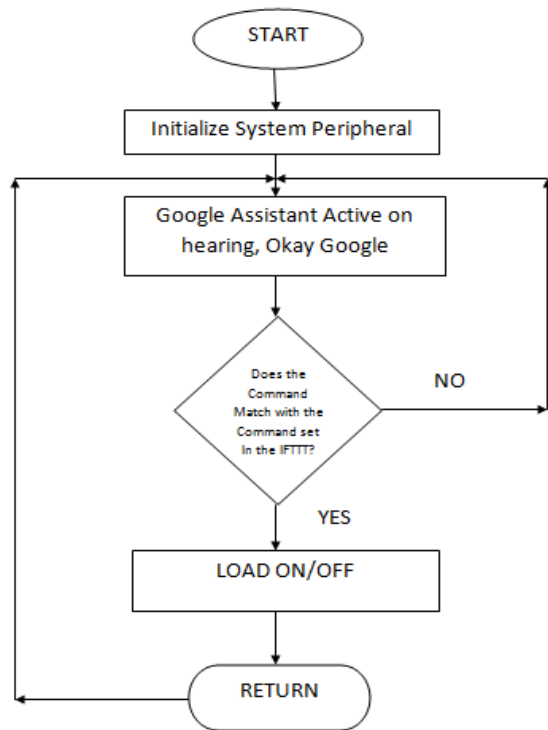


Fig -7: Adafruit monitoring and controlling smart devices in Cloud

4.7 FLOWCHART



V. RESULTS

The Result of the proposed framework is completely utilitarian, and the framework is reacting admirably to the given guidelines. The Google Assistant is initiated on Start up. The previous existing system had a Google home device with preprogramed feature and only controlled in the home premises, But in this system The conversation or the input can be given to the mobile device through NLP by saying "Hey Google" and giving the desired commands programed through IFTTT for the mobile Applets and can be controlled through cloud from anywhere, In this model we have used natural language processing to communicate with Google Assistant, like Hey Google turn ON the indoor lights or turn OFF indoor lights. Similarly for night mode we can say turn ON night lights, and for outdoor lights we can say turn ON outdoor lights. By this way we can communicate with the device easily. Apart from giving commands to the device, the existing system does not have this type of future tech like automatically turning ON the cooling device when the temperature is raised to a certain point, later turning OFF the device when the temperature is decreases which are included in this model.

The underneath figure 8 demonstrates the total working model execution of a similar framework. Figure 9 print the same output in Serial Monitor in Arduino IDE

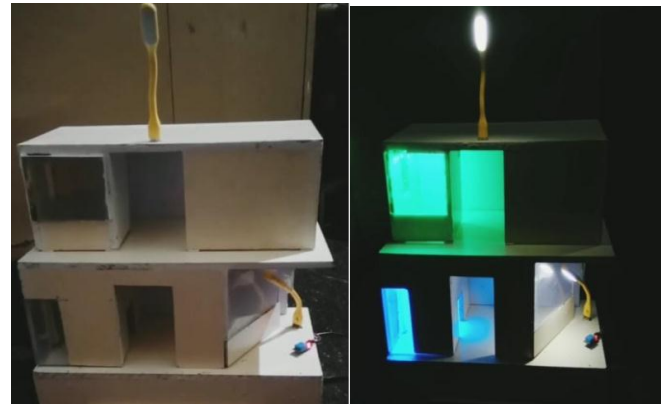


Fig-8: Initially Light Turned OFF and then ON

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COM11
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Adafruit MQTT demo

Connecting to
sunilkumar
.....
WiFi connected
IP address:
192.168.43.162
Connecting to MQTT... Failed to subscribe
Retrying MQTT connection in 5 seconds...
MQTT Connected!
Adafruit Server Running
Outdoor light State:
0
Outdoor light State:
1
Indoor light State:
0
Indoor light State:
1
Night light State:
1
Night light State:
0
Humidity OK!
Temperature OK!
Sensor Running
Program Executed Correctly
Adafruit Server Running

Humidity OK!
Temperature OK!
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Humidity OK!
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Humidity OK!
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 Autoscroll
    
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Fig -9: Serial Monitor output

VI. CONCLUSION

The conclusion of this paper is to propose a cost-efficient Voice controlled (Google-Assistant) [13] Home Computerization. The client can get engineering for minimal effort and high adaptability. It limits human exposition and boosts human comfort-ability. The proposition talked about in the paper is fruitful as CBHASUAI-GA (Cloud Based Home Automation System Using Artificial Intelligence-Google Assistant) plan was effectively actualized. Home computerization framework outfits mediation between different sorts of appliances like LED bulb and fan and so on. At long last, It gives expert and appeasement of usage of machines according to the clients need. It is entirely solid for matured individuals and physically tested individuals who can't ready to achieve switchboard for turning OFF/ON and rely upon others. The objective of this paper is to give a financially savvy Google-assistant or controlling devices from long distance. In the wake of watching another current framework, we have proposed a strategy for better human mediation.

FUTURE SCOPE

The future extension for CBHASUAI-GA can be a gigantic factor. There are numerous streams to enhance to make CBHASUAI-GA most dominant, insightful, adaptable, and productive to be considerably more attractive Smart Home framework. To actualize multiple sensors like humidity sensor, light sensor, heat sensor, and smoke sensor. Android application can be created for the execution of a similar task, and there will be directions for switching ON/OFF the framework. For greater security reason camera module can likewise be actualized on a similar framework.

ACKNOWLEDGEMENT

We might want to offer our thanks and genuine gratitude to Prof. Chaithra.N, Department of C&IT REVA UNIVERSITY for their help all through the venture.

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