



# IJRASET

International Journal For Research in  
Applied Science and Engineering Technology



---

# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

---

**Volume:** 12    **Issue:** IV    **Month of publication:** April 2024

**DOI:** <https://doi.org/10.22214/ijraset.2024.60286>

**[www.ijraset.com](http://www.ijraset.com)**

**Call:** ☎ 08813907089

**E-mail ID:** [ijraset@gmail.com](mailto:ijraset@gmail.com)

# Home Automation System using Esp32 and Alexa

Niraj Patil<sup>1</sup>, Anant Nimbalkar<sup>2</sup>, Gaurav Pawar<sup>3</sup>, Sulekha Shardul<sup>4</sup>

<sup>1, 2, 3</sup>Under Graduate Student Bachelor of Engineering, Department of Computer Engineering, Shatabdi Institute of Engineering and Research, Agaskhind, Nashik, 422502 (M.S.), India

<sup>4</sup>Assistant Professor, Department of Computer Engineering, Shatabdi Institute of Engineering and Research, Agaskhind, Nashik, 422502 (M.S.), India

**Abstract:** Due of its many benefits, home automation is growing in popularity every day. The home automation system is currently being controlled via emails, SMS, or other applications, according to the present state of development. The scientific community and the industry, however, have made large investments in the Internet of Things (IoT) space in recent years. With the release of gadgets like the Amazon Echo, Google Home, and Samsung Smart Things, among others, the Smart Home market has been given special attention.

An industry's expansion produces creative, cost-effective, and cutting-edge solutions. This essay focuses on creating a reliable, economical solution that may be used broadly in non-smart houses. Amazon Echo, Amazon Cloud, and AmazonSpeech Services are used to power our system. The hardware utilized to provide smart features for non-smart homes is Arduino ESP32. Identify the various parts of our product and demonstrate how well our system works to turn on and turnoff our appliances. Any equipment or appliances at home will be able to be controlled using voice commands. In comparison to conventional homes, automated homes will have better communication because to this.

**Keywords:** IoT, home automation, Wi-fi, esp32.

## I. INTRODUCTION

Voice recognition has emerged as a result of machine interaction. When a user commands something specific, speech recognition uses built-in algorithms and programs to interact with them. If calibrated correctly, home automation can be extended to companies and makes it possible to control lighting and other appliances. For different types of applications, automation calibration and settings are not always the same.

To achieve certain requirements, engineers employ sophisticated calibrations and algorithms. To build a smart city, automation is necessary. It is involved in a variety of operations, including monitoring of water, sewage, and traffic. A smart home system incorporates metering for light, moisture, and other factors in the home, together with security management and appliance control. For a home appliance to function as an intelligent smart device, it must be connected via IOT or another method. Amazon created the Amazon Echo Dot, a smart speaker. It is equipped with an interactive artificial intelligence called "Alexa" that has been programmed within. The gadget can play music, podcasts, weather reports, and other content. It can be used in smart home systems to provide home monitoring in addition to controlling appliances. Low-cost systems are needed in India because home automation systems there are highly expensive. Buildings and households may automate at little cost with Alexa-integrated solutions. Register the names of the connected devices as smart devices and turn on home automation using the Alexa app and server.

## II. LITERATURE SURVEY

Haris Isyento Ajib Setyo Arifin Muhammad Suryanegra "Design and implementation of IOT based smart home voice commands for disabled people using Google Assistant", on smart technology and application (ICoSTA), 2020: IEE [2] David Sheppard; Nick Felker; John Schnalzel "Development of voice commands in digital signage for improved indoor navigation using Google Assistant SDK, IEEE sensors Applications symposium (SAS), IEEE. [3] Mr. Vaibhav Malav, Mr. Raushan Kumar Bhagat, Mr. Rahul Saini, Mr. Udit Mamodiya Conference 2019, Research paper on Bluetooth based home automation using Arduino [4] Tatjana Eric, Sandra Ivanovic, Suncica Milivojsa, "Voice control for smart home automation: Evaluation of approaches and possible architectures", Internet of Things Journal IEEE, Sept 2018 [5] Prof. B.P Kulkarni, Aniket V Joshi, Vaibhav V Jad- hav, Akshay Kumar T Dhamange, "IoT Based Home Automation Using Raspberry PI". [6] Nikhil Singh, Shambhu Shankar Bharti, Rupal Singh, and Dushyant Kumar Singh, "Re- remotely controlled home automation system," in Advances in Engineering and Technology Research.

### III. SYSTEM ARCHITECTURE

The working of the block diagram is shown in Figure 2. The 230 V supply is rectified, filtered, and made it to operate the relay. The Echo dot is always ON waiting for the wake word. The voice command gets processed through the Alexa cloud server. Alexacloud server has an inbuilt Voice recognition system known as Alexa Voice Service. The commands from the cloud are received by the ESP32 which processes the command and activates the relay. Every device is given a name inside the ESP32 through programming. Every time the command is passed, the data is recognized from the registered server through the internet and the proper relay is activated. IoT for Data Collection.

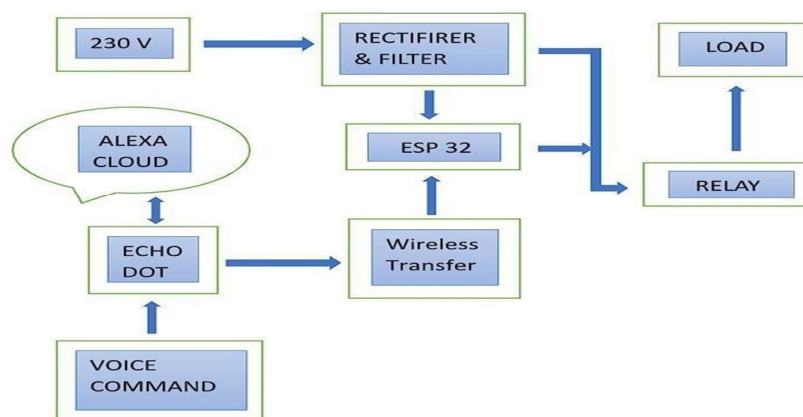


Fig.1 Proposed System Block Diagram

### IV. SYSTEM FLOW

The below Figure Explains step by step process of working with Alexa integrated, automated system as a flowchart:

A flowchart is a picture of the separate steps of a process in sequential order. It is a generic tool that can be adapted for a wide variety of purposes and can be used to describe various processes, such as a manufacturing process, an administrative or service process, or a project plan. It's a common process analysis tool and one of the seven basic quality tools. Elements that may be included in a flowchart are a sequence of actions, materials or services entering or leaving the process (inputs and outputs), decisions that must be made, people who become involved, time involved at each step, and process measurements.

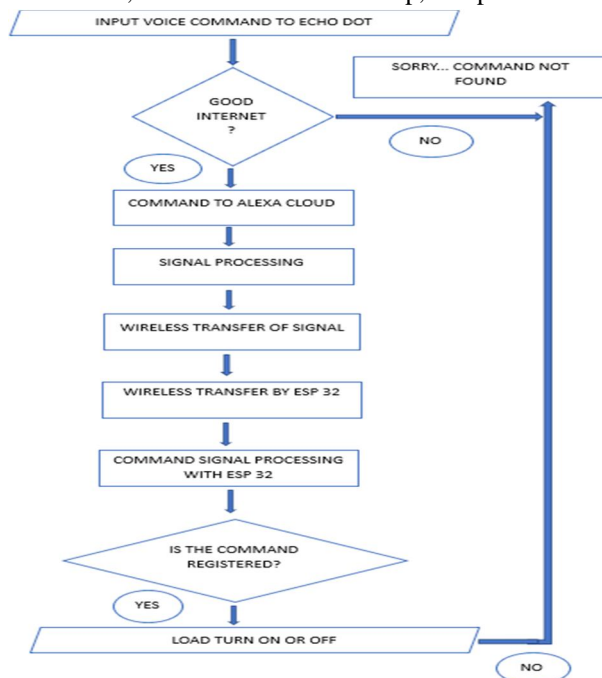


Fig.2 System Flowchart

## V. SYSTEM REQUIREMENTS

### A. Arduino IDE

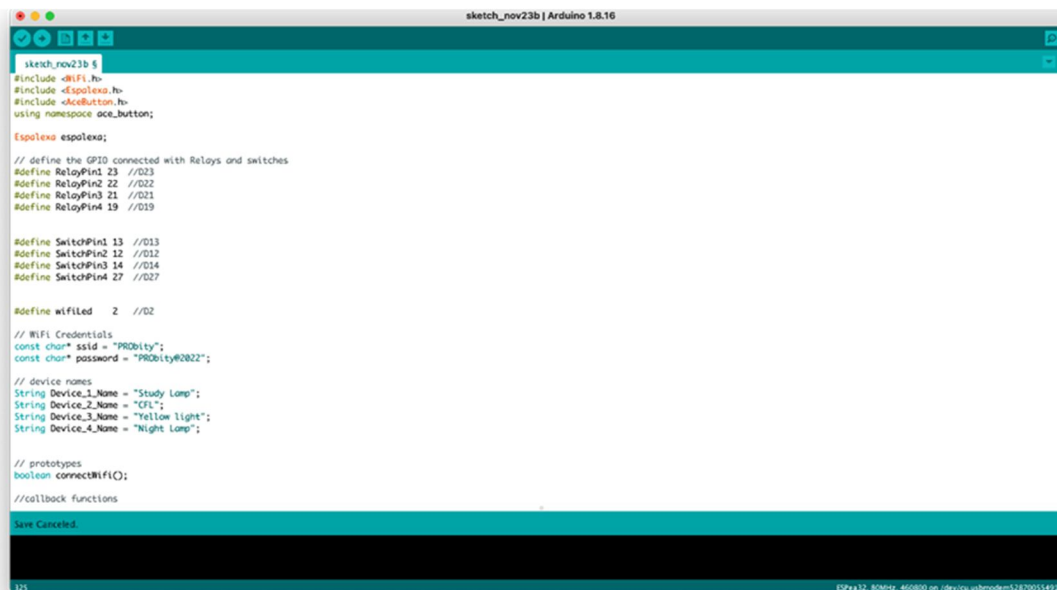
The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions, and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them. The Arduino IDE is a cross-platform Java application that serves as a code editor and compiler and is also capable of transferring firmware serially to the board. The development environment is based on Processing, an IDE designed to introduce programming to artists unfamiliar with software development. The programming language is derived from Wiring, a C-like language that provides similar functionality for a more tightly restricted board design, whose IDE is also based on Processing.

### B. Amazon Alexa App

Amazon Alexa, also known simply as Alexa, is a virtual assistant technology largely based on a Polish speech synthesizer named Ivana, bought by Amazon in 2013. It was first used in the Amazon Echo smart speaker and the Echo Dot, Echo Studio, and Amazon Tap speakers developed by Amazon Lab126. It is capable of voice interaction, music playback, making to-do lists, setting alarms, streaming podcasts, playing audiobooks, and providing weather, traffic, sports, and other real-time information, such as news. Alexa can also control several smart devices using itself as a home automation system. Users are able to extend the Alexa capabilities by installing "skills" (additional functionality developed by third-party vendors, in other settings more commonly called apps) such as weather programs and audio features. It uses automatic speech recognition, natural language processing, and other forms of weak AI to perform these tasks.



Fig.3 Alexa Home Screen



```

sketch_nov23b
#include <WiFi.h>
#include <esp8266.h>
#include <aceButton.h>
using namespace ace_button;

Esp8266 esp8266;

// define the GPIO connected with Relays and switches
#define RelayPin1 23 //D23
#define RelayPin2 22 //D22
#define RelayPin3 21 //D21
#define RelayPin4 19 //D19

#define SwitchPin1 13 //D13
#define SwitchPin2 12 //D12
#define SwitchPin3 14 //D14
#define SwitchPin4 27 //D27

#define wifiled 2 //D2

// WiFi Credentials
const char* ssid = "PROBity";
const char* password = "PROBity@2022";

// device names
String Device_1_Name = "Study Lamp";
String Device_2_Name = "CFL";
String Device_3_Name = "Yellow light";
String Device_4_Name = "Night Lamp";

// prototypes
boolean connectWifi();
//callback functions

Save Canceled
  
```

Fig.4 Coding

## VI. RESULT



Fig.5 Result

## VII. CONCLUSION

Voice Automated system greatly helps in automation and for helping paraplegic persons since they can't use remote or any other means. Voice automation is extremely helpful for blind people since normal remote-controlled home appliance systems make use of IR remotes which has to be shown to the appliances for control. Voice command systems can be done even by illiterate persons by simply mentioning the device name and telling "ON" or "OFF". These systems are highly reliable and it can be operated even by integrating with Mobile phones since they operate with Wi-Fi. Hence, they can be operated from anywhere. Systems such as Blue tooth or Wi-Fi employed remote control systems even though they are efficient, only the registered smartphones can be used to operate the appliance. The voice-automated system eliminates the disadvantage and makes the system accessible to everyone.



## REFERENCES

- [1] Haris Isynto AjibSetyo Arifin Muhammand Suryanegra "Design and implementation of IOT based smart home voice commands for disabled people using google Assistant", conference on smart technology and applications(ICoSTA),2020,publisher:IEEE.
- [2] David Sheppard ; Nick Felker; John Schnalzel "Development of voice commands in digital signage for improved indoor navigation using Google Assistant SDK ,IEEE sensors Applications symposium(sas),2019,publisher: IEEE.
- [3] Mr. Vaibhav Malav, Mr. Raushan Kumar Bhagat, Mr. Rahul Saini, Mr. Udit Mamodiya Conference 2019, Research paper on bluetooth based home automation using Arduino.
- [4] Tatjana Eric, Sandra Ivanovic, Suncica Milivojsa, "Voice control for smart home automation: Evaluation of approaches and possible architectures", Internet of Things Journal IEEE, Sept 2018.
- [5] Prof.B.P Kulkarni, Aniket V Joshi, Vaibhav V Jadhav, Akshaykumar T Dhamange, "IoT Based Home Automation Using Raspberry PI", International Journal of Innovative Studies in Sciences and Engineering Technology, Vol. 3 Issue 4 April 2017.
- [6] Luigi Atzori, Antonio Iera, and Giacomo Morabito, The Internet of things: A survey, Computer Networks, vol. 54, no. 15, pp. 2787-2805, 2010.
- [7] R.Piyare, M.Tazil, "Bluetooth based home automation system using cellphone" in 2011 IEEE 15th International Symposium on Consumer Electronics
- [8] Nikhil Singh, Shambhu Shankar Bharti, Rupal Singh, and Dushyant Kumar Singh, "Remotely controlled home automation system," in Advances in Engineering and Technology Research (ICAETR), 2014 International Conference on. 2014, pp. 1–5, IEEE.
- [9] Md. Sarwar Kamal, Sazia Parvin, Kashif Saleem, Hussam Al-Hamadi, Amjad Gawanmeh, "Efficient Low-Cost Supervisory System for Internet of Things Enabled SmartHome" in ICC2017: WT04- 5th IEEE International Workshop on Smart Communication Protocols and Algorithms (SCPA 2017)
- [10] Ala Al-Fuqaha, Mohsen Guizani, Mehdi Mohammadi, Mohammed Aledhari, and Moussa Ayyash, "Internet of things: A survey on enabling technologies, protocols, and applications," IEEE Communications Surveys Tutorials, vol. 17, no. 4, pp. 2347–2376, 2015.



10.22214/IJRASET



45.98



IMPACT FACTOR:  
7.129



IMPACT FACTOR:  
7.429



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24\*7 Support on Whatsapp)