

Real Time Implementation of Home Automation Using Alexa

Jyothisna Latha Kunchaparthi¹, Department of CSE, Seshadri Rao Gudlavalleru Engineering College, csejyothisnalatha@gmail.com
Manisha Vadlamudi², Department of CSE, Seshadri Rao Gudlavalleru Engineering College, yadlamudi.manisha676@gmail.com
Jafeeza Shaik³, Department of CSE, Seshadri Rao Gudlavalleru Engineering College, shaikjafeeza786@gmail.com
Venkata Sai Surendra Borra⁴, Department of CSE, Seshadri Rao Gudlavalleru Engineering College, surendraborra01@gmail.com
Reddy Veera Venkata Satya Prasad⁵, Department of CSE, Seshadri Rao Gudlavalleru Engineering College, prasadpp2150@gmail.com

Abstract:

The traditional switches are positioned in different sections of the home, making it difficult for the user to go close to them to control them, which is especially problematic for the old and crippled. As technology advances, homes are increasingly transitioning from traditional switches to centralized smart control systems with remote-controlled switches. Furthermore, the smart home idea raises the level of living at home. The main goal of this project is to create a real-time home automation system that uses an ESP 32 controller to control appliances with voice commands (Alexa) using a dedicated Android app. The most modern answer is provided by this home automation system, which works with Alexa and smartphones. To do this, a mobile device and an Alexa device are communicated with using an ESP 32 controller with an inbuilt wi-fi module. The switch state is synchronized across the control system, and each user interface displays the current switch status in real time. The system featured a low-cost design, a user-friendly interface, and was simple to install. It was meant to manage electrical gadgets and appliances in the home.

Introduction:

Demotics, often called home automation or smart home technology, is the automation of a dwelling, also known as a smart home or smart house. Lighting, temperature, entertainment, and appliance management are just a few of the elements that a home automation system monitors and controls. There may also be access control and alarm systems for residential security. Internet-connected home appliances make a significant contribution to the Internet of Things ("IoT"). Reliable home automation solutions are utilized to connect regulated devices to a single smart home hub (also known as a "gateway"). The system's user interface may be accessed via wall-mounted terminals, tablet or desktop Computers, mobile phone apps, or a Web interface that is also available off-site via the Internet. In addition to significantly enhancing data transfer between family members or other trusted individuals for personal security, home automation may eventually give rise to actions that have a positive environmental impact.

Literature Survey:

"Sharadha Somani, Parikshit Solunke, Shaunak Oke, Parth Medhi, and Prof. P. P. Laturkar's paper is titled "IoT Based Smart Security and Home Automation".

This article focuses on a system that utilizes IOT to provide camera functionality, home automation, and security capabilities. Your smartphone can operate all of your home appliances remotely thanks to the Android operating system. At the front of the house, motion detectors keep an eye out for activity and send out a warning when they detect it, along with a live image of the front door. The app will be able to send out a notice since the home owner will see this message online. Because of this, the owner has the ability to operate machinery, such as opening a door for a visitor or sounding an alarm in the event

of an intrusion. The server for the system is a little computer called the Raspberry Pi, which is used by the system. The smart house consists of two parts. Home automation also includes a controller for the lights in the fans and the doors, as well as a security module with a camera, motion sensor, and smoke sensor.

Using IOT, Satyendra K. Vishwakarma, Prashant Upadhyaya, Babita Kumari, and Arun Kumar Mishra created "Smart Energy Efficient Home Automation System".

This handbook guides users through the installation of a smart home automation controller step-by-step. Through design control, it uses IOT to make common household products into smart, intelligent gadgets. The linked smart home may be accessed remotely thanks to a resource-conserving strategy. The major element of the suggested system is the Node MCU, together with IFTTT for voice recognition, Adafruit for MQTT brokering, and the Arduino IDE for microcontroller programming. A web-based application and Google Assistant are used in this multimodal strategy to operate the smart home. A smart house is created using a primary controller device linked to a permanent Wi-Fi system. The primary controller is attached to the auto power backup and set up to automatically connect to the available network in order to ensure that the Wi-Fi connection does not break.

Internet of Things-based "Enhance Smart Home Automation System" by Tushar Churasia and Prashant Kumar Jain.

The technique described in this research creates a model to reduce the processing overhead in current smart home systems using various encryption algorithms, such as AES, ECHD, hybrid, and others. An intermediate gateway is used by these systems to connect a variety of sensor devices. The recommended strategy uses sensor-based learning to provide an automated mechanism. While it is being built, the system employs a temperature sensor, but more sensors may be added as needed. These sensor-equipped smart home appliances may be set up and run without human intervention. This approach reduces encryption decryption while prioritizing authentication and the learning-based automation of smart home devices. This strategy prioritizes authentication and the learning-based automation of smart home devices while reducing encryption and decryption. The solution enhances sensor data security and computational efficiency for smart home devices by avoiding the local gateway that was described in the previous system. The smart home is immediately connected to the real-time broker cloud, which controls all incoming and outgoing requests between users and devices. The main purpose of using a real-time broker cloud is to accelerate cryptographic operations.

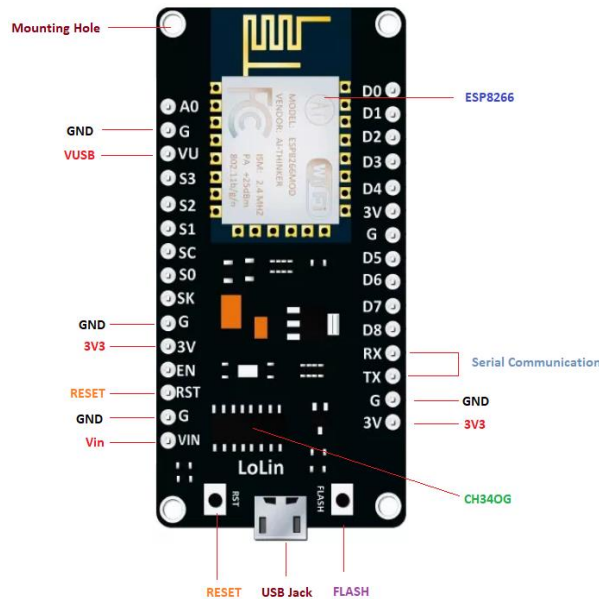
Software and Hardware requirements:

Hardware requirements:

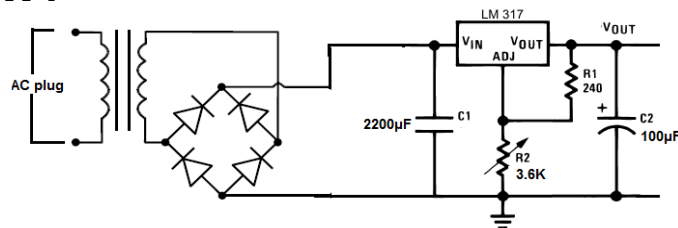
- Node MCU
- Power Supply
- Relay
- Transformer
- Bulb
- CPU Fan
- Alexa Bot
- DC motor

➤ **Node MCU:**

When creating your own IoT device with a few lines of Lua code, Node MCU, an open-source firmware and development kit, is essential. The board has many GPIO pins that may generate PWM, I2C, SPI, and UART serial communications and are used to link the board to external peripherals.



➤ **Power Supply:**



A part that supplies power to at least one electrical charge is called a power supply. It normally transforms one form of electrical power into another, but it may also transform another source of energy, such as solar, mechanical, or chemical energy, into electrical energy.

➤ **Relay:**



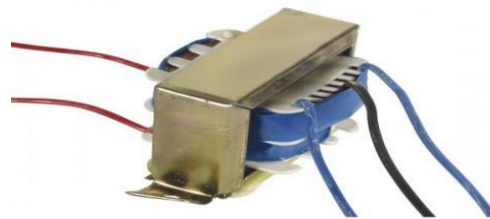
Relays are electromagnetic switches that are used when several circuits need to be controlled by a single signal or when a low power signal is needed to turn on and off a circuit.

➤ **Alexa Bot:**

Using Alexa's voice control, it can play music or podcasts from services like Amazon Music, Spotify, Apple Music, Pandora, and more in its primary capacity as a speaker. Also, it serves as a hub for smart home devices that are linked to your Wi-Fi network.



➤ **Transformer:**

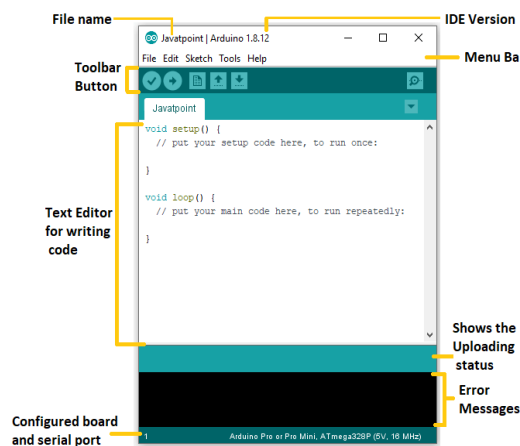


A static electrical device known as a transformer switches control between at least two circuits. A fluctuating current causes one transformer curl to change in attractive motion, which in turn activates a different electromotive force across a second loop twisted around the same centre.

Software Requirements:

- Arduino IDE
- Embedded C

➤ **Arduino IDE:**



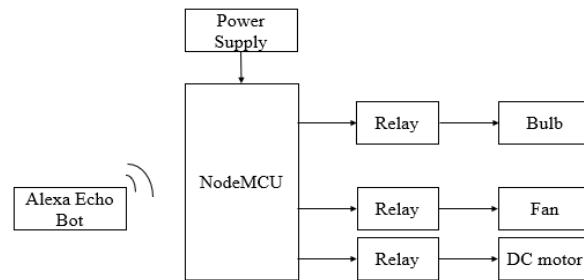
Code for the Arduino Module is often written and compiled using an open-source program called the Arduino IDE. Because it is an official Arduino program, code generation is so simple that even the average individual without prior technical expertise may start learning. The Editor and Compiler are the two fundamental components of the IDE environment. After being typed in the Editor, the code is compile and uploaded into the selected Arduino Module using the Compiler. Both C and C++ are supported in this environment.

Proposed Work:

The Node MCU Wi-Fi module is what we're utilizing in the suggested setup. To remotely operate the household appliances, a separate host server will be created. Moreover, a User

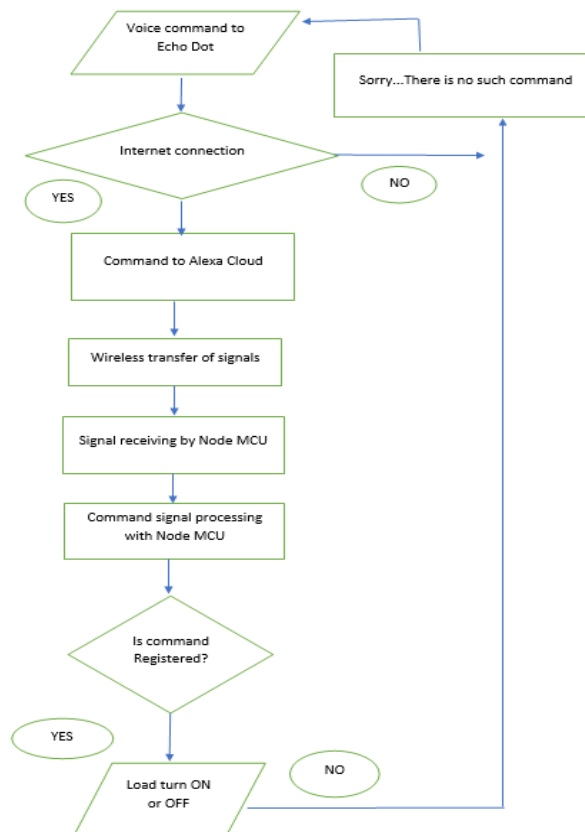
ID and Password are established for the User to access the Host Server. We may connect to the Node MCU module using an IP address, and we can then transmit input signals to the appropriate load to activate the relay. The user may control the loads from any location in the world. We also gave the loads a priority order. We can activate all of the loads in accordance with the priorities we've specified with the use of a single command.

Block Diagram:



Refers the working model of unit

Flow Chart:



Working:

The name of the device that has to be handled has been pre-programmed and recorded by the ALEXA server. As a consequence, whenever we ask ALEXA to switch on or off a device,

the information is retrieved over an internet connection from the server. The gadget gets ready to take the instruction "How can I serve you" when we pronounce the wake word "ALEXA." For instance, you may ask Alexa to switch on a light, a fan, a motor, or a gadget by saying "Hey Alexa, turn on light 1," "Hey Alexa, turn on light 2," "Hey Alexa, turn on fan," "Hey Alexa, turn on fan," and so on. With the aid of this command, we are able to switch on the devices in accordance with the priorities that we had specified in the code that we had dumped into the node MCU. The following are the priorities: The Server will process the command, and it will pass the signal that has been processed to the Node MCU. The lights, fans, and DC motors will be the first to respond when we give Alexa a command, followed by its powerful Intelligence system. In addition to a password and SSID in the ESP module, this Node MCU is set with an APP KEY to allow phone and Wi-Fi access. A prioritized list of lights, fans, and motors will appear when we ask Alexa to switch on a device. A similar situation will take place when the load is turned off. By simply connecting to a Wi-Fi network whose name may be provided in the ALEXA cloud server, load automation is made simple.

The following is the final image that we got after connecting all the components:

**Acknowledgement:**

This automation option is very useful for automation and for old individuals who are unable to operate a remote control or any other device. Even those without literacy skills may utilize voice controls by describing the thing, such as a fan or light, and then saying "on" or "off." You may use even a mobile phone for this. This makes the switch system accessible to everyone and solves the issues with traditional switches. Moreover, this may be executed from any place.

References:

- [1] Marie A., Benedict I., Zandrae A., Neil A. and Gustilo R. 2015 *Home Automation Using Raspberry Pi through Siri Enabled Mobile Devices*
- [2] Piyare R. and Tazil M. 2011 *Bluetooth based Home Automation System using Cell Phone*
- [3] Mr. Malav Vaibhav, Mr. Raushan Kumar Bhagat, Mr. Rahul Saini and Mr. Mamodiya Udit Conference 2019, Research paper on bluetooth based home automation using Arduino
- [4] Mokh. Sholihuhadi; Mihammad ahmad as shidiqi; Iiham ari elbaithzaeni; muhammad Alfian mizar; mhd lrvan "voice based monitoring and control system of electronic appliance using dialog flow API via Google Assistant", international conference on computer science and engineering (UBMK), 2019 publisher: IEEE