Voice-controlled ESP32 Switch Board with Amazon Alexa/Google Home Integration.

(Group No.: 118)

Abstract

Designing of ESP32 Alexa/Google Home Assistant home automation system with manual switches, relay module, and EPROM. Amazon Alexa mobile application which is available on several platforms is also used in this project to control the active state of appliances connected to the switch board with voice commands using Amazon Alexa app or Google Home assistant app. For this IoT project, there is no need for any custom design PCB for this project. If the ESP32 is connected with WiFi, then with the help of Amazon Alexa/Google Home Assistant mobile application and manual switches, the relay module and the current status of switches can be monitored easily.

Keywords: ESP32, Smart Switchboard, Voice Assistant.

Motivation

Convenience: By building a voice-controlled smart switch board, one can easily control the active state of various devices and appliances in their home using just their voice. This can be especially useful for people with mobility or accessibility issues, as well as for those who want to simplify their daily routines.

Learning and Skill Development: Building an IoT project with voice control can be a great way to learn new skills in programming, electronics, and hardware development.

Environmental Sustainability: A voice-controlled smart switch board can help us save energy and reduce the carbon footprint by automating the use of energy-efficient devices and appliances.

Novelty with respect to recent developments/Literature

The novelty of Voice-controlled ESP32 Switch Board with Amazon Alexa/Google Home Integration lies in its ability to integrate two popular voice assistants, Amazon Alexa and Google Home, with an ESP32-based smart switch board. The ESP32 microcontroller is a powerful and low-cost solution that can control a wide range of sensors and actuators, making it an ideal platform for home automation projects. The switch board can be operated through voice commands given by the user as well as on a manual basis without replacing old traditional switch boards.

Some of the benefits of this system include:

Ease of use: Voice-controlled smart switch board makes it easy for users to control their devices without the need for complex user interfaces.

Cost-effectiveness: Building your own smart switch board using an ESP32 or other similar hardware can be more cost-effective than buying a pre-built system. Additionally, we can customize our system to our specific needs and preferences, which may not be possible with a pre-built system.

Accessibility: The system can be controlled by anyone, including people with disabilities or those who are visually impaired.

Flexibility: The system can be expanded to control multiple devices and appliances, and can be easily customized to suit the user's needs.

Integration: The integration with Alexa and Google Home allows users to control their home devices using voice commands, and also opens up the possibility for integration with other smart home systems.

Methodologies

Building a Voice-controlled ESP32 Smart Switch board with Amazon Alexa/Google Home Integration typically involves several methodologies, including:

1. Hardware design: The first step is to design the hardware for the smart switch board, including the ESP32 microcontroller, sensors, and actuators. This involves selecting the appropriate components, designing the circuit board, and assembling the hardware.
2. Software development: Once the hardware is in place, the software must be developed to control the devices and respond to voice commands. This involves programming the ESP32 microcontroller and developing the necessary software to integrate with Alexa or Google Home.
3. Cloud integration: In order to integrate with Alexa or Google Home, the system must be connected to the cloud, typically through a cloud service provider such as Amazon Web Services or Google Cloud. This involves configuring the cloud service and setting up the necessary communication protocols.
4. Testing and optimization: Once the system is built, it must be thoroughly tested to ensure that it works as expected. This involves testing the hardware, software, and voice interface, and making any necessary optimizations to improve performance.

Equipment Required and Budget

Sl. No.	Equipment	Justify for use	Quantity	Budget
1	Esp32	Wifi access	1	549
2	8 Channel Relay	To control ac supply	1	430
3	Jumper wire	To make connections (connects remote electric circuits used for printed circuit boards)	As per requirement	240
4	Bread Board	Platform for connection or (is used for building temporary circuits)	1	200
5	5v Adapter	To give power supply to our to our home Automation	1	450
6	Electrical Equipment	For demonstration	As per requirement	1000

Expected Outcome & Deliverables

Some of the potential results of this integration include:

1. Increased convenience: Users will be able to control their home devices using simple voice commands, making it easier and more convenient to manage their smart home systems.

2. Improved accessibility: Voice-controlled home automation can be particularly helpful for people with disabilities or those who are visually impaired, as they can control their devices without needing to use physical buttons or switches.

3. Improved integration with other smart home systems: Integrating with Alexa or Google Home opens up the possibility for further integration with other smart home systems, allowing users to create a more seamless and connected smart home experience.

Gantt Chart/ Roadmap:

Tabular specifying progress for each month for a semester timeline.

Task	Month	Progress
Project planning and scope definition	January	Completed
Research on hardware components	January	Finished
Purchasing components	January	The required components had been purchased
Assembling of Components and prototype testing	February	Two prototype testing done
Troubleshooting	February	No problems occured till now

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Current presentation remark:

Expected outcome in terms of prototype/product/patent/publication (tick one)

Approval from panel members

Sign:	Sign:	Sign:
Name:	Name:	Name:
Member 1	Member 2	Convener