Smart Board- A real time controller for home appliances using Alexa & Google Home

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ABSTRACT

IoT has become a huge technological revolution by which different types of devices can be connected using internet. Smart offices are dynamic environments meant to enhance employees' productivity, but also to create healthier and proactive work environment and to improve energy usage and reduce power wastage. Regular methods of switching systems are hard for disabled persons and blind persons as they cannot use the traditional switches. Voice recognition is the current revolution of automation and are preferred. Voice recognition systems involve programming and algorithms to accept the user commands through voice and operate the appliance. Amazon echo dot and google speaker, a smart speaker has an internally programmed AI. It offers dual interaction and can connect to smart devices. To reduce the high cost of smart devices, we have developed a Smart Board which helps in controlling of appliance just by plugging in that device to its sockets.

Keywords: **IoT , automation, energy efficient, AI**

1. INTRODUCTION

Thanks to the combination of physical devices and virtual space, a new spectrum of services and applications has emerged. In recent years, the appearance of voice assistants has gradually become an influential part of our daily life.

In 2011, Apple pioneered the creation of intelligent voice assistants by integrating Siri into its smartphones, originally used for web searches. Since then, several other low-cost consumer products have been developed. Currently, the most popular are Google Assistant, Microsoft Cortana and Amazon Alexa, each of which tries to solve and automate our daily routines, such as home or office automation, environmental management, accessibility, automation of production lines. One technological innovation on which these principles are based is smart offices. Their mission is to "integrate physical devices, people, and computer technologies with the goal of providing employees with a healthy, supportive, interactive, and intelligent environment". Home automation produces control of lighting and other devices and can even be extended to industry if properly calibrated. Automation calibration and configuration does not have to be the same for all applications.

2. LITERATURE SURVEY

In the scientific literature, various approaches have been presented that deal with smart automated offices, as well as specific problems identified in the construction and optimization of such systems. There are several home automation systems available such as Bluetooth control, Wi-Fi control, IOT systems, SMS and Remote control. Automation helps a lot in reducing manpower, improving energy efficiency, faster communication, etc. One of the earliest intelligent AI was "Siri". It was developed by Siri Inc. Later, when Apple acquired Siri, it was introduced in the iPhone 4S. It was also planned to be released for Blackberry and Android devices. Anna et al. [1] proposed the use of artificial intelligence Siri for home automation. It is designed to recognize

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voice recognition commands over connected Zigbee networks. But the problem was that it was uneconomical and could not be used to show the status of the device because there were no sensors. Also, it was only available for iOS users. Piyare and Tazil et al. [2] proposed the use of Bluetooth for near-field control of devices. It uses a mobile phone to wirelessly transmit commands to the Arduino controller. But the disadvantage is its short operating range and low data transfer. S. Hidayat et al. [3] proposed to control the home automation system using Bluetooth technology. The Raspberry is connected to a relay system and the device is controlled by voice command. But the device turns out to be expensive and requires a wired storage medium. In addition, there was another problem that greatly reduced its performance. Its operating time was more than a minute, which was very undesirable because the device requires a faster startup and shutdown process. P.S.N. Priyanka et al. [4], Shreya Ghosh et al [5] proposed a home automation control system using DTMF. DTMF systems, although simple, cause problems with call frequency and require manual input to identify the key. Rozita Teymourzadeh et.al [6] discusses in his article the mobile phone-based control of devices using GSM technology. Sharing the same bandwidth between multiple users can cause transmission interference. Ma Naing et al [7] proposed automation using Arduino. Although Arduino is easy to program, its structure and construction require a lot of expenses for large-scale development. The systems mentioned above are also not suitable for the blind. So voice recognition is a good way to solve these problems. But the speech recognition must be able to correctly understand the commands and give the right answers. They should even be able to interpret our commands in a noisy environment. One such system is the AI "Alexa" inbuild to a device known as an "Echo dot" [8]. Built on a particle photon, this device connects to Alexa, a voice-controlled smart personal assistant service that responds to the word "Alexa." Alexa Voice Service (AVS) is Amazon's intelligent voice recognition and natural language understanding service. Similar to Alexa, Google Assistant is also a virtual assistant powered by artificial intelligence developed by Google, which is available mainly for mobile and smart home devices. It can participate in two-way conversations. The full-bodied sound of Amazon makes it better suited to your audio tastes [9-11].

3. TECHNOLOGIES AND METHODOLOGIES USED IN SMART BOARD

The proposed system makes use of Alexa and Google Home integrated with a Wi-Fi network which is configured in an ESP8266 Wi-Fi module. The load (device) name which is to be addressed in the voice command is registered in the Sinric Pro Server. This eliminates the need to frequent reconfiguring of Wi-Fi using the Alexa and Google Home app. This is done by registering a service in both the apps.

A. Sinric Pro API

The state of the devices or load is updated via use of APIs from Sinric Pro. Along schedule for automatic power on/off for the connected devices is possible only by using these APIs. The ESP8266 Wi-Fi module is responsible for sending state of the loads to the Sinric Pro server.

B. Components required

For the project we have used ESP8266 Node MCU, 4-channels Relay, and a Voice command device (either Alexa app/Echo dot or Google Home app/Google home mini), Sockets.

3.B.i. Amazon Alexa app:

Figure 1. Alexa app

3.B.ii. Mobile Charger

Figure 2. Mobile Charger (Rectifier)

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3.B.iii. Node MCU:

Figure 3. Node MCU (EP8266)

3.B.iv. Relay Module:

Figure 4. Relay Module (4-channels)

C. Block Diagram

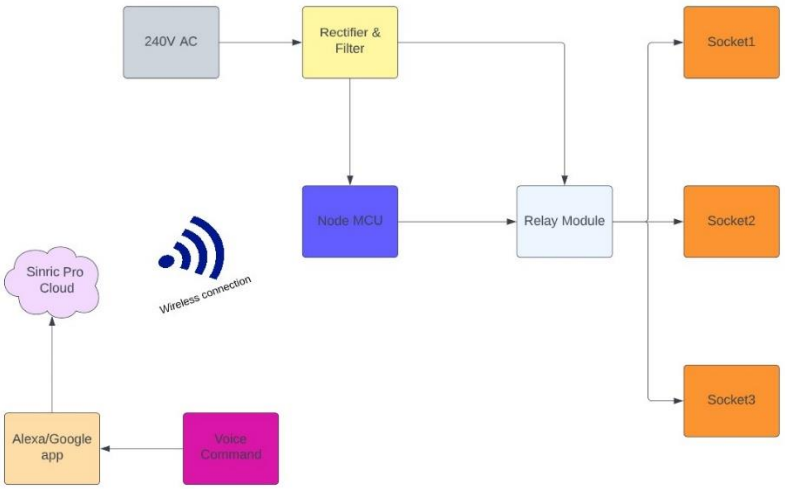

Figure 5. Block Diagram

4. TECHNIQUES USED FOR REAL-LIFE IMPLEMENTATION AND WORKING

Combining all the components according to the circuit diagram and after uploading the codes to the Node MCU, the Smart Board will get ready for listening the commands through Alexa or Google app.

A. Circuit Diagram

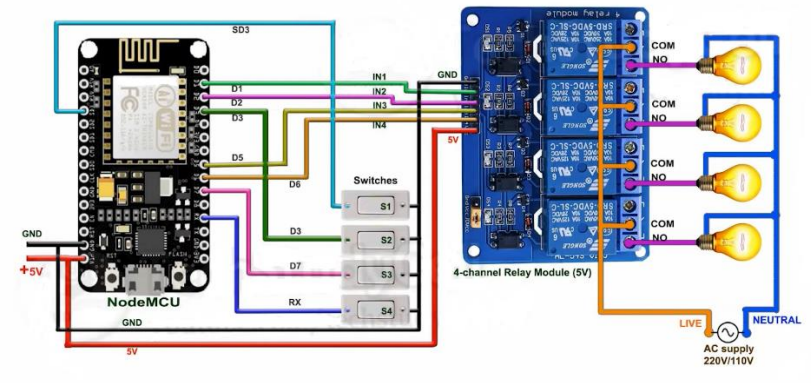

Figure 6. Circuit Diagram

B. Device (load) IDs Used

device_ID_1 "6311af0036b44d06d4b0d773"
device_ID_2 "xxxxxxxxxxxxxxxxxxxxxxx"
device_ID_3 "6311af7136b44d06d4b0d7b9"
device_ID_4 "6311afa636b44d06d4b0d7e9"

C. Working

The name of the control device is pre-programmed and registered to the Sinric Pro server, which is connected to the Alexa and Google Home applications. So, every time we ask to turn the device on and off, ALEXA receives that information from its server through an internet connection. When we give the wake word "Alexa" or "Ok Google", the device prepares to receive the command. When we give a command like "Alexa, turn on socket1" or something similar that is recognized by its advanced AI system, the command is processed by the server and the processed signal is sent to the ESP8266. ESP8266 is registered with APP KEY to enable connection to phone and Wi-Fi network and facilitate automatic connection to Wi-Fi network. The SSID name and password are registered in the ESP module. Beside this, all devices can be controlled using manual switches also.

5. VISUAL REPRESENTATION OF THE OUTCOMES / OUTPUT

The whole process of working this Smart Board can be described by this flow chart as:

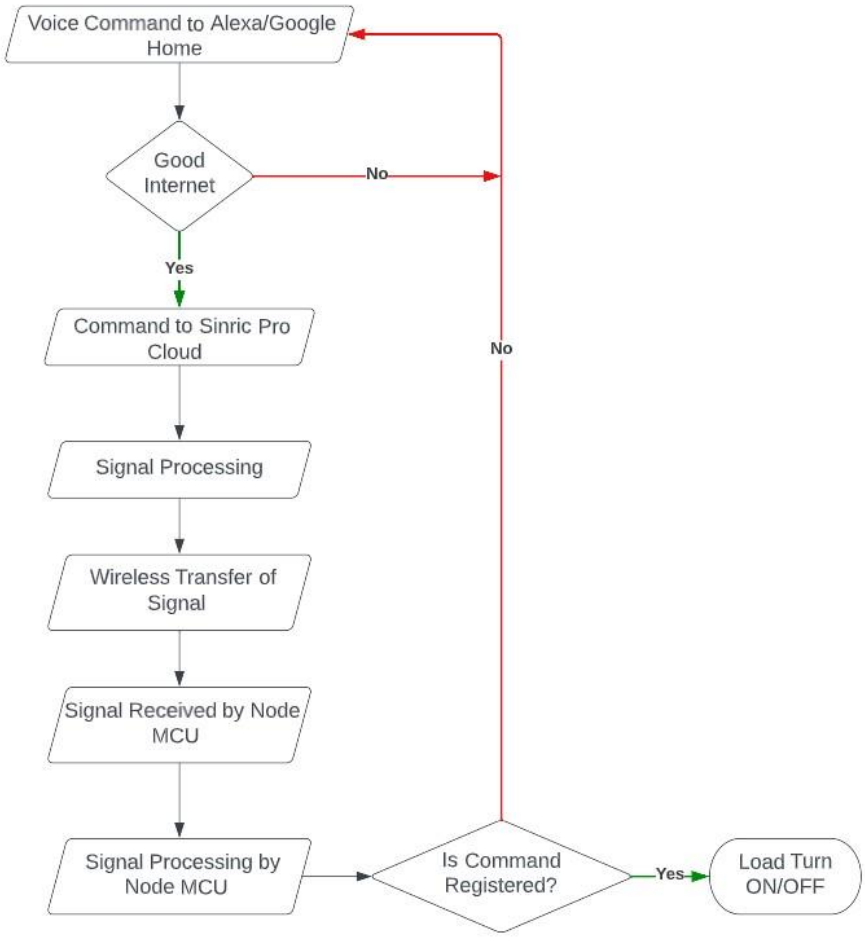

Figure 7. Flow Chart

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6. FUTURE WORK

At home, it is difficult for paralyzed and blind people to use the device manually. Although there is a remote control for the device, it is difficult for blind people to use it. So, voice recognition systems help such people a lot. Currently this project can connect only 3 devices (which can be ON/OFF by manual switches also), in future, we can add more and more devices to it according to our comforts. Besides, these we can also add devices like thermostats which can help in emergency fire and helps to save lives of many.

7. CONCLUSION

Voice Automated system helps a lot in automation and helping paraplegics because they cannot use remote or other means. Voice automation is very useful for the blind, as standard remote-controlled home devices use IR remotes that must be pointed at the devices to control them. Voice command systems can make even illiterate people mention the name of the device and say "ON" or "OFF". These systems are very reliable and can even be used integrated with mobile phones because they work with Wi-Fi. Therefore, they can be used anywhere. Systems such as Bluetooth or Wi-Fi used remote control systems, although they are effective, only registered smartphones can be used to control the device. Voice automation eliminates hassles and makes the system accessible to everyone.

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