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IMPLEMENTATION OF IOT BASED VOICE CONTROLLED SMART HOME USING GOOGLE ASSISTANT

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ABSTRACT
This paper offers a user-friendly Internet of Things device that enables voice commands to operate home automation systems and electronic appliances. The gadget integrates a relay and an ESP8266 Wi-Fi module, which are compatible with well-known voice services like Google Assistant and Alexa. The ESP8266 module listens for voice commands from the user and delivers a signal to the relay, which switches on or off the linked devices. This configuration offers an affordable and easy-to-use way to automate home appliances by making it easier to control a variety of electrical devices. The device is a useful tool for improving daily convenience and efficiency in smart homes because it is simple to install and modify for various surroundings.

I.INTRODUCTION

The need for efficiency and convenience has led to a notable growth in demand for smart home solutions in recent years. This article presents a user-friendly Internet of Things gadget that can be used to voice-command electronic appliances and home automation systems. The ESP8266 Wi-Fi module and a relay are used in the construction of the gadget, enabling smooth interaction with well-known voice services like Google Assistant and Amazon Alexa.
The ESP8266 module provides an easy-to-use yet efficient way to automate household devices by processing voice commands and coordinating with the relay to turn items on or off. In order to do this, the ESP8266 microcontroller is programmed using the Arduino platform and the API key is generated using Sinric Pro. Because of its adaptability, the system can be quickly and simply deployed in a variety of settings, making it an affordable option for those who want to automate their everyday tasks and improve their smart home.

II. LITERATURE REVIEW

Architectures for IoT-enabled home security systems have been presented in the past, with an emphasis on using inexpensive, open-source hardware components like Arduino and Raspberry Pi MCU boards with an assortment of sensors. In order to notify users of trespassing, passive infrared (PIR) sensors can be used in conjunction with a webcam to detect motion and take pictures.
A low-cost wireless home automation and security system is described by Kodali et al. [1] and is based on the TI-CC3200 LaunchPad, a battery-operated Microcontroller Unit (MCU) with integrated Wi-Fi connectivity. PIR motion sensors are mounted at building entrances and are connected to an MCU's digital input-output pin.
Wi-Fi is enabled and the Energia Integrated Development Environment (IDE) is used to program the MCU. Mobile phones without Internet access can now get security alerts and manage Internet of Things devices linked to the microcon troller thanks to Kodali et al.'s configuration. Tanwar and associates.
[2] outline a low-cost home security system with an email alert system that operates in real time. A Raspberry Pi MCU and a PIR module are used in the system. The Raspberry Pi is linked to PIR sensors and security cameras using general-purpose input/output pins and USB ports, respectively. The system sends real-time emails to residents via the Internet, assuming that their residences have Internet access.
A reasonably priced Ethernet-based smart house system for tracking temperature, smoke, energy use, and trespassing is described by Gupta and Chhabra [3]. The Intel Galileo 2nd generation microcontroller board, certified by Arduino, is used in this system. Four 220 V devices are connected via a relay module, and the microcontroller is directly coupled to temperature, smoke, and PIR sensors.
Piyare et al. [4] describe a Bluetooth-based home automation system in which an Arduino BT board with digital and analogue input/output ports, to which sensors and appliances are connected, talks with an Android smartphone running a Python script. Each device has an on/off toggle feature in the smartphone app.
Behera et al. [5] used an Arduino Uno board, an Arduino Wi-Fi Shield, and a PC home server to build and implement a real-time smart home automation system.
A low-cost smart home system based on a similar design was proposed by Howedi et al. [6] and included an Arduino Uno board, PIR sensors, DHT11 temperature sensors, an INA219 high side DC current sensor, and servo motors for controlling windows and doors.
The Raspberry Pi 3 MCU served as the key hub for Panwar et al.'s [7] implementation of the Eyrie smart home automation system. Their suggested architecture removed the requirement for Ethernet or Wi-Fi connectivity by connecting a number of Arduino Nano boards placed throughout the house to different kinds of sensors and NRF24L trans-receivers. Using the Debian operating system, Mosquito Broker is an open-source message broker that relays messages to the Raspberry Pi 3. An end-user

smartphone app and online interface were implemented using the Eclipse SmartHome framework.
A home automation system with intelligent task scheduling is created by Baraka et al. [8] using wired X10 technology to connect light and switch modules to an Arduino microcontroller and wireless ZigBee to connect appliances. A web-based Android application that can be used to remotely add and manage devices as well as view suggested scheduling is made possible by an Ethernet shield that is put on the Arduino MCU.

III. EXISTING SYSTEM

Using smart switches or plugs, such as those made by TP-Link or Sonoff, that interface with Alexa and Google Assistant is one concept already in existence for voice-controlled home automation. With the use of voice commands or smartphone apps, customers may operate appliances with these devices, giving them access to features like remote control and programmed on/off cycles. Although practical, these solutions are frequently more expensive and offer less customization than can DIY options utilizing the ESP8266 and platforms such as Sinric Pro .

IV.PROPOSED METHODOLOGY:

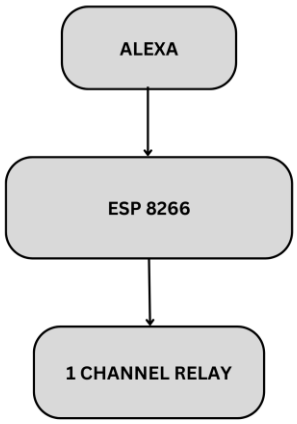

Fig 1: Proposed method flowchart

A.ESP 8266

The ESP8266 is a low-cost Wi-Fi microcontroller with integrated TCP/IP networking software and microcontroller capabilities, manufactured by Shanghai, China-based Espress if System. The chip became well-known among English-speaking manufacturers in August 2014 as a result of the ESP-01 module made by third-party manufacturer Ai-Thinker. By using Hayes-style commands, microcontrollers can connect to Wi-Fi networks and create simple TCP/IP connections with the aid of this small module. However, at first, there was a dearth of English-language documentation about the chip and the commands it could perform.Because of the incredibly low price and the fact that the module had very few external components, many hackers investigated the module, chip, and software, translating the Chinese

The goal is to use the ESP8266 Wi-Fi module with Sinric Pro to create an advanced voice-controlled Internet of Things home automation system with expanded functionality to handle more than just on/off actions. Multiple devices, sensors, and smart features like voice-activated timer scheduling through Alexa or Google Assistant, light dimming, and fan speed control will all be supported by the system. To provide users even more power and flexibility, a mobile app might be integrated to track the status of the device, get notifications, and manually overrule voice commands. This system will prioritize an intuitive user interface and provide greater scalability to effectively manage intricate smart home configurations.

Fig 2: ESP 8266 Controller

documentation, indicating that it might eventually be very inexpensive in volume. A built-in 1 MiB flash memory in chips like the ESP8285 makes it possible to create single-chip Wi-Fi devices.

B. 1 CHANNEL RELAY

5 V Relay Module with 1 Channel is designed for switching only a single high-powered device from your Arduino. This 1 channel 5V 10A relay control board module with optocoupler modules is compliant with international safety standards, control, and load areas isolation trenches it has a single relay genuine. The inputs of 1 Channel 5V 10A Relay Module are isolated to protect any delicate control circuitry. Power input and relay control signals are brought to header pins on the board. It can be used as a single chip module for appliance control and work with both DC and AC signals where you can control the 220V AC load [9].

Fig 3: Channel relay

C. AMAZON ALEXA

The Polish voice synthesizer Ivona, which Amazon acquired in 2013, serves as the primary foundation for the virtual assistant known as Amazon Alexa, or Alexa. It was initially used by the Amazon Echo smart speaker, as well as the Echo Dot, Echo Studio, and Amazon Tap speakers made by Amazon Lab126 [10]. Voice interaction, music playback, to-do list creation, alarm setting, podcast streaming, audiobook

playing, and real-time weather, sports, traffic, and news reporting are all supported by natural language processing. Alexa can also control several smart devices as part of a home automation System. Alexa's capabilities could be enhanced by installing "skills"—extra features created by outside vendors, more commonly known as apps in other contexts—like weather and audio features. It uses natural language processing, automated speech recognition, and other basic AI techniques to accomplish these objectives.

Some phones also let users say commands like "Alexa, or Alexa go to bed" or "Alexa wake up," but other gadgets, such as the Amazon Dash Wand and the Amazon mobile app on iOS or Android, require the user to press a button to activate Alexa's listening mode.[11] Most Alexa-enabled devices, such as Amazon or Alexa, allow users to activate the device with a wake-word.E. BIZZER A buzzer, sometimes called a beeper, is a signaling device. [12] The word "buzzer" originated from the buzzing sound that buzzers made when they were electromechanical devices driven by
50 or 60 cycles of stepped-down AC line voltage. 33 Ringing and beeping are two additional frequently used sounds to signal that a button has been pressed.

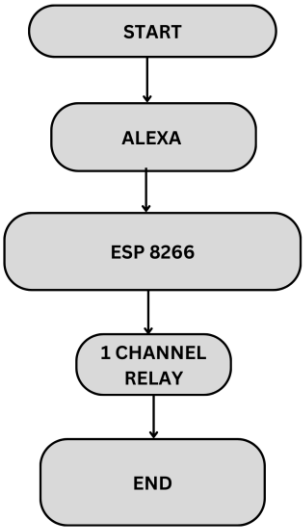

Fig 4: Flow Chart of voice command

V.RESULTS AND DISCUSSION

Using the ESP8266 and Sinric Pro, an Internet of Things-based home automation system was constructed that effectively used voice commands from Alexa to operate a number of appliances. [13] The system performed effectively, executing commands to switch on and off gadgets, dim lights, and change fan speeds in real-time. The free Sinric Pro platform made integration easy and supported more than ten devices with little setup work. Even with sporadic network outages, the system as a whole was responsive and easy to use, providing an affordable and expandable smart home automation solution.

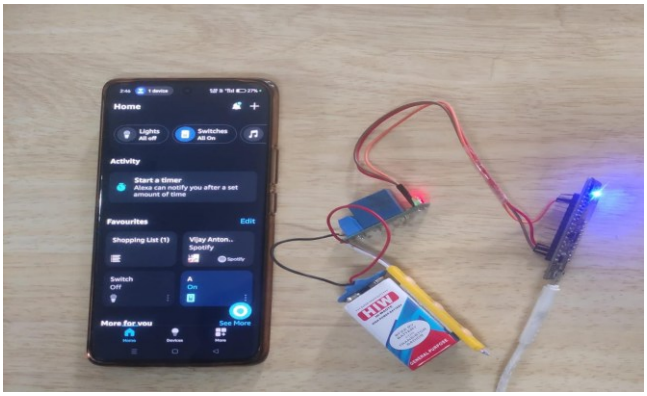

Fig 5: Result image

VI.TESTING OUTPUT

Using voice commands and Alexa, the Internet of Things-based home automation system was successfully tested to operate several devices. With a reaction time of 1-2 seconds, commands like turning on, dimming, and modifying fan speeds were carried out precisely and provided near real-time operation. The system demonstrated its scalability by handling up to 10 devices through Sinric Pro with efficiency and without any performance concerns. While there were sporadic Wi-Fi instability-related network delays, overall system performance was dependable. Overall, the testing verified that the system is effective and easy to use for tasks related to home automation.

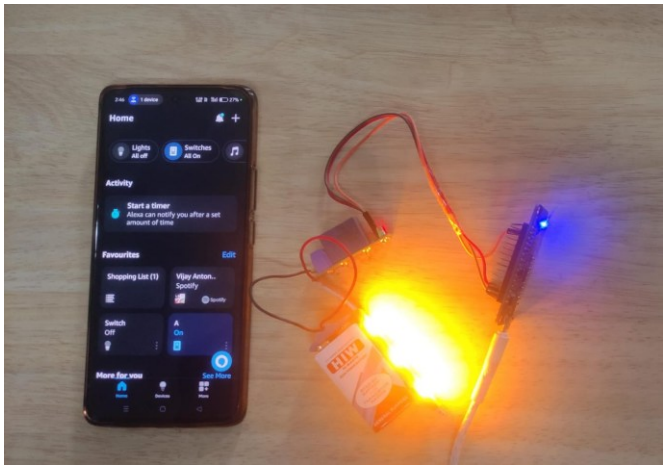

Fig 6: Testing Output

VII.CONCLUSION AND FUTURE SCOPE

To sum up, the Internet of Things (IoT)-based home automation system that makes use of the ESP8266 module and Sinric Pro has shown to be a dependable and approachable way to operate a variety of appliances using voice commands. The system's efficacy in augmenting daily convenience in smart homes is emphasized by its capacity to promptly respond to commands and concurrently control several gadgets. In order to create a more complete smart home ecosystem, the project's scope can be expanded in the future to include more sophisticated features including integration with more IoT sensors for temperature, humidity, and motion detection. Moreover, by adjusting to unique behaviors and tastes, the application of machine learning algorithms could tailor user experiences. To improve house safety, additional security elements like alert systems and remote monitoring could be included. All things considered, this project has a lot of potential for advancement and expansion in the field of smart home technology.

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