

Low Cost IVRS Based Home Automation

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ABSTRACT: The project "LOW COST IVRS BASED HOME AUTOMATION" aims to simplify the task of operating analog switches mounted on walls. Currently, it is a cumbersome process to physically press the switches each time an appliance has to be turned on or off. This project offers a smart solution that allows users to operate the switches through a Web Browser on their mobile phone or PC. Unlike the expensive smart switches available in the market that require additional devices like hubs for their working, this project uses the Cloud and a Web Browser to control the manually operated switches. The switches are interfaced with Beetle ESP32-C3, which is primarily intended for IoT applications and has an inbuilt Wi-Fi for enabling or disabling the switches. The processor receives commands from the user through the Web Browser and controls the switches accordingly. Additionally, the user is updated about the status of the switches after the control operation is performed to the cloud. This project also offers the ability to control the intensity of light, the speed of the fan, and other devices using the Web Browser.

KEYWORDS: IoT, ESP32-C3, RISC

I. INTRODUCTION

Over the past few decades, we have seen the rise of appliance controls, especially for devices like TVs and other electronics that have made our lives much easier. It is not unusual to wonder whether home automation could enable us to control fluorescent lamps, fans, and other electronic appliances using a remote or controller. The answer is a resounding yes, but the real question is whether these options are cost-effective. If the answer is no, then we need an alternative solution. Introducing the Arduino-based home automation system that uses Bluetooth, which is not only cost-effective but also gives the user the flexibility to control any specific device. To save time, we are introducing an automation system that connects to the Beetle ESP32-C3 and the relay. With this assistance, the system can easily manage your home appliances from your portable device using Wi-Fi.

II. RELATED WORK

The internet's rapid expansion has opened up new opportunities for growth in various industries, including the burgeoning field of home automation. This area of interest has captivated the attention of many individuals worldwide.[1] Interactive Voice Response (IVR) is a telephony technology that enables users to interact with automated information systems via voice commands or a telephone keypad. Its primary function is to provide self-service, offering numerous advantages such as extended business hours, reduced waiting times, and the ability to serve multiple users simultaneously.[2] The IVR system acts as a liaison between individuals and computers, connecting the

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telephone network with instructions. Users can access information from any location at any time by dialling a designated number and following automated instructions once a connection has been established [3]. The IVR system employs pre-recorded or computer-generated voice responses to provide information in response to input from a caller. The input can be given through touchtone or Dual Tone Multi-Frequency (DTMF) signals generated when the caller presses a key on their phone[4]. The system dynamically determines the sequence of messages to be played based on an internal menu structure maintained within the IVR application program and user input.

III. METHODOLOGY

HARWARE REQUIREMENTS

- i. Beetle ESP32-C3
- ii. Relay Circuit
- iii. Cooling Fan
- iv. Lamp
- v. Pump motor

SOFTWARE REQUIREMENTS

- i. Arduino IDE
- ii. Blynk Android Application

To operate the home automation system, a Beetle ESP32-C3 microcontroller is utilized, and users can issue commands through the Blynk Android application installed on their mobile phone. The system functions via a Wi-Fi network connection established between the mobile phone and the microcontroller's inbuilt Wi-Fi module. Both devices must be connected with an authentication token for the system to operate effectively. The Blynk Android application sends commands through Wi-Fi to the electrical equipment, which responds according to the user's specific requirements.

“Home automation” refers to the automatic and electronic control of household features, activity, and appliances. In simple terms, it means you can easily control the utilities and features of your home via the Internet to make life more convenient and secure, and even spend less on household bills.[5] Read on to find answers to some of the most common questions about home automation technology, and get a few ideas for home automation solutions to incorporate in your home. Home automation is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through Wi-Fi, so you can manage them from your smartphone or tablet whether you're at home, or miles away. This allows you to turn on the lights, lock the front door, or even turn down the heat, no matter where you are.

There are three main elements of a home automation system: sensors, controllers, and actuators. Sensors can monitor changes in daylight, temperature, or motion detection. Home automation systems can then adjust those settings (and more) to your preferences. Controllers refer to the devices personal computers, tablets or smartphones used to send and receive messages about the status of automated features in your home. Actuators may be light switches, motors, or motorized valves that control the actual mechanism, or function, of a home automation system.

Interactive Voice Response (IVR) is a telephony technology it allows interactions with a many of automated information systems through a mobile keypad or voice commands. Its key function is to provide self-service. IVR applications provide a wealth of benefits. Operational business hours can be extended, callers' waiting times reduced, and multiple users can be served simultaneously. Automated attendant and automated survey are two examples of IVR applications. In the automated survey application, a questionnaire is played by the IVR over the phone and respondents answer by pressing the appropriate keys on the phone keypad or just by voice. Interactive voice response, or IVR, is an automated telephone system that combines pre-recorded messages or text-to-speech technology with a dual-tone multi-frequency interface to engage callers, allowing them to provide and access information without a live agent [6].

IV. BLOCK DIAGRAM

The overall project's functionality is presented in the block diagram. The microcontroller, Beetle ESP32-C3, acts as the main controlling unit of the system [7]. Users set commands for the appliance's operation using a mobile application. The command form is interpreted by the mobile app in either voice or switch mode, and it sends a signal to the Beetle ESP32-C3 unit via a wireless network established by Wi-Fi communication. This communication is enabled by the Wi-

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Fi module, which is integrated into the Node MCU. After receiving the signal, the Beetle ESP32-C3 turns the appliance on/off with the assistance of the relay, which is physically connected to both the microcontroller and the appliances [8]. The power supply unit powers the microcontroller, the relay, and the final appliances. The block diagram depicted in Figure 1 displays this system's components and their interconnections.

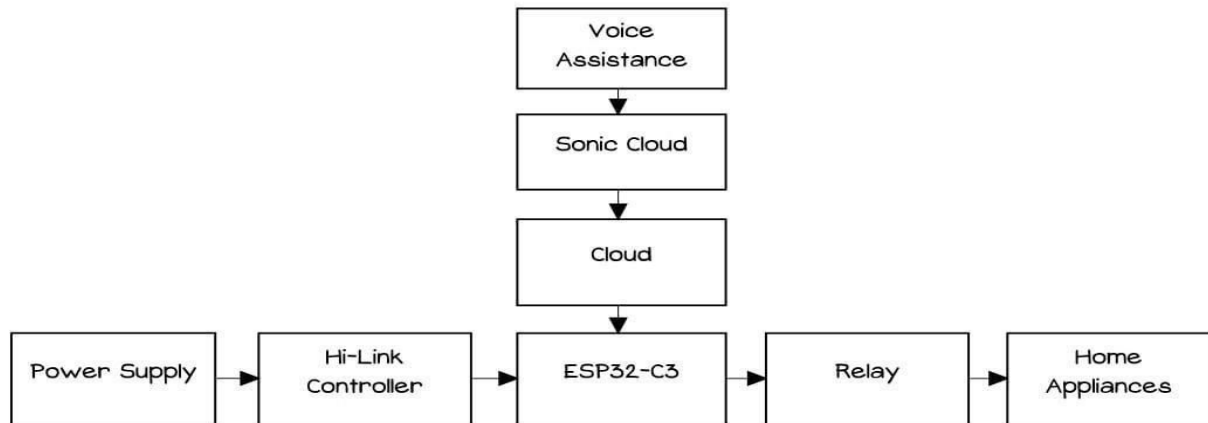


Fig.1 Block diagram

V. FLOWCHART

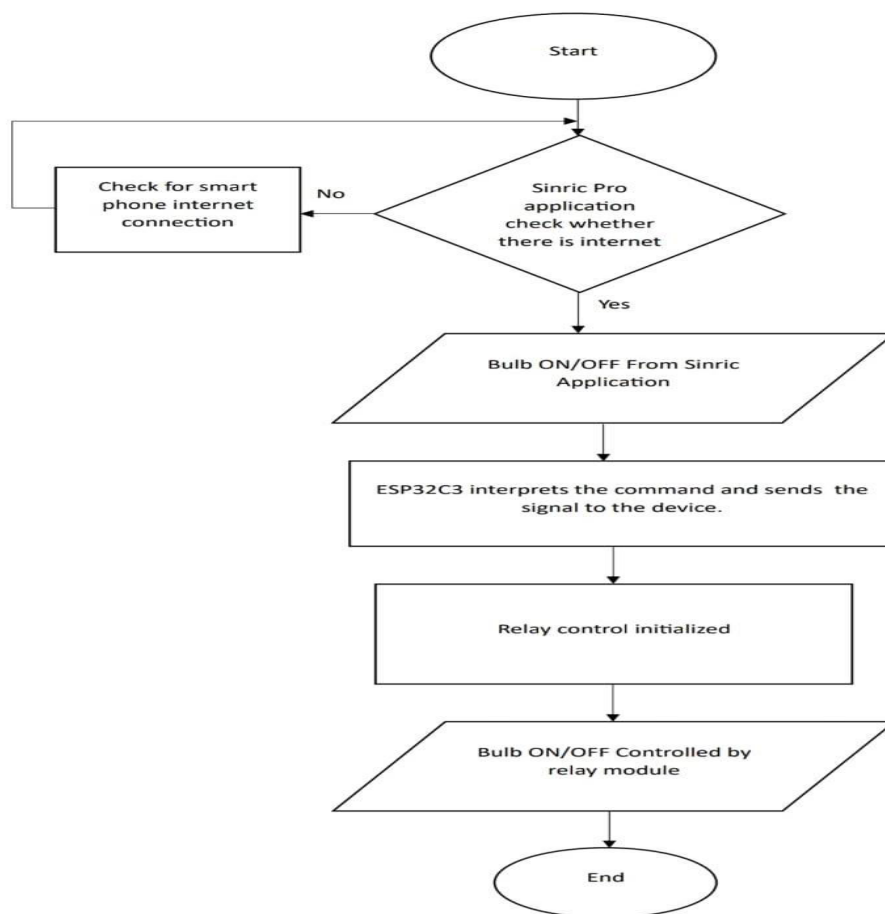


Fig 2 flow chart

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This flowchart is simply a graphical representation of the steps of the home automation systems. The flow chart shown in Figure 2, It shows steps in sequential order and is widely used in presenting the flow of algorithms, or processes. This flow chart shows the Controlling the devices of household appliances is successfully. The home appliances like a ceiling fan, either a lamp or the LED lamps. This bulb may voice operated upon two levels i.e., switching ON and switching OFF and also Fan ON/OFF this the system will be used for operating the loads.

VI. EXPERIMENTAL RESULTS

Figure 3 shows the internal structure of the low-cost IVRS-based home automation system. The system is capable of effectively controlling household appliances, such as ceiling fans, fluorescent lamps, and LED lamps, by switching them on and off. Additionally, it includes a voice-operated bulb that can be turned on or off at two different levels. This system is ideal for operating heavy loads within the home. Overall, this project is a great way to learn about IoT (Internet of Things) and home automation and provides a practical application of these technologies. Home automation using NodeMCU with voice assistance offers several benefits, including: Convenience: Voice control offers a convenient way to control devices in your home without having to physically interact with them.

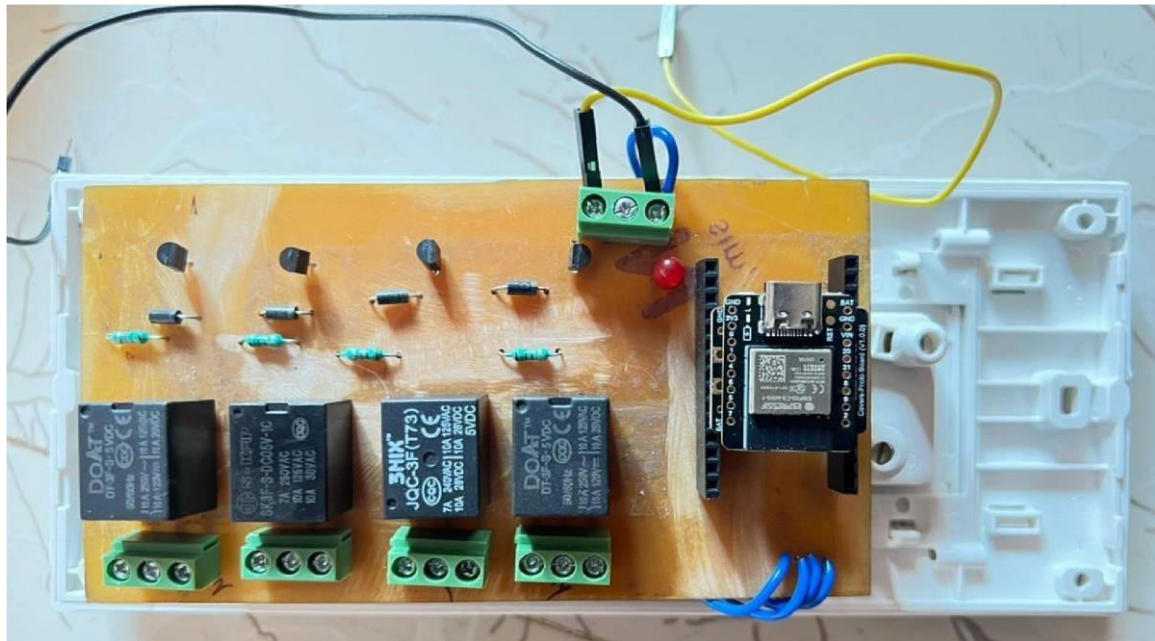


Fig.3 Internal structure

VII. CONCLUSION

Currently, the high cost of home automation is the primary obstacle to its widespread adoption. This research paper has examined and analysed the various home automation systems currently available in the market. However, these systems require additional network devices such as hubs, which further increase their cost. The use of the Beetle ESP32-C3 microcontroller and the IoT platform has the potential to significantly reduce the cost of such devices. Additionally, it offers greater convenience to users as it enables remote control of the devices. The system can be accessed through a web page or an application, making it platform-independent and eliminating the need for a specific operating system. The system has been designed to deliver optimal results to users.

Low Cost of this system is applicable for poor people also. This system can be done anywhere in any industries. Now-a-days, home automation has become one of the most important part with low cost, reliable and convenience. Short Messaging Service normally in home automation the minor devices that mean small devices will be connected to the major devices like Arduino, NodeMCU, etc. The messaging services cannot be activated automatically.



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VIII. FUTURE SCOPE

Automation is a word but a requirement of everyone in the future. Technology made it help to control your home appliances with the help of mobile application or voice assistant. People in India are quickly taking this technology but still, this technology is new for most people. Future scope for the home automation systems helps to making homes are smarter. Homes are interfaced with the voice assistance, for light and provide automated devices based on conditions. Smart Homes In the coming years, fully automated smart homes are surely become a reality as the home automation is developing rapidly. Because of good user convenience, smart homes are appealing a wide range of people all over the globe. The User can check for the electricity usage, the condition of his devices and get notification accordingly Smart Cities are increasing with automation and IoT, this devices can communicate with each other. This system will help in building new and smarter cities. Cities that would be free from pollution, traffic accidents, and etc. problems. Agriculture this proposed system can be used in Agriculture as well. The various devices are used in fields can be operated from any remote location.

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