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# Smart Home Automation using Augmented Reality and Internet of Things

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***Abstract:*** ***This idea offers a cheap, adaptable method for controlling your home and keeping an eye on the environment. The work focuses primarily on IOT-based home automation using augmented reality as a user interface (GUI) for various home appliances based on wireless home automation system using IOT, which enables us to control basic home appliances automatically using smartphones. This idea can be effectively applied to our home to make it smarter, safer, and more automated. The advantage of choosing this system over comparable existing systems is that the user can receive warnings and status updates delivered by the Wi-Fi-connected microcontroller operated system on his phone from any location, regardless of whether his mobile phone is online. For remote access and appliance control, the ESP32 microcontroller is utilised in the current project. Finally, this project's usage of augmented reality enables users to interact directly with all of the objects in their immediate environment. In order to control two relays both via and without the internet, this project uses an ESP32, an IoT app, augmented reality, and a switch.***
***Keywords: AR, Home automation, ESP-32***

## I. INTRODUCTION

Home automation systems transform into highly accessible, energy-efficient smart home technologies. In order to ensure customer comfort and pleasure, it includes fundamental features. The modern world wants every family to live a secure, prosperous, convenient, and comfortable life. The field of home automation holds great promise. Its key advantages are improved comfort, more safety and security, and more responsible use of resources, which results in significant cost savings. Because it is safer and more secure, home automation has grown more advantageous. Home automation has advanced and is now more accurate at monitoring all household appliances. The design of a home automation system involves a number of difficulties. Scalability is important so that additional devices can be quickly added to the system.Since the mobile phone doesn't need to be linked to the internet—only the board needs Wi-Fi—the user may receive the alerts and the status of the IoT system from any location, including places where Internet connectivity may not be easily available. This project attempts to address the issue that current home security and surveillance systems have with informing users of the situation while they are away from home. An embedded SoC ESP32 is used in this project to enable remote access to appliances and gadgets. The evolution of technology and services has significantly altered peoples' expectations for automation and security over time. Over time, many automation systems have made an effort to give residents a quick, easy, and secure way to get to work. The region of operation is significantly constrained by the fact that many current systems continue to employ Bluetooth modules rather than Wi-Fi modules. Users are able to interact directly with all things in the surrounding environment because to the project's use of augmented reality (AR).

## II. LITERATURE REVIEW

This method enables consumers to conveniently regulate home appliances while reducing the risk of electric shock. The Bluetooth client has been evaluated on various Android phones from various manufacturers, and it performs according to its intended features.[2] This system provides the best way to do away with manual switching. Home appliances can be managed in this way for user convenience and to prevent the risk of electric shock. Voice instructions can be used to operate the Arduino board's attached devices, doing away with the requirement to use the application interface.[3] . Because a user-defined NLP method is employed, there may be instances where the assistant is unable to correctly understand your commands. The Wi-Fi module may manage the system directly, negating the need for an Arduino board. The user can send commands directly to the module, which will control the appliances as needed.[4]. Home automation technology is quite common, and there is a demand in the market for goods that offer users ease and a nice user interface (GUI). Due to the popularity and ease of use of this technology, AR-based circuits and apps are

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in high demand. Little has been done in this area, and home automation and augmented reality will be a tremendous technological leap.

## III. METHODOLOGY

### *A. AR (Augmented Reality)*

A live camera feed is used to produce augmented reality (AR), which is a more enriched version of reality. Simply put, AR enables digital content to appear to be a part of the real environment. The visual appeal of a developing application is what draws the user in.




Fig 1: Visual Image query

Developers may utilise visual cues to notify the user what aspects of UI are designed to engage with and how to interact with them in order to enhance the graphic elements of the interface and user interaction.[9] Visual cue design may make interactions appear more natural because navigating in an AR application can be challenging and irritating. Each AR system is made up of three parts: hardware, software, and applications.

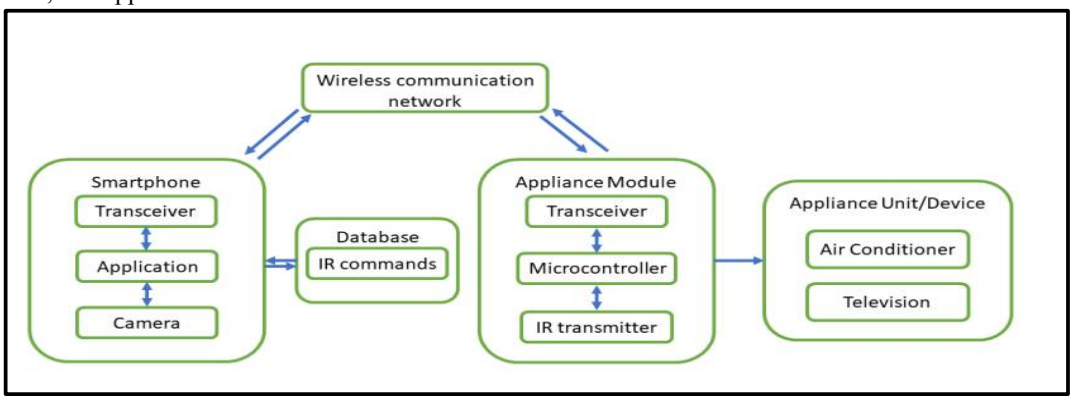



Fig 2: Generalised Block Diagram

In this project, we'll create a straightforward home automation system with basic parts that will enable us to turn on and off various electrical appliances. The project is ESP32-based, and the relay operation is managed by an iot app that sends commands using augmented reality. The goal of this project is to demonstrate a concept for home automation using an ESP32, an app, augmented reality, and a manual switch to control two relays both online and offline while keeping track of real-time feedback in the app. For both this generation and the one to come, automation of gadgets has many applications. The developed model's Internet of Things component manages home appliances via the server.

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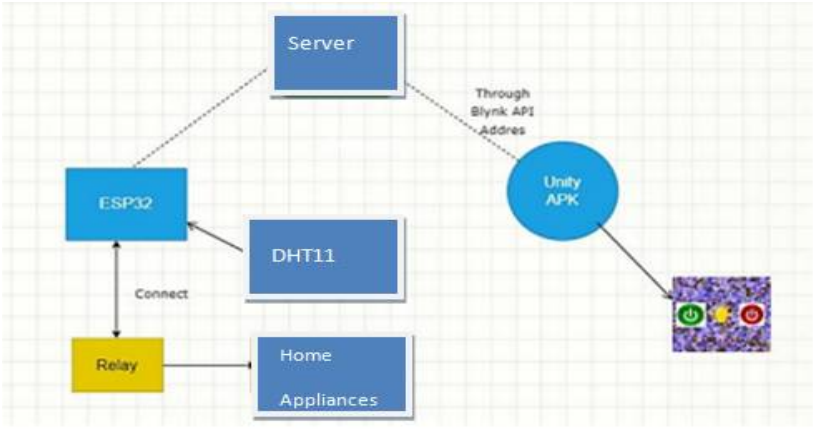



Fig 3: Block diagram of Proposed system

The virtual pin is used in the app to control the appliance using the project's authentication token. A demonstration of control using the rest API was also given, and the Esp32's range was examined. In the app, the switch status is also updated. The app is created using the Unity Hub. While the app camera is positioned in front of the image target, the virtual buttons are displayed. Figure 10 displays the view of the virtual buttons. The API updates the status of the home appliance to ON or OFF when the image switches are interrupted.

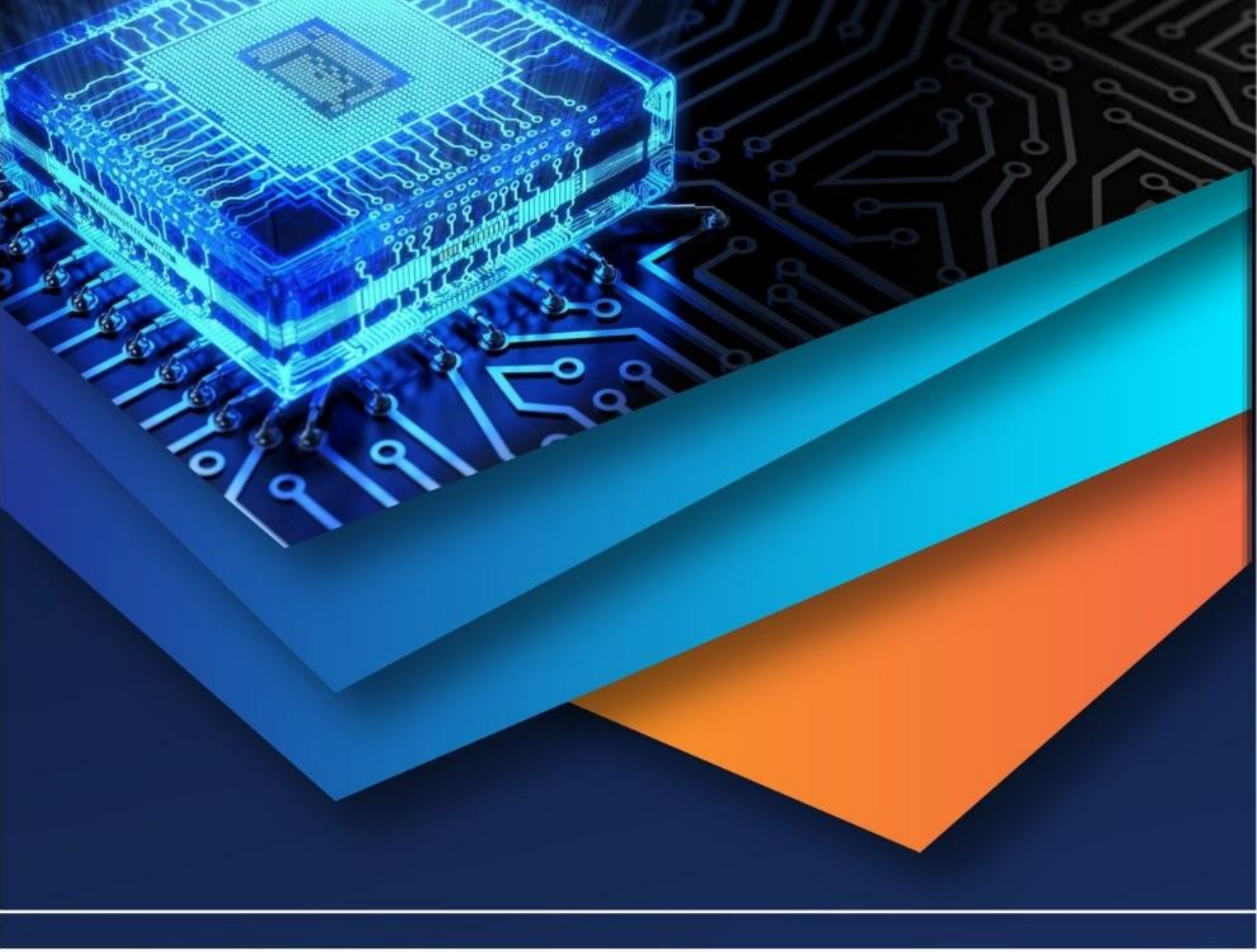
## IV. CONCLUSION

In this project we were successful in implementing AR for home automation using images technology with hardware of ESP-32 Cam. Other appliances can use the App as well. Home appliances are turned on and off while the image target is displayed. The paper's performance metrics were also assessed. Following implementation, performance metrics including RSSI (Received Signal Strength Indicator), Transmission Time across various targets, and analysis based on range, across windows and open areas, as well as with a wall obstruction, the Wi-Fi strength, were taken. By delivering a large number of commands in various scenarios and timing the broker's responses, the sensitivity of the broker is put to the test. The results of the tests carried out, which show short reaction times in both online and local networks, support the choice to use MQTT. The measured time delay for an internet broker is tolerable, but the speed of a local broker is far faster. These tests support promoting the MQTT protocol as a means of establishing M2M communication for a HAS.

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