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IOT BASED REAL TIME FEEDBACK SYSTEM

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ABSTRACT:

An IoT-based real-time feedback system is designed for the management of lights and fans. An IoT-based real-time feedback system manages lights and fans by integrating the RM Maker App with advanced hardware, including the ESP32 microcontroller, feedback modules, an 8-channel relay board, and a power supply module. This setup enables remote control and monitoring via Wi-Fi. The RM Maker App serves as a centralized control interface, allowing users to manage their environment from any location with internet access. Voice commands to Alexa-enabled devices provide seamless control of lights and fans, while physical switches offer alternative control options. This system simplifies tasks, promotes energy efficiency, and enhances user experience. Using the Arduino IDE for programming, the project demonstrates IoT technology's potential to optimize lighting and ventilation control, improving functionality and comfort in various settings.

Key Words: IoT, Real-time feedback, RM Maker App ESP32 microcontroller, Energy conservation

I. INTRODUCTION:

The project, "IoT-Based Real Time Feedback System for Home Automation," integrates IoT technology with the RM Maker App and various hardware components. This comprehensive solution revolutionizes how users interact with and control electrical devices such as fans and lights, now augmented with voice-based Alexa integration. The RM Maker App acts as the central control interface, offering convenient access to connected devices from anywhere with internet connectivity. Users can effortlessly turn on or off lights and fans, enhancing customization and monitoring of their environment through both app-based and voice-controlled commands via Alexa-enabled devices. Physical switches on the control board provide alternative control options, ensuring reliability even without internet access. By seamlessly integrating digital and physical controls, our system offers versatility tailored to users' needs and preferences. By empowering users to create smart living environments that adapt to their lifestyles through both app-based controls and voice commands, our solution not only enhances convenience but also promotes energy efficiency and sustainability. Through the convergence of advanced hardware and intuitive software, we demonstrate the significant impact of IoT in improving the functionality and comfort of modern living spaces.

II. RELATED WORK

Recent advancements in IoT technology have significantly influenced smart home automation systems, focusing on user interaction, energy efficiency, and overall functionality. Studies have explored IoT platforms integrated with mobile applications for seamless device control. For instance, Singh et al. (2020) developed a system using the Blynk app for remote appliance control, enhancing user convenience. Kumar and Lee (2021) highlighted voice control with Amazon Alexa and Google Assistant, offering intuitive, hands-free interaction. Chen et al. (2019) demonstrated real-time feedback mechanisms for monitoring energy consumption and device status, optimizing energy usage. Zhang et al. (2022) introduced a hybrid system combining physical switches with app controls, enhancing reliability during internet outages.

III. PROPOSED METHODOLOGY

The Wi-Fi-based home automation system currently in development incorporates real-time feedback features, significantly enhancing functionality and convenience. This innovative IoT-based Real-Time Feedback system is tailored for the efficient management of lights and

fans, specifically designed for modern environments. By integrating the RM Maker app with advanced hardware components such as the ESP32 microcontroller, feedback modules, an 8-channel relay board, and a power supply module, the system facilitates comprehensive control and monitoring capabilities over Internet connectivity.

A. SYSTEM ARCHITECTURE

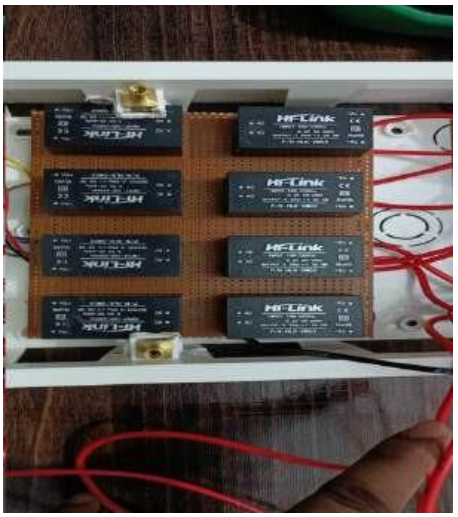
1. Hardware Components

ESP32 Microcontroller:

The ESP32 microcontroller is a powerful and versatile component widely used in IoT projects due to its integration of Wi-Fi and Bluetooth capabilities, making it ideal for wireless communication applications. With its dual-core processor and various built-in peripherals, the ESP32 offers high computing power and flexibility, allowing for efficient development and execution of IoT applications. It's programmable using Arduino IDE or other development environments, ensuring accessibility for a wide range of developers.

Feedback Modules:

Feedback modules are essential for monitoring electrical systems. They measure key parameters like voltage, current, and temperature, providing real-time data for analysis. This feedback enables precise control and optimization of electrical loads, enhancing efficiency and reliability.



8-Channel Relay Board:

An 8-channel relay board serves as a key component for controlling electrical loads in IoT applications. Each relay channel can independently switch high-power devices such as lights, motors, or appliances. This allows for versatile and scalable control of multiple loads simultaneously. The relay board interfaces with the microcontroller, enabling remote or automated control of electrical devices based on predefined conditions or user commands.

Power supply module:

Power supply modules are crucial components in electronic devices and systems, responsible for converting electrical power from a source (such as a wall outlet or a battery) into a form suitable for powering the device's internal circuitry.

Arduino IDE version 2.3.2 is a powerful tool tailored for programming microcontrollers like the ESP32. Its user-friendly interface simplifies coding tasks, facilitating effortless writing, compiling, and uploading of code. Equipped with a wide array of pre-written code snippets called sketches, and supporting multiple hardware platforms, Arduino IDE 1.8 enhances the development of IoT projects, ensuring both ease of use and adaptability. Arduino IDE 1.8 streamlines the development process for IoT projects, ensuring ease of use and flexibility.

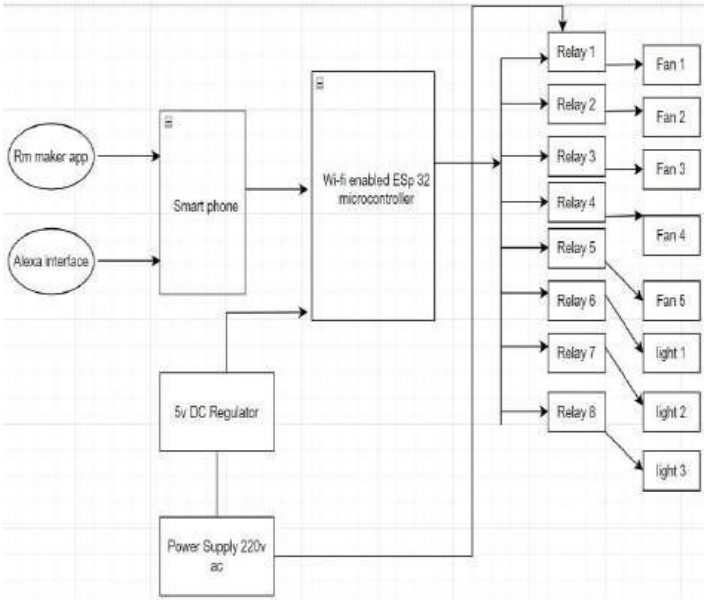
RM Maker App:

RM Maker App is a user-friendly graphical interface that complements Arduino IDE. It allows for the creation of custom control interfaces for IoT devices without extensive programming knowledge. With features like switches, sliders, and buttons, RM Maker simplifies the process of designing and deploying IoT control interfaces, enhancing accessibility and usability.

IV. SYSTEM DESIGN AND WORKING PRINCIPLE

The proposed internet-based home automation system aims to revolutionize light and fan management by incorporating real-time feedback for enhanced functionality and convenience. At its core, it integrates advanced hardware with intuitive software, anchored by the ESP32 microcontroller for robust processing and internet connectivity. The system enables centralized control over multiple devices through an 8-channel relay board, with real-time status updates via the RM Maker app. A power supply module ensures stable performance. The software employs Embedded C++ using the Arduino IDE for efficient development. Real-time feedback mechanisms continuously monitor device status, with data transmission via the ESP32. The RM Maker app serves as the centralized control hub, enabling seamless interaction. Integration with Alexa provides voice command functionality, while physical switches ensure reliability without internet connectivity. This approach enhances existing home automation systems with comprehensive control, advanced hardware, and real-time feedback for improved user awareness.

A. BLOCK DIAGRAM:



B. CONFIGURE AND INTERFACE SETUP:

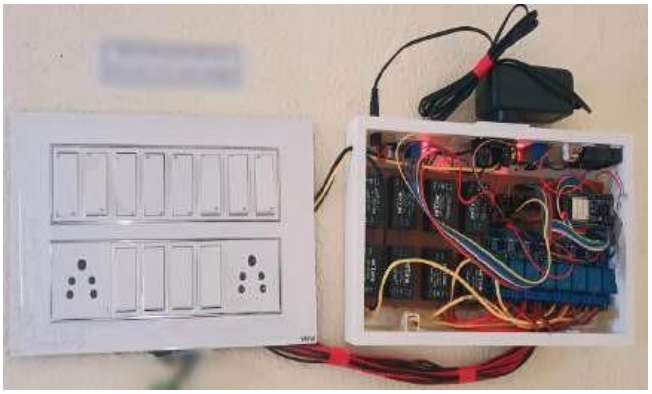
1. In your Arduino IDE, go to File > Preferences. Enter the following URL into the "Additional Board Manager URLs"field:`https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json`. If you already possess the URL for the ESP8266 boards, please separate the URLs with a comma. `https://raw.githubusercontent.com/espressif/arduino-esp32/gh-pages/package_esp32_index.json, http://arduino.esp8266.com/stable/package_esp8266com_index.json`. Click "OK".

2. Go to Tools > Board > Boards Manager.

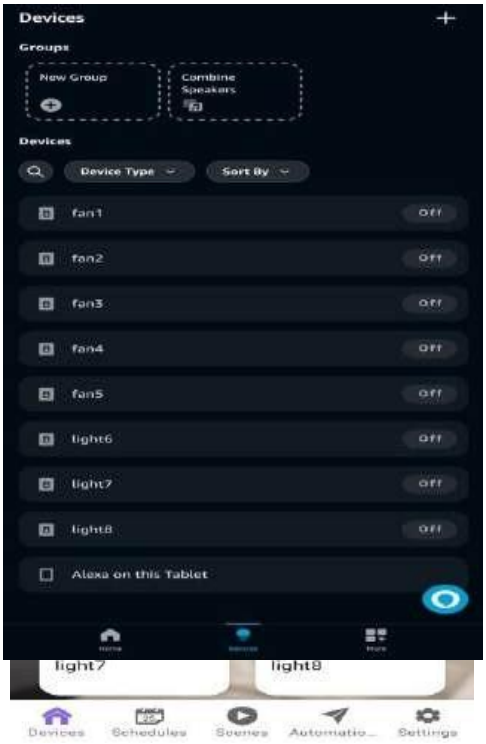
3. Search for "ESP32" in the Boards Manager. Press the "Install" button for "ESP32 by Espressif Systems".

4. Wait for the installation to complete.

C. IMPLEMENTATION AND OUTPUT:



ESP 32 Rain Maker app interface



Alexa app interface

V. FUTURE SCOPE

Rapid Development: Home automation is evolving swiftly, paving the way for fully automated smart homes in the near future.

Enhanced Communication: Automation and IoT enable seamless communication between devices, fostering the development of smarter cities.

Improved Efficiency: Remote access and control enhance efficiency in agricultural practices, optimizing resource utilization and crop management

VI. CONCLUSIONS

The Wi-Fi-based home automation system seamlessly integrates IoT technology, real-time feedback, and voice assistant features, revolutionizing modern home management with convenience and efficiency. Users benefit from intuitive controls and advanced hardware, effortlessly managing devices to ensure comfort and energy conservation. The system's Wi-Fi connectivity enables remote access, while robust hardware components guarantee reliability and optimal performance. Ongoing optimization efforts aim to further enhance reliability and user satisfaction, driving continued advancements in functionality and user experience. As technology evolves, the system remains adaptable, continually meeting the changing needs of modern homeowners.

VII. REFERENCES

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