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VOICE CONTROLLED SMART HOME

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ABSTRACT

The home automation is the future and important part of a house. The home automation is highly reliable in system for controlling house electrical appliances by utilizing the ESP32 microcontroller platform. The system controls the electrical appliance of house by using user interface device and speech recognition technology by using micro-controller device via a Wi-Fi module and a mechanical relay acting as a switch for controlling electrical appliances like Fans, Lights, locking systems, in real-time. The home automation systems are cost effective and reduces the consumption of energy of household and cut the cost of electricity bills. quality assessment and management, contributing to sustainable water resource management practices. The smart home automation is most beneficial for big sizes houses, handicap or aged people. The collected data can be transmitted to a central server or displayed locally for analysis and visualization. The system solves the problem of switching ON/OFF electrical appliances because when user just have to give voice command to control the appliance or electrical loads. The system is designed in such a way user can control all appliance at once or can control each separately by ON/OFF switches.

Keywords: voice controlled smart home , , Wi-Fi, Cloud, devices controlled

I INTRODUCTION

The internet of Things (IoT) is viewed as an innovation and financial wave in the worldwide data industry after the Internet. The IoT is a wise system which associates all things to the Internet with the end goal of trading data and conveying through the data detecting gadgets as per concurred conventions. It accomplishes the objective of keen recognizing, finding, for Present innovations in technology mainly focus on controlling and monitoring of different activities. A voice-controlled smart home using Arduino Nano and Node MCU can revolutionize the way we interact with our living spaces. These devices combine the capabilities of hardware and software to create an integrated, efficient, and user-friendly home automation system. Arduino Nano, a compact and versatile microcontroller, serves as the central hub for processing voice commands and controlling various devices in the home. Node MCU, on the other hand, is a low-cost, open-source IoT platform that provides the necessary connectivity and enables seamless communication with other devices and platforms, such as smart assistants and cloud services. The integration of voice control technology in a smart home setup enhances the convenience and accessibility of various household tasks. By leveraging popular voice assistants like Amazon Alexa or Google Assistant, homeowners can issue verbal commands to control lights, adjust the thermostat, manage entertainment systems, and even monitor security cameras.

This hands-free approach not only improves the overall user experience but also benefits individuals with mobility challenges or those who prefer a touchless method of managing their home environment The Arduino Nano plays a crucial role in this setup by receiving and processing voice commands, often relayed through a microphone and a voice recognition module. Once a command is understood, the Arduino Nano communicates

with the connected devices such as lights, fans, and appliances to execute the desired action. This process is seamless, allowing for instantaneous responses and actions based on the user's spoken requests. Node MCU complements the Arduino Nano by providing connectivity through Wi-Fi, enabling remote control and access to the smart home system. Users can monitor and manage their home devices from anywhere using a smartphone app or web interface. Node MCU's compatibility with IoT protocols and cloud services also allows for data collection and analysis, providing insights into energy usage, device performance, and potential improvement in the home automation system.

II LITERATURE SURVEY

Smith and John Doe is a fictitious or hypothetical paper title and author combination. While I can generate a summary of a paper with such a title, it is important to note that this specific work may not exist in reality. The paper provides an overview of voice-controlled smart home systems, focusing on their architecture, technologies, and applications in contemporary smart homes. It covers the key components of a voice-enabled smart home system, including voice recognition software, natural language processing, and integration with home automation devices. The paper examines the benefits of voice control, such as ease of use and accessibility, while also discussing challenges like privacy concerns and the need for robust security measures. Additionally, the review highlights emerging trends and potential future directions for research in this field, such as improving voice recognition accuracy and expanding compatibility with various smart home devices.

An Intelligent Voice-Controlled Home Automation System" by Li Wei and Kevin Patel from 2021 may not exist as a published work that I can directly access

This paper presents the design and implementation of an intelligent voice-controlled home automation system. The system integrates advanced voice recognition and natural language understanding technologies to enable seamless voice control in a smart home environment. It focuses on the architecture of the system, which includes a central hub connected to various IoT devices throughout the home. Users can interact with the system using natural language commands to control lighting, appliances, security systems, and more.

The paper discusses the challenges of implementing such a system, including ensuring accuracy in voice recognition and maintaining security and privacy. A case study is included to demonstrate the system's effectiveness in a real-world setting, showcasing improvements in user convenience and home management efficiency

III EMBEDDED SYSTEMS

An embedded system is a microprocessor-based computer hardware system – a combination of a computer processor, storage medium (eg: RAM) and input/output peripheral devices – which form part of an independent or larger mechanical or electrical system, device or machine. Within these products, an embedded system contains sequentially executed software that is designed to perform a dedicated function, a limited number of tasks or group of specific tasks such as: sampling sensor values, registering a button press or communicating with a PC. Its purpose is to control a device and allow a user to interact with it.

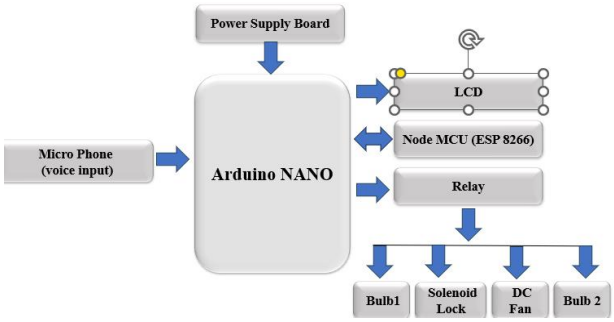

Fig: Block Diagram of Voice Controlled Smart Home

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At the core of an embedded system is an integrated circuit (IC) designed to carry out computation for real-time operations. Complexities range from a single microcontroller to a suite of processors with connected peripherals and networks; from no user interface to complex graphical user interfaces. The complexity of an embedded system varies significantly depending on the task, application and environment for which it is designed.

IV PROPOSED SYSTEM

The main components that the proposed system consists of are transformer, Rectifier, voltage regulator, Arduino, 4-channel relay LCD and ESP32 (node MCU).

A voice controlled smart home system using ESP32 typically works by integrating to controlled various parameters of home appliances such as lights, fan, and solenoid lock. The microcontroller then collects data from node (MCU) and processes it to controlled the home appliances. Here's a general overview of how such a system might work:

1.Appliances: Various parameters are connected to the microcontroller. These devices are controlled by the signals which are send by the node (MCU) and turn on the relay separately

2. Data Acquisition: The Arduino Nano reads data from these sensors at regular intervals. It may use analog or digital inputs, depending on the type of devices and its interface.

3. Data Processing: Once the device data is acquired, the Arduino Nano processes it to ensure accuracy and reliability. This may show whether the device is turn on or off condition in the display.

4. Data Analysis: The processed data is then analyzed to determine the selected device to turn on. This analysis will separately operate the relay separately

5. Communication: Based on the analysis, The ESP32 can be equipped with communication modules such as Wi-Fi module to transmit the data to a remote server i.e., r displays it on a local interface i.e., LCD. This enables real-time monitoring and remote management from the mobile phone.

6. User Interface: A user interface, which could be a web dashboard, a mobile app, or an LCD display, allows users to view the real-time data and system status. They can also configure settings and receive a message which device is turn on

Overall, the ESP32-based voice controlled system provides an efficient and cost-effective solution for monitoring and maintaining the applications such as fans, lights, locking systems

V CASE STUDY

The project is performed on the various cases like at Home, Industries, etc. The results are as follow:

Depend upon the given voice commands from the mobile the devices are operated separately

Case 1: Test results of on conditions

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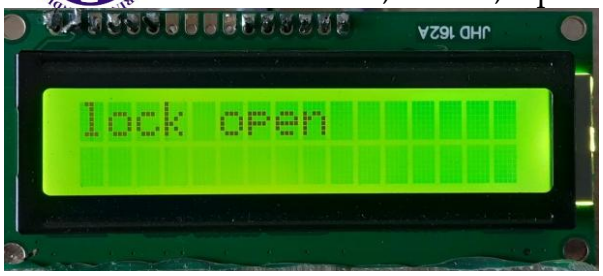
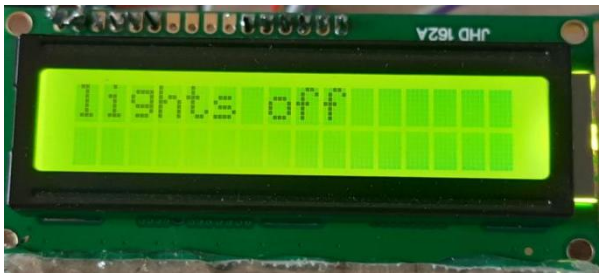
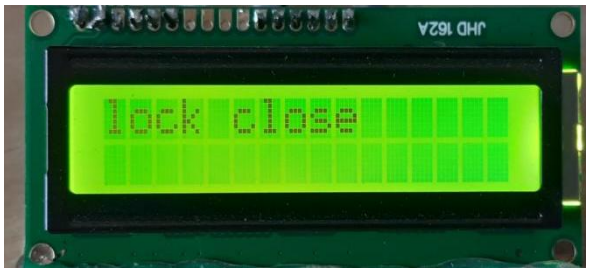


Case 2 : Test results of off conditions

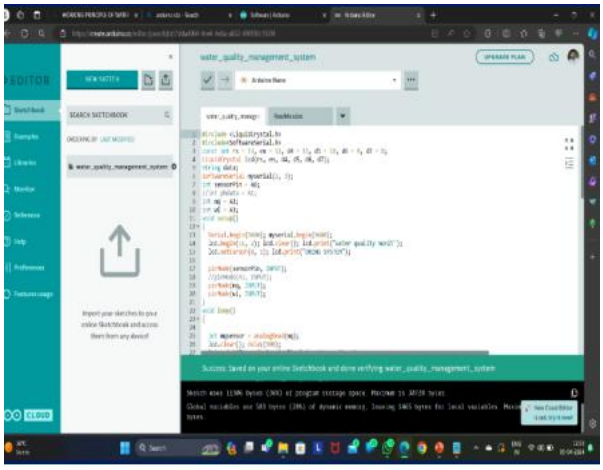




VI SOFTWARE USED

After learning about the main parts of the Arduino UNO board, we are ready to learn how to set up the Arduino IDE. Once we learn this, we will be ready to upload our program on the Arduino board.

1. **Download and Install Arduino IDE:** If you haven't already, download and install the Arduino IDE (Integrated Development Environment) from the official Arduino website: https://www.arduino.cc/en/software



2. Connect your Arduino Nano: Plug your Arduino Nano into your computer using a USB cable. Make sure the cable is firmly connected to both the Arduino Nano and your computer.

3. Select Board and Port: Open the Arduino IDE. In the Tools menu, under the Board submenu, select "Arduino Nano." Then, under the Port submenu, select the port that your Arduino Nano is connected to. If you're not sure which port to choose, you can check in the Device Manager (Windows) or System Information (Mac).

4. Test Connection (Optional): To make sure everything is set up correctly, you can upload a simple sketch to your Arduino Nano. Open the "Blink" example sketch (File -> Examples -> 01. Basics -> Blink). This sketch will make the onboard LED on pin 13 blink on and off. Click the "Upload" button (the right arrow icon) in the Arduino IDE toolbar. If the upload is successful, you should see the LED on your Arduino Nano blinking.

5. Start Programming: Now you're ready to start writing your own Arduino sketches! You can find plenty of tutorials and examples online to help you get started with different projects and components.

VII CONCLUSION

In conclusion, water quality management plays a crucial role in environmental management by providing information on the chemical, physical, and biological characteristics of water bodies. It is

critical for ensuring the safety of water for human consumption and for the preservation of aquatic ecosystems. There are various methods, such as chemical analysis, physical analysis, biological analysis, remote sensing, and citizen science, are used to monitor water quality, each with its own strengths and limitations. However, the use of a combination of methods is necessary to get a comprehensive understanding of water quality and its changes over time. Despite the challenges and limitations, it is important to continue improving and developing these methods for accurate and reliable water quality measurement. This information is essential for effective water management policies, public health protection, and preservation of ecosystems.

In the past, water quality has been measured by taking the water samples and sending them to the laboratories, and examining them, which is very costly, time-consuming, and involves more human resources. Through this project, we aim to provide a cost-effective and scalable solution for water quality assessment and management, contributing to sustainable water resource management practices. The embedded nature of the system allows for compact and efficient deployment in various environments, facilitating continuous monitoring of water quality.

VIII FUTURE SCOPE

We can add more devices to operate the home Fastly and secure.

- **Security:** Monitoring By adding the more security features To operates the devices correctly.
- **Accessibility** : Access the home from any places without any disturbances like lag factor

Also, we can add the feature to control the water supply to each flat depending upon user water usage.

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