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Abstract – This paper proposes the development of a home automation system using Wi-Fi and ESP8266. The system will allow users to control various household appliances such as lights, fans, air conditioners, and electronic devices using their smartphones or other connected devices. The proposed system will use the ESP8266 microcontroller, which has Wi-Fi capabilities, to connect to the internet and receive commands from the user's device. The system will use a web interface that will allow users to control and monitor their devices remotely. The web interface will be hosted on a local server, and the system will use MQTT protocol for data communication. We created the Flutter application to turn on and off the all home appliances through the application.

1. Introduction

Home automation refers to the application of computer and information technology for control of home appliances easily. Home automation for the elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care. The popularity of home automation has been increasing in recent years due much higher affordability and simplicity through Smartphone and tablet connectivity. Internet of Things (IoT) is a concept where each device is assign to an IP address and through that IP address anyone makes that device identifiable on internet. The mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. Basically, it started as the "Internet of Computers." Research studies have forecast an explosive growth in the number of "things" or devices that will be connected to the Internet. The resulting network is called the "Internet of Things" (IoT). The recent developments in technology which permit the use of wireless controlling environments like, Bluetooth and Wi-Fi that have enabled different

devices to have capabilities of connecting with each other. It will indirectly reduce the cost of this system. Each of the connection has their own unquespecifications and applications.

2. Problem Statement

The traditional home automation systems are often complex and expensive, making it difficult for the common household to adopt them. Additionally, many of these systems are not easily accessible from a remote location, making it challenging to monitor and control home appliances when away from home. The proposed IoT based home automation system aims to address these issues by providing an affordable and user-friendly solution that can be accessed from anywhere using a smartphone application. The system will simplify the automation process and reduce the complexity of the system while ensuring that it is accessible to a wider audience. By using the ESP8266 microcontroller and Flutter framework, the system will provide a cost-effective and efficient solution that will enable users to control all home appliances from a single platform.

3. PROPOSED SYSTEM

The proposed system consists of two primary components: the hardware and the software. The hardware component includes the ESP8266 microcontroller, which is used to control the appliances, while the software component includes the Flutter framework, which is used to develop a multi-platform application for controlling the appliances. The following sections provide a detailed description of the proposed system components. The hardware component of the system consists of the ESP8266 microcontroller, which acts as the central processing unit (CPU) of the system. The ESP8266 is a low-cost, Wi-Fi enabled microcontroller that can be easily programmed using the Arduino IDE. The ESP8266 communicates with the home appliances using various protocols, such as Infrared (IR) or Radio Frequency (RF) communication. To control the

appliances, the ESP8266 is connected to a relay board that switches the appliances ON or OFF based on the user's commands. The relay board is connected to the ESP8266 via GPIO pins, and the appliances are connected to the relay board. The software component of the system consists of the Flutter framework, which is used to develop a multi-platform application for controlling the appliances. Flutter is an open-source mobile application development framework that allows developers to create high-performance, visually attractive applications for both Android and iOS platforms. The application is designed to provide users with an easy-to-use interface for controlling the appliances. The user can turn ON or OFF the appliances, set timers, and create custom schedules for the appliances. The application communicates with the ESP8266 using Wi-Fi, and the ESP8266 responds to the user's commands by switching the appliances ON or OFF.

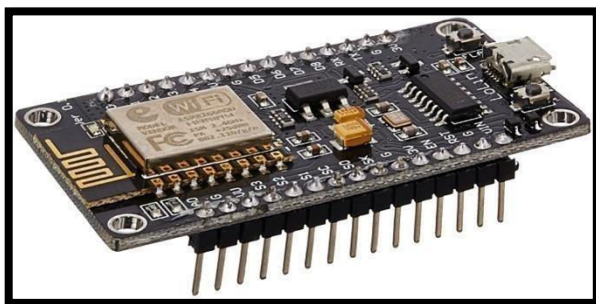


Fig-1: NodeMCU ESP8266

ADVANTAGES:

User-friendly: The system is easy to use, and the smartphone application provides a simple and intuitive interface for controlling the appliances.

Multi-platform support: The system is designed to work on both Android and iOS platforms, making it accessible to a wider audience.

Cost-effective: The use of the ESP8266 microcontroller and the Flutter framework makes the system affordable compared to traditional home automation systems.

Energy savings: The system allows users to set schedules and timers for their appliances, reducing energy consumption and saving money on electricity bills.

Convenience: The system enables users to control their home appliances from anywhere using a smartphone application, providing added convenience and flexibility.

Hardware Requirements:

| | |
|------------|--------------------------------|
| IOT device | : NodeMcu (ESP 8266) |
| Router | : Wifi |
| OS | : Android, Linux, Windows, IOS |
| Browser | : Any web browser |
| Web tool | : Visual studio code. |
| Backend | : php |
| Database | : MySQL |

Cloud platform : 000webhostapp Methodology

The proposed methodology for developing the IoT based home automation system involves the following steps:

Hardware Setup: The first step involves setting up the hardware components of the system, including the ESP8266 microcontroller and the relay board. The ESP8266 is connected to the relay board, which is then connected to the home appliances. **Software Development:** The next step involves developing the software components of the system, including the smartphone application. The Flutter framework is used to develop the application, which is designed to communicate with the ESP8266 microcontroller over Wi-Fi. **Integration:** Once the hardware and software components are developed, the next step involves integrating them to create a functional system. The smartphone application is configured to send commands to the ESP8266, which processes the commands and switches the appliances ON or OFF accordingly. **Testing:** The final step involves testing the system to ensure that it is functioning correctly. The system is tested for various scenarios, including turning appliances ON and OFF, setting schedules and timers, and creating custom control settings.

Working Modules:

Hardware module: This module comprises the hardware components of the system, including the ESP8266 microcontroller, relay board, and the home appliances. The hardware module is responsible for processing commands from the smartphone application and controlling the appliances accordingly.

Wi-Fi module: This module is responsible for establishing a Wi-Fi connection between the smartphone application and the ESP8266 microcontroller. The Wi-Fi module enables the smartphone application to send commands to the microcontroller over a wireless network.

Smartphone application module: This module comprises the smartphone application developed using the Flutter framework. The application

module is responsible for sending commands to the ESP8266 microcontroller to control the appliances, setting schedules and timers for the appliances, and creating custom control settings. Control module: This module is responsible for processing the commands received from the smartphone application and controlling the appliances accordingly. The control module communicates with the hardware module to switch the appliances ON or OFF based on the received commands.

Storage module: This module is responsible for storing the schedules, timers, and custom control settings for the appliances. The storage module enables users to create custom schedules and settings for their appliances and ensures that these settings are retained even if the microcontroller is reset or powered off.

5. Literature Survey

In this paper [1] the author experimented, the implemented system's that is connect all the devices with the sensors and the automated home is controlled by the controller. But there is some lacking in the other existing system.

The security is a little bit weak in that observed process. In our home automation system, there are huge benefits than the other systems. Our system controls all the instruments of our house through mobile phones or computers. The system we build there is no lacking in security because we improved the security system of our proposed system. Our system is much secure because here we use identical eye retina scan pattern.

In this paper [2] the author experimented, the projected system is enforced victimisation Node MCU by overcoming all the drawbacks of previous existing strategies during this project all the sensors square measure connected to the Node MCU board and therefore results may be seen in phone. for each second it shows new worth The camera module is connected to the Arduino UNO board as a result of in Node MCU board we've just one analog pin for camera module we are going to use lot of analog pins. The captured pictures are going to be hold on in folder of our computer and, it sends Captured pictures to the user email.

In this paper [3] the author experimented, association with the server, the information of device square measure sent to the web server for checking of the framework. The web server page that is ready to switch to screen

and management the framework. By stepping into the distributed subject address inside net program this internet server page will show up. The web server offers the data relating to the temperature in higher places of the house and movement state inside the house. All the required data is place away inside the cloud.

6. Conclusion

In conclusion, the IoT based home automation system is a practical solution for homeowners looking to automate their homes and control their appliances from a smartphone application. By integrating the ESP8266 microcontroller with a relay board and developing a smartphone application using the Flutter framework, users can control their appliances remotely and set custom schedules and control settings. The system's modular design enables easy

maintenance and scalability, and the use of Wi-Fi connectivity allows for seamless wireless communication between the smartphone application and the microcontroller. The proposed system offers several advantages, including improved energy efficiency, enhanced convenience, and greater control over home appliances. It also provides an opportunity for future enhancements such as voice control, machine learning, and energy monitoring. Overall, the IoT based home automation system represents a practical and scalable solution for homeowners looking to automate their homes and improve their quality of life.

7. Future Enhancement

Voice control: Adding voice control functionality to the smartphone application would enable users to control their home appliances using voice commands. This would enhance the usability of the system, particularly for individuals with disabilities or mobility issues.

Machine learning: Integrating machine learning algorithms into the system could enable it to learn from the user's behavior and automatically adjust the appliances' settings based on their preferences. This could improve the system's efficiency and reduce the need for manual

intervention.

Security features: Adding security features such as two-factor authentication, data encryption, and user authentication could enhance the system's security and protect user data from unauthorized access.

Energy monitoring: Adding energy monitoring functionality to the system could enable users to track their energy consumption and identify ways to reduce their energy usage.

Integration with smart devices: Integrating the system with other smart devices such as smart speakers, smart thermostats, and smart locks could create a more comprehensive home automation system and enhance the user experience.

Solar power integration: Integrating the system with solar panels could enable users to power their home appliances using renewable energy, reducing their reliance on grid electricity and lowering their carbon footprint.

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