IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 2, April 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

IOT Based Home Automation with Integrated Energy Monitoring System

Karthikeyan N[1], Thamilarasu S[2], Rethanya L[3], Yamuna Shree K[4], Swathi S[5]

Assistant Professor Department of ECE,Velalar College of Engineering and TechnologyErode, Tamil Nadu,India[1]

UG Student Department of ECE, Velalar College of Engineering and TechnologyErode, Tamil Nadu, India.[2 3 4 5]

***ABSTRACT*:** This paper explores the capability of utilizing IOT-based home automation. The aim is todevelop a home automation system with an integrated energy monitoring system. The devices are equipped with sensors, such as a temperature sensor, humidity sensor, ultrasonic sensor, flame sensor, and gas sensor, to monitor the home. The ESP8266 microcontroller acts as a central processing unit and integrates various sensors for home automation and energy monitoring. The collected data from the microcontroller is visualized on a Blynk application or a web dashboard for remote monitoring and control purposes. The paper examines the significance of home automation and gives the total energy and power consumed by the overall appliances, as well as the individual voltage, current, and power that can be calculated for each device in the home. The appliances can be operated manually by the Blynk app, and automation can be achieved by the PIR sensor.

KEYWORDS: Sensor, Microcontroller, Blynkapp, Internetof Things.

I. INTRODUCTION

In today's scenario all the technologies are operated in automatic condition from anywhere around the world. Smart home automation is a system where all home devices are automated and smarter than today. It connects electronics with human life and increases man's ability to control his environment as well. On the other hand, a smart monitoring system makes our life safer. This automated system makes ourhome smarter and smarter.

IoT devices are typically utilized for home automation applications, such as mobile phone-basedcloud platform control of lights and fans. The energy monitoring were included with home automation. The energy consumed by the individual appliances and total power and cost was visualized in the mobile app. The home monitoring unit was implemented in thepaper. It can be achieved by the sensors value and mobile app.

II. RELATED WORK

In this section, the paper briefly describes the existing work for automation system for home using IOT.

The paper aim is microcontroller (ESP32) to develop a home automation system that implements the internet of things (IoT) using a Wi-Fi-based that is interfaced with a JavaScript-based android app that uses the HTTP request method to control the microcontroller. With this IoT project, one can control home appliances from the comfort of their smartphone and manual switches additionally. If there is no internet available still, one can control the relay module from the manual push buttons. As far as this paper is concerned, the Node MCU (ESP32) microcontroller along with Relays is used to control electrical switches remotely from the server.
The continuous smart grid development makes the advanced metering infrastructure an essential part of electricity management systems. Smart meters not only provide consumers with more economical and sustainable electricity consumption but also enable the energy supplier to identify suspicious behavior or meter failure. In this work, a shape-based algorithm that indicates households with abnormal electricity consumption pattern within a given consumer group was proposed. The algorithm was developed under the assumption that the reason for unusual electricity consumption may not only be a meter failure or fraud, but also consumer's individual preference and lifestyle.

The proposed a Zigbee based design of home automation system that would promote the implementation of home automation and digital control. They have not implemented it practically but only proposed an idea with simple

structure, high reliability.

The existing automation systems based on Bluetooth are cost efficient and easy to implement/install butaren't flexible enough with the environment or simply lacks the ability to use them beyond a limit. Generally, a Bluetooth system operates under range of 0 to15 meters. Moreover, from user point of view Bluetoothis an outdated technology and presumably has compatibility issues. ZigBee based systems also have the similar problem of range as their application is limited to indoor use. These systems are generally used for LAN. In GSM based home automation system, it is not only limited to smart mobile phone instead, you can use a normal featured phone. However, the system is network dependent and a specific format is required to send the message in order to control the appliances.

III. SYSTEM DESIGN

The Figure 1 shows the block diagram of the proposed system. The PIR sensor was used to determine the presence of the person, through which the light can be turned on and off. The fan can be operated remotely with the Blynk app, which was interfaced with a microcontroller to transmit the signal from the mobile app to switch on the fan. The relay was used to make communication between the microcontroller and fan possible. The proposed system provides complete smart home automation with integrated sensors.

The system consists of three parts: one for home automation, the other for energy monitoring, and then home parameter monitoring. Sensors such as current and voltage sensors were integrated into the system to measure the amount of power and energy consumed byall appliances. Then, with the help of a current and voltage sensor, the individual value of the appliancesat which it operated was determined with its utilized power. The home monitoring can be done by the various sensors like temperature sensor, humidity sensor, flame sensor, gas sensor. The monitoring system will improve for safety purpose. The system were proposed with different type of sensors and result was showed in the mobile app and the can control the home appliances remotely.

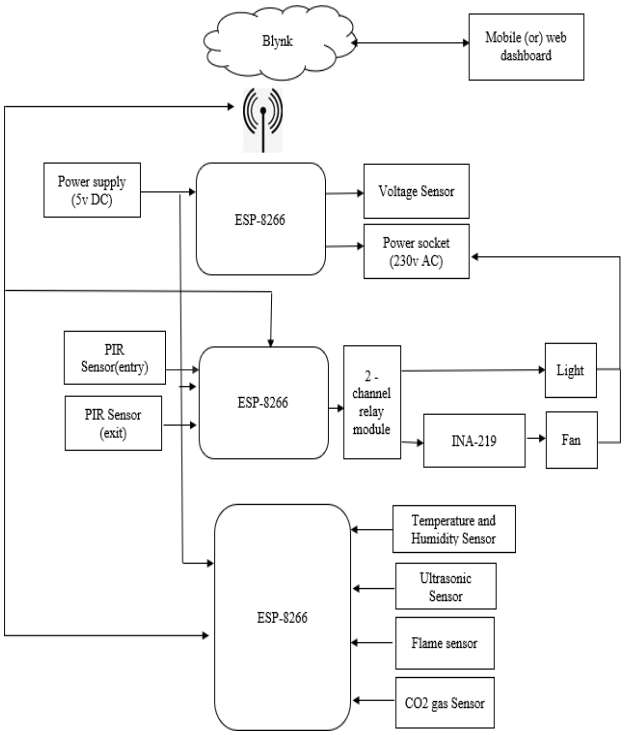

Fig 1 Block diagram of proposed system of homeautomation with integrated energy monitoring.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

3.1 Home automation system

The home automation was implemented by the PIRsensor. The PIR sensor is a type of motion sensor. When it senses motion, it triggers a response, such as turning on lights and other appliances. The sensor value was given to the microcontroller, which wasconnected to the relay module. The relay turns the light on and off with the help of the microcontroller, which can be viewed in the Blynk app.

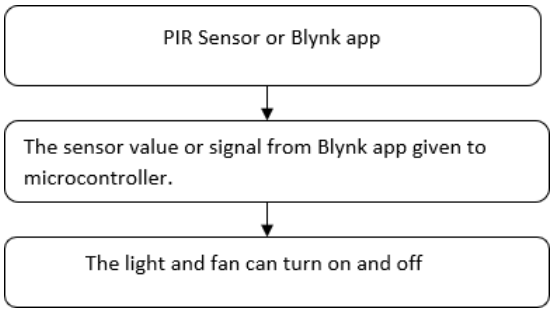

Fig 2 Home automation system

The above Figure. 2 shows the state of light and fan, which were visualized in the Blynk app. The fan can be operated in the mobile app. The appliances can be monitored and controlled by the Blynk app.

3.2 Energy monitoring system

The proposed system consists of voltage sensor, current sensor through which we can calculate the totalenergy, power, voltage, current and the power, voltage and current can be monitored for the individual appliances.

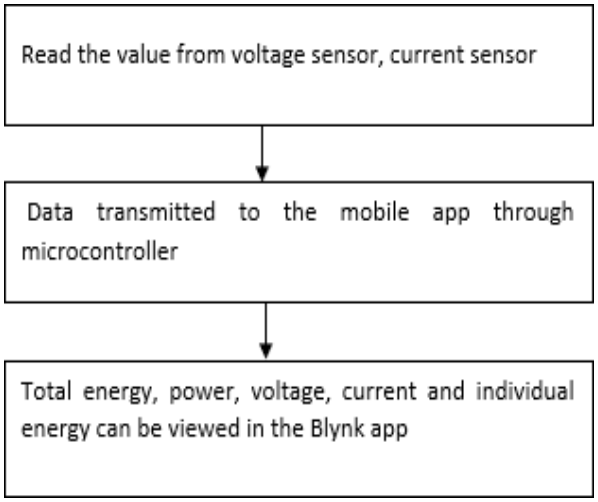

Fig 3 Enegy monitoring system

The figure 3 shows the implementation of the energy monitoring system. This system were implemented to monitor the power and to detect the voltage that appliances consume. The voltage sensorwas installed at the main power supply to measure the voltage level and current sensor were attached to each individual appliance to measure the current consumption. The microcontroller interfaced with the sensors and process the data. The microcontroller collects voltage and current data from the sensors. Byusing the algorithms to calculate power consumption (P=V x I) for each appliance and totalpower consumption. Then the real-time data can be viewed in the smart phone or in web dashboard.

The energy monitoring system was implemented to measure the total energy ,power,voltage,current and it help the consumer to know about the power consumed.The advantages of this system to reduce the power consumption and to know whether there was a high voltage consumption and current leakage.The smart grid technology can be used to implement the system more secure.The sensor current coil can also be used to measure the current through the wire.The measured value can be viewed in the Blynk app.The result can also be visualized in the web dashboard.The System can effectively monitor energy consumption for both individual appliances and the overall system.

3.3 Home monitoring system

Home monitoring can be done by various sensors like temperature sensors, humidity sensors, flame sensors, and gas sensors. The parameters in the house can be monitored by these sensor. The sensors will have a threshold value. When the value was greater than the threshold value, the necessary action was given by sending the alert information to Gmail, which can also be viewed in the Blynk app. The alert message was also visualized in the Blynk app. The parameter was normal; the level can be seen in the Blynk app. The below fig. 4 represents the status of the sensor reading.

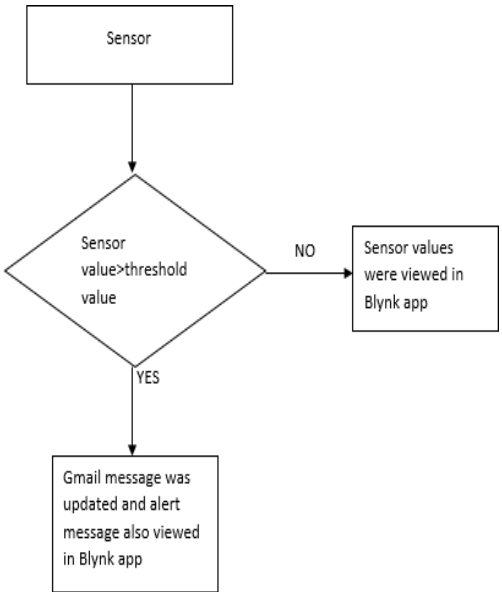

Fig 4 Home monitoring system

The above figure 4 describes the home automation system. The primary responsibility is designing and implementing a home monitoring system that synchronizes temperature, moisture, fire, and gas sensors to ensure complete safety and security. The system will continuously monitor the internal environment of the house, taking into account variations in temperature and moisture content, in addition to the existence of fires or potentially harmful gases. The system will promptly notify property owners through alerts on their phones or other linked devices in the event of anomalous readings or possible threats, such as fires or gas leaks. This project aims to provide mortgage holders with ongoing information about the security status of their house, enabling them to take preventative action to avoid accidents, secure property, and ensure the well-being of occupants. If the threshold voltage of the sensor is reached then the alert message will be send to the Gmail.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

IV. RESULT AND DISCUSSION

After successfully implementing the above- mentioned system, we tested the prototype on the hardware module. The home automation was implemented with an energy measuring system.

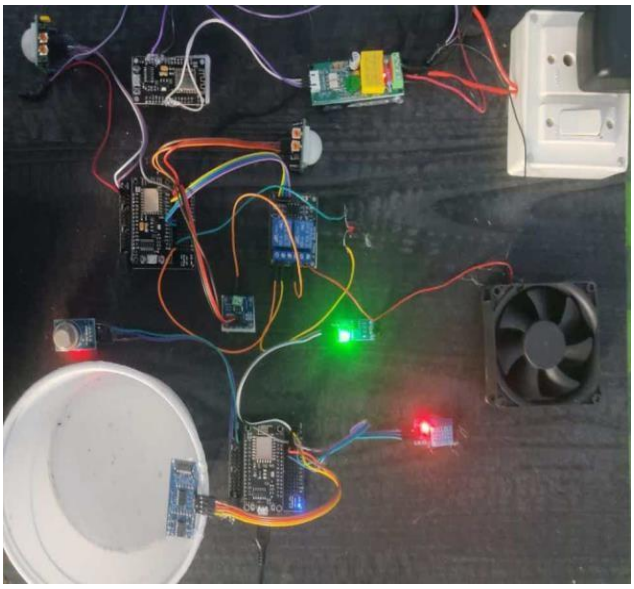

Fig 5 Hardware implementation of the proposedsystem

The above figure 5 describes the hardwareimplementation of the home automation system .

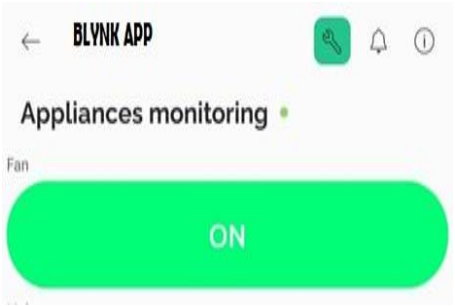

Fig 6 Representation of appliances manual control inblynk app.

The above figure 6 discusses the implementation of the appliance control on the Blynk app. The fan can bemonitored and controlled through the Blynk app. The appliances can be operated manually by this Blynk app.Automation can be achieved by a PIR sensor

The Figure 7 gives the total voltage, total current,. The system can also give the total voltage, total current, and total power. The system can also measure individual voltage, current, and power. The measured values were visualized in the Blynk app.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

Fig. 7 Representation of total voltage, total current that overall appliance consuumed.

Fig 8 Representation of total power that overall appliances consumed.

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

The above Figure 8 discusses the total amount ofpower consumed at home. The consumer can checkthe total power consumed in the Blynk app. The graph represents the power consumption of the appliances in real time.

Fig 9 Representation of total energy and cost

The figure 9 describes the total energy calculated in kwh per hour and the cost given for the total energy consumed. The above-mentioned figures give the total voltage,current, power, and energy consumed by the overall appliances.

Fig 10 Representation of fan voltage

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Refereed Journal |

|| Volume 12, Issue 2, April 2024 ||

International Conference on Recent Development in Engineering and Technology – ICRDET 24

Organized by

Dhaanish Ahmed Institute of Technology, KG Chavadi, Coimbatore, Tamilnadu, India

Figure 10 describes the individual appliances; here is the calculated voltage that the fan consumed.

Figure 11 gives the total current and power that the fanconsumes. The voltage, current, and power can be calculated for each device in the home. This system will help the consumer know the value of the power that each appliance consumes. This helps with energy efficiency and reduces power consumption.

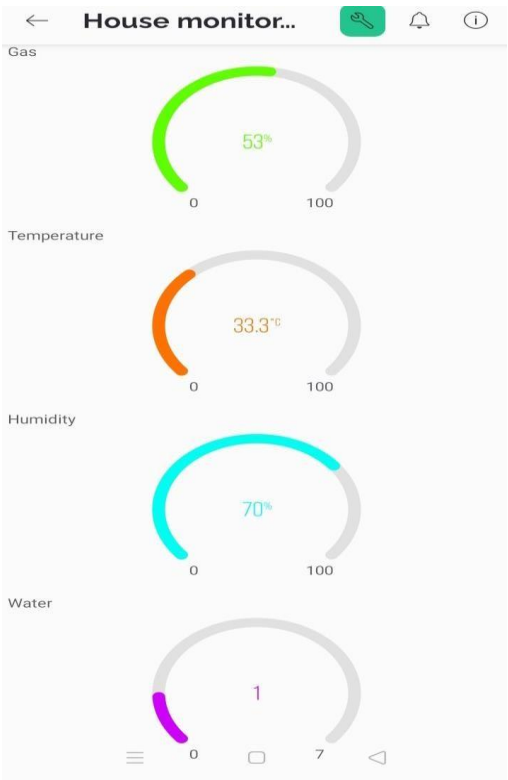

Fig 11 Representation of fan's current and power consumed.

Fig 11 Representation of home monitoring system The above figure 12 describes the home parameters like temperature, humidity, water tank level, gas.The system improve the functionality of the home automation. The result can be viewed by the blynk app. The alert message were given through the gmail.

V. CONCLUSION

In this work, a real-time home automation system has been successfully implemented which is quite effective in terms of performance and technology. In conclusion, a major development in contemporary living is the incorporation of IoT technology into home automation systems that also include energy monitoring features. This system provides ease, efficiency, and sustainability by enabling customers to remotely control and monitor their home gadgets and energy consumption. By utilizing real-time data insights, homeowners may make well-informed decisions to maximize their energy efficiency, decrease expenses, and lessen their ecological impact.

VI. FUTURE SCOPE

The camera module can be used to automate the home and use the AI tool and deep learning to interface with a security system in the home. Connecting home automation systems to smart grids can enable demand response programs, allowing utilities to better manage energy demand during peak times and incentivizing consumers to use energy more efficiently.

REFERENCES

1. Jeu Young Kim, Hark-Jin Lee, Ji-Yeon Son, and Jun-hee Park, “Smart Home Web of Objects-based IoT Management Model and Methods for Home data mining” from IEEE Explore in 2015 17th Asia-- Pacific Network Operations and Management.

2. Lance Allison, “Inter-App Communication between Android Apps Developed in App-Inventor and Android Studio” 2016 IEEE/ACM International Conference on Mobile Software Engineering and Systems. DOI: 10.1109/MobileSoft.2016.018

.Progress Mtshali, Freedom Khubisa, “A Smart Home Appliance Control System for Physically Disabled People” from Research gate 2019 Conferenceon Information Communications Technology and Society (ICTAS). DOI:10.1109/ICTAS.2019.8703637.

3. R. S. Ransing and M. Rajput, "Smart home forelderly care, based on Wireless Sensor Network," 2015International Conference on Nascent Technologies in the Engineering Field (ICNTE), Navi Mumbai, 2015, pp. 1-5.

4. S. Kumar and S. R. Lee, "Android based smart home system with control via Bluetooth and internetconnectivity," The 18th IEEE International Symposium on Consumer Electronics (ISCE 2014), JeJu Island, 2014, pp. 1-2.

5. Young-Guk Ha, “Dynamic integration of Zigbeehome networks into home gateways using OSGI service registry,” IEEE Transactions on Consumer Electronics., vol. 55, Issue. 2, pp.470-476, May. 2009

.J. Stankovic, Q. Cao, T. Doan, L. Fang, Z. He, R.Kiran, “Wireless Sensor Networks for In-HomeHealthcare: Potential and Challenges,” Proc. Of the Workshop on High Confidence Medical DevicesSoftware and Systems, June 2005.

6. Srivastava, A., Gupta, A., & Anand, R. (2021). Optimized smart system for transportation using RFID technology. Journal| MESA,12(4), 953-965.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi crossref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details