IOT Based Smart Home Automation

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***Abstract*—This paper presents a comprehensive approach to designing and implementing an IoT-based smart home automation system that offers remote monitoring and control of household devices such as lights, fans, and door locks. The system leverages a Raspberry Pi microcontroller and Wi-Fi communication to connect with home appliances via the Blynk application. It also integrates safety features such as smoke detection and real-time notifications, providing enhanced security and convenience. A detailed review of literature highlights the evolution of IoT-based automation technologies. Furthermore, the paper provides circuit diagrams, code samples, and a detailed methodology for implementation, demonstrating a scalable and cost-effective smart home solution.**

I. INTRODUCTION

With the growing adoption of Internet of Things (IoT) technologies, smart home automation has emerged as a transformative innovation in enhancing home security, energy efficiency, and user convenience.

IoT enables the seamless interconnection of physical devices through internet-based control systems. In this project, the smart home system comprises a Raspberry Pi, relays, sensors (DHT11, PIR), and mobile integration through the Blynk application. The system allows users to control appliances remotely and monitor temperature, humidity, and security parameters through a web-based or mobile interface.

II. LITERATURE REVIEW

The following table summarizes and compares recent studies on IoT-based home automation systems, highlighting different methodologies, hardware platforms, and communication protocols.

S. No.	Title & Author(s)	Platform Used	Control Method	Features	Year
1	Atzori et al., 2010	Arduino, Zigbee	Web & Sensor	Home Monitoring, Energy Saving	2010
2	Abdul-Rahman & AlRousan, 2004	Java, PC Interface	Java App	Control Devices via Java GUI	2004
3	Alheraish, 2004	GSM + Microcontroller	SMS	GSM-based Device Control	2004
4	Elkamchouchi & Elhorbaty, 2012	GSM + PIC Microcontroller	SMS	Power Saving, GSM Alerts	2012
5	ElShafee & Hamed, 2012	Arduino + Wi-Fi	Android App	Remote Light & Fan Control	2012
6	Jain et al., 2014	Raspberry Pi	GUI, Email	Email-based Device Control	2014
7	Kumar et al., 2016	ESP8266 + Arduino	Mobile App	Voice-controlled Devices	2016

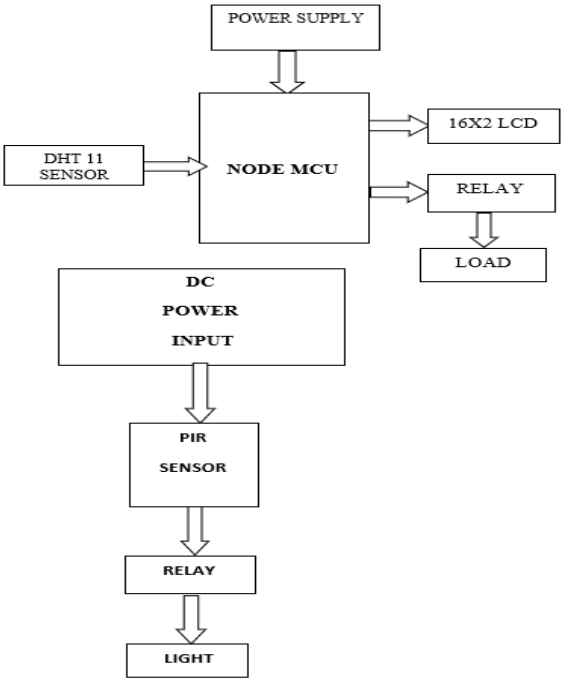
Discussion**:** While earlier systems depended on GSM and Java-based interfaces, modern implementations have shifted towards cloud-based and smartphone-centric control using Wi-Fi and platforms like Blynk. This project follows this trend by integrating real-time control and environmental monitoring through the internet, enhancing usability and scalability.

III. METHODOLOGY

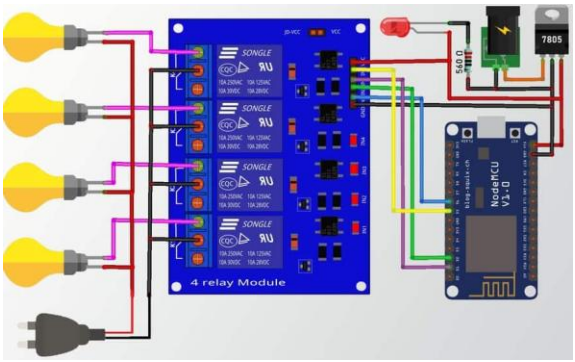
System Architecture
The system is based on three major components:
Microcontroller: Raspberry Pi or NodeMCU ESP8266 for control logic
Communication Protocol: Wi-Fi using the Blynk IoT platform
Control Devices: Lights, fans, door lock actuators, sensors (PIR, DHT11)

Hardware Components
NodeMCU ESP8266
DHT11 Temperature & Humidity Sensor
PIR Motion Sensor
5V Relay Module
LCD Display (I2C)
Smoke Sensor (MQ-2)
Power Supply

Block Diagram



Circuit Diagram



Sample Code Snippet
cpp
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```
#define BLYNK_TEMPLATE_ID "TMPL3JKyRAlEB"
#define BLYNK_TEMPLATE_NAME "IOT BASE HOME AUTOMATION"
#define BLYNK_AUTH_TOKEN "Your_Auth_Token"

#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include "DHT.h"

#define DHTPIN D5
#define DHTTYPE DHT11
DHT dht(DHTPIN, DHTTYPE);

char auth[] = BLYNK_AUTH_TOKEN;
char ssid[] = "your_wifi_ssid";
char pass[] = "your_wifi_password";

void setup() {
  Serial.begin(9600);
  Blynk.begin(auth, ssid, pass);
  dht.begin();
  pinMode(D0, OUTPUT);  // Relay for light
}

void loop() {
  Blynk.run();
  float temp = dht.readTemperature();
  float hum = dht.readHumidity();
  Blynk.virtualWrite(V1, temp);
  Blynk.virtualWrite(V2, hum);
}
```

System Features

Remote Appliance Control: Lights, fans, and doors via mobile app

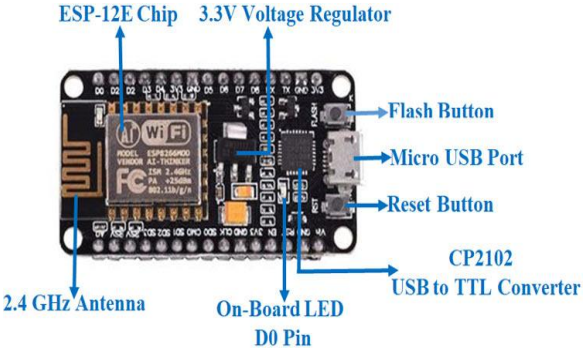
Environmental Monitoring: Real-time temperature and humidity display

Security: Motion and smoke detection with alerts

Visitor Entry Monitoring: RFID-based door access and counter system

Sample Pictures

Hardware Setup



IV. CONCLUSION

The proposed IoT-based smart home automation system provides a reliable, scalable, and user-friendly solution for remote control and monitoring of home appliances. By integrating sensors and the Blynk cloud platform, users gain real-time insights and control, enhancing energy efficiency and home security. Future enhancements may include AI-based voice control, integration with smart assistants like Alexa or Google Assistant, and edge computing for local decision-making.

REFERENCES

[1] Atzori, L., Iera, A., & Morabito, G. (2010). The internet of things: A survey. Computer Networks, 54(15), 2787–2805.

[2] Al-Ali, A. R., & AlRousan, M. (2004). Java-based home automation system. IEEE Transactions on Consumer Electronics, 50(2), 498–504.

[3] Alheraish, A. (2004). Design and implementation of home automation system. IEEE Transactions on Consumer Electronics, 50(4), 1087–1092.

[4] Elkamchouchi, H. M., & Elhorbaty, E. M. (2012). Smart Home Design using GSM and Internet. International Journal of Application or Innovation in Engineering & Management.

[5] ElShafee, A., & Hamed, K. (2012). Design and Implementation of a WiFi Based Home Automation System. IJETT, 2(1), 13–18.

[6] Jain, A., Vaibhav, A., & Goyal, L. (2014). Raspberry Pi based interactive home automation system through E-mail. International Conference on Reliability, Optimization and Information Technology.

[7] Kumar, S., & Yadav, N. (2016). Voice Controlled Home Automation System using Artificial Intelligence. International Research Journal of Engineering and Technology (IRJET).