

# IOT BASED HOME AUTOMATION

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**Abstract:** Home automation systems must comply with the household standards and convenience of usage. Home automation is one of the major growing industry that can change the way people live. Some of these home automation systems target those seeking luxury and sophisticated home automation platforms; others target those with special needs like the elderly and the disabled. Typical wireless home automation system allows one to control household appliances from a centralized control unit which is wireless. These appliances usually have to be specially designed to be compatible with each other and with the control unit for most commercially available home automation systems. The developed system can be integrated as a single portable unit and allows one to wirelessly control lights, fans, air conditioners, television sets, security cameras, electronic doors, computer systems, audio/visual equipment's etc. and turn ON or OFF any appliance that is plugged into a wall outlet, get the status of different sensors and take decision accordingly. The system is portable and constructed in a way that is easy to install, configure, run, and maintain. The perfect user interface still does not exist at present and to build a good interface requires knowledge of both sociology and technology fields. The problem lies with the situation of the elderly or disabled people, who cannot usually help themselves to move around, and might require external assistance. People who live alone might also need a helping hand at home. Therefore, an android app-controlled home automation system is designed, so that the users can perform certain tasks by just the use of their phones. Having a phone as a remote will make the system more user-friendly and portable.

**Keywords:** Node MCU, Microcontroller, IOT, circuit

## I. INTRODUCTION

IoT-based home automation refers to the use of Internet of Things (IoT) technology to control and manage various aspects of your home, such as lighting, heating, security, and appliances, through connected devices and the internet. Here are some key components and benefits: **Devices:** You can use IoT-enabled devices like smart thermostats, smart lights, smart locks, and smart cameras to control and monitor different aspects of your home remotely. **Sensors:** Sensors like motion detectors, temperature sensors, and humidity sensors can be integrated into the system to automate actions based on environmental conditions. **Hub or Controller:** A central hub or controller, often in the form of a smartphone app, allows you to manage and configure your smart devices. **Voice assistants like Amazon Alexa or Google Assistant** can also serve as controllers. **Connectivity:** These devices connect to your home Wi-Fi network or other communication protocols like Zigbee or Z-Wave, enabling remote access and control via the internet. **Automation:** You can create automation routines or schedules that trigger specific actions. For example, you can set the lights to turn on automatically when motion is detected or adjust the thermostat based on your preferences. **Remote Control:** With a smartphone app or web interface, you can control your home devices from anywhere with an internet connection.

## II. EXISTING SYSTEM AND ITS LIMITATIONS

1. Smart Device: Use smart devices like lights, thermostats, and locks.
2. Voice Control: Control devices via voice assistants (e.g., Alexa, Google Assistant).
3. Smartphone Apps: Manage and monitor devices through dedicated apps.
4. Wi-Fi Connectivity: Connect devices to your home network for remote control.
5. Thread: Low-power protocol for IoT networking.
6. Sensors: Detect motion, temperature, light, and more.
7. Cloud Services: Store data, enable remote access.
8. IFTTT: Create custom automation rules.
9. Machine Learning: Optimize automation based on user behaviour.
10. Security Protocols: Ensure device and network security.
11. Geofencing: Trigger actions based on location.
12. Local Control: Prioritize local communication for privacy.

### **III. PROBLEM STATEMENT**

"Many homeowners face challenges in managing and controlling their household appliances, lighting, heating, cooling, security, and other systems efficiently. Traditional control methods often lack convenience, energy efficiency, and remote access. There is a growing demand for a comprehensive IoT-based home automation system that can address these issues and provide users with seamless control, energy savings, and enhanced security for their homes."

The specific objectives and features of the home automation system can be outlined based on the desired outcomes, such as:

1. Remote Control
2. Energy Efficiency
3. Security
4. User-Friendly Interface
5. Integration
6. Customization
7. Scalability
8. Data Privacy and Security
9. Cost-Effectiveness

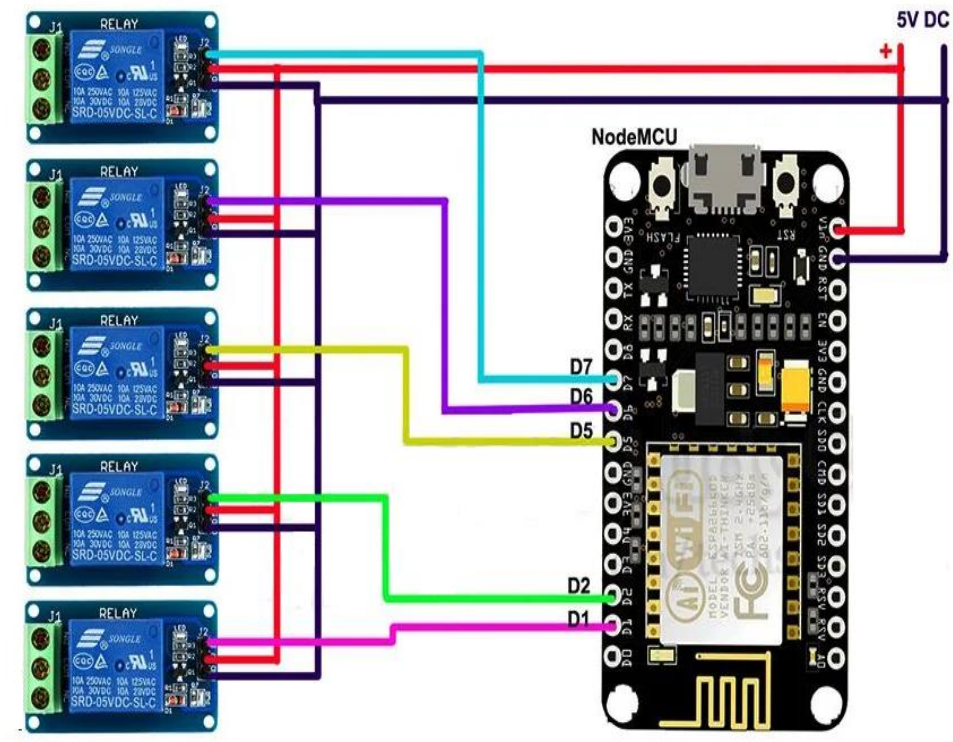
By addressing these objectives in the development of an IoT-based home automation system, the problem statement can guide the design, implementation, and testing phases of the project to create a solution that meets the needs and expectations of homeowners.

### **IV. SCOPE OF PROJECT**

Historically a Smart Home was perhaps considered a luxury item and would be classed as more of a "want" rather than a "need". After all, people have been getting up off the sofa to turn their lights on and off manually for many years! Nowadays though, Home Automation systems bring all manner of benefits to you and your family - security, safety, comfort, convenience, energy efficiency and money saving. So, if Smart Technology is already here, bringing Home Automation to multiple devices (smart gadgets, smart appliances, etc), what smart technology will the future bring? In this article we'll use our crystal ball to look at the future of home automation.



## V. SCHEMATIC DIAGRAM



### WORKING:

In this Home Automation System, we will control 4 home appliances as Tv, Fan, Bulb, Motor, Refrigerator connected to Relay using Blynk Application. The Wifi Module NodeMCU ESP8266 will Receive commands from the smartphone wirelessly through the internet. To encode the ON/OFF signal and send it to Server and to ESP8266 Board we need the best IoT Platform. So we chose Blynk as no other application can be better than this one. This project requires internet connectivity & can't work without Internet connection

## VI. HARDWARE COMPONENTS DESCRIPTION

### 1. Node MCU ESP8266

Node MCU ESP8266 Wi-Fi Module is an open-source Lua based firmware and development board specially targeted for IoT based applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Express if Systems, and hardware which is based on the ESP-12 module.

- Microcontroller: Ten silica 32-bit RISC CPU Xtensa LX106
- Operating Voltage: 3.3V
- Input Voltage: 7-12V
- Digital I/O Pins (DIO): 16
- Analog Input Pins (ADC): 1
- UARTs: 1
- SPIs: 1
- I2Cs: 1
- Flash Memory: 4 MB
- SRAM: 64 KB
- Clock Speed: 80 MHz
- USB-TTL based on CP2102 is included onboard, Enabling Plug n Play
- PCB Antenna
- Small Sized module to fit smartly inside your IoT projects

- Node MCU ESP8266 Pinout:
- For practical purposes ESP8266 Node MCU V2 and V3 boards present identical pinouts. While working on the Node MCU based projects we are interested in the following pins.
- Power pins (3.3 V).
- Ground pins (GND).
- Analog pins (A0).
- Digital pins (D0 – D8, SD2, SD3, RX, and TX – GPIO XX)
- Most ESP8266 Node MCU boards have one input voltage pin (Vin), three power pins (3.3v), four ground pins (GND), one analog pin (A0), and several digital pins (GPIO XX).

## **2.RELAY MODULE**

Relay Module is a convenient board which can be used to control high voltage, high current load such as motor, solenoid valves, lamps and AC load. It is designed to interface with microcontroller such as Arduino, NodeMCU, etc

### **Specification**

- Digital output controllable
- Compatible with any 5V microcontroller such as Arduino.
- Rated through-current: 10A (NO) 5A (NC)
- Control signal: TTL level
- switching voltage 250VAC/30VDC
- switching current 10A
- Size: 43mm x 17mm x 17mm

## **3.Bulb electric**

A bulb is the glass part of an electric lamp, which gives out light when electricity passes through it. The stairwell was lit by a single bulb. Synonyms: light bulb More Synonyms of bulb.

- This quantifies the colour appearance of the bulb and is measured in degrees Kelvin. Common colour temperatures are:
- 2800K – Very Warm White
- 3000K – Warm White
- 3500K – White
- 4000K – Cool White
- 5000K - Daylight
- 6500K – Natural Daylight (how the sun appears at midday)

## **4.Female to Female Connecting Wires /Jumper Wires (Set of 10)**

This is a set of 10 rainbow colour male to male jumper wires. They can be used for interconnecting electronic components on mounted On circuit . The wires are 20 cm long. Both the side of the wire has female pins.

The colour of all four wires will be different but the exact colour might vary from that of the picture. These male-to-male jumper wires are of good quality, reusable and has an approximate length of 20cm.

### **Specifications of Male to Female Connecting Wires 1 x 20cm male to female breadboard connecting wires**

- Easy to plug in
- Durable, Flexible
- Multiple Colours
- Jumper wire size : 26 AWG
- Current Rating : up to 1 A
- Insulation Type: PVC

## **VII. CONCLUSION**

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet.

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