

# IoT Based Home Automation System-ESP8266

## BLOCK DIAGRAM OF IOT BASED HOME AUTOMATION

The IoT-based home automation system using the ESP8266 is structured around several key components that work together to provide seamless control and monitoring of home appliances. At the core of the system is the ESP8266 microcontroller, which interfaces with various actuators. Actuators like relays, lights, fans, and other appliances are controlled by the ESP8266. The system connects to the internet via a Wi-Fi router, enabling the ESP8266 to communicate with the Blynk Cloud, which acts as the central hub for data exchange and command processing. Users interact with the system through the Blynk mobile application on their smartphones, providing a user-friendly interface for remote control and real-time monitoring of connected devices. The Blynk Cloud facilitates this interaction by receiving commands from the mobile app and sending them to the ESP8266, which then activates the appropriate sensors and actuators. This setup allows for efficient and convenient home automation, leveraging the ESP8266's robust wireless communication capabilities and the versatility of the Blynk platform to enhance user experience and system functionality.

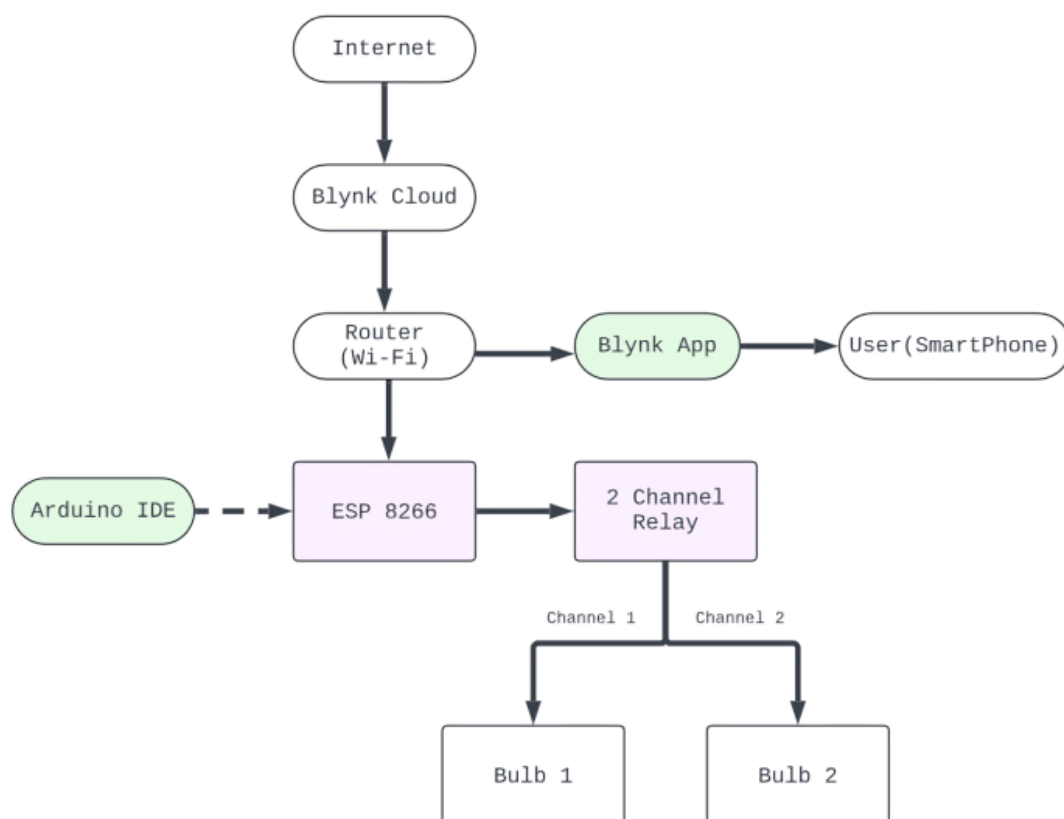


Figure1| Block Diagram of IoT based Home Automation-ESP8266

# METHODOLOGY

Implementing an IoT-based home automation system using the ESP8266 involves several steps, including setting up the hardware, programming the microcontroller, and integrating it with a cloud service like Blynk.

## Step 1: Define the Project Scope

Determine the devices and appliances required to be automated (e.g., lights, fans, temperature sensors) and the functionalities required (e.g., monitoring).

## Step 2: Gather Components

- **ESP8266:** A popular Wi-Fi module used for IoT projects.
- **Two channel Relay:** To control high-voltage appliances.
- **Power Supply:** Appropriate power source for the ESP8266 and connected components.
- **Breadboard and Jumper Wires:** For prototyping the circuit.

## Step 3: Set Up the Hardware

1. **Connect the ESP8266:**
  - Power the ESP8266 using a suitable power source (typically 3.3V).
  - Connect the GPIO pins of the ESP8266 to the relay modules and sensors.
  - Ensure proper grounding and connections to avoid hardware damage.
2. **Relay Module Connection:**
  - Connect the input pins of the relay module to the GPIO pins of the ESP8266.
  - Connect ground and power supply pins.

## Step 4: Program the ESP8266

1. **Install Arduino IDE:**
  - Download and install the Arduino IDE from the official website.
  - Install the ESP8266 board package via the Boards Manager.
2. **Install Libraries:**
  - Install necessary libraries, such as the Blynk library and any sensor-specific libraries.
3. **Write the Code:**
  - Initialize the Blynk library with your authentication token.

- Define the pin configurations and sensor read/write logic.
  - Implement the logic to read sensor data and control appliances based on received commands.
4. **Upload the Code:**
- Connect the ESP8266 to your computer via a USB-to-Serial adapter.
  - Upload the code to the ESP8266 using the Arduino IDE.

## Step 5: Configure Blynk

1. **Set Up the Mobile App:** Add widgets to your project to control and monitor your devices (e.g., buttons, sliders, graphs).
2. **Get Auth Token:** Obtain the authentication token from the Blynk app and include it in your ESP8266 code.

## Step 6: Test and Debug

1. **Test Connectivity:** Ensure the ESP8266 connects to your Wi-Fi network and communicates with the Blynk server.
2. **Test Functionality:** Verify that you can control appliances and read sensor data through the Blynk app
3. **Debug:** Troubleshoot any issues with hardware connections, code, or network connectivity.

## Step 7: Deployment

1. **Install at Home:** Install the system in your home, ensuring it is safely integrated with your home's electrical system.

This methodology provides a structured approach to creating an IoT-based home automation system using the ESP8266, ensuring a comprehensive and secure setup.

## HARDWARE MODEL DEVELOPMENT

The hardware implementation of an IoT-based home automation system involves connecting a two-relay switch to two lamps. Build a connection between the ESP8266 and the relay switch. After successfully connecting the ESP8266 to the relay switch, to write the code, access the Blynk web application setup page. Launch the Blynk web application, then choose the virtual pin data stream to create the on-and-off switches. Following this, we must configure the settings for the Arduino IDE and then insert the Blynk authentication token. Later on, insert your Wi-Fi credentials and choose the appropriate board and port. Following that, proceed to check and upload the code to the microcontroller. We must configure Blynk on our mobile device and control the on and off switches for both relays. Set up a connection between the ground (GND) and the negative terminal of the 5-volt battery power source, and link the VIN pin to the positive terminal of the 5V DC power source. Once you've arranged all these connections, check to see if the bulbs illuminate correctly after pressing the pushbutton. Inspect the switches on both the mobile and web dashboards.

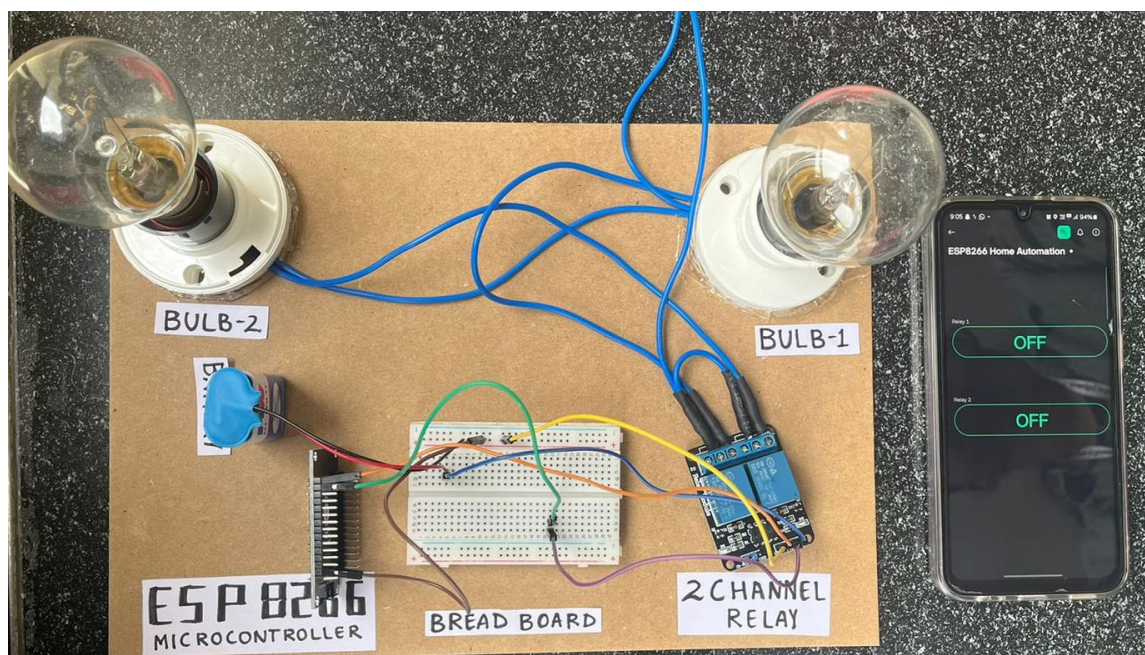
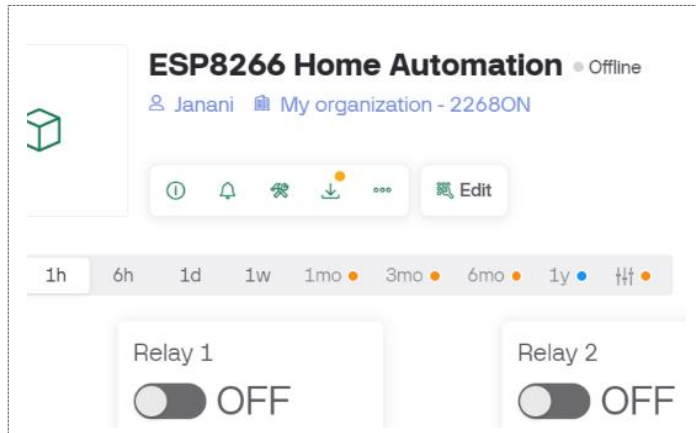


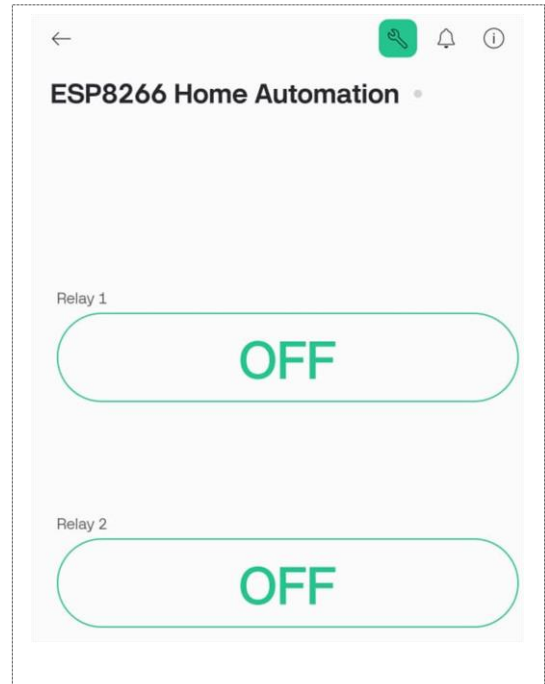
Figure2| Hardware Setup

# SOFTWARE MODEL DEVELOPMENT

- Blynk IoT Application Interface



**Figure3| Blynk IoT Web Interface**



**Figure4| Blynk IoT App Interface**