**ESP8266 4-Relay Control with Arduino IoT Cloud**

**Overview**

This project allows you to control **four relays** using an **ESP8266 (NodeMCU)** via the **Arduino IoT Cloud**. You can **toggle relays** using **physical switches** or control them **remotely from anywhere** using a cloud-based dashboard.

**🎯 Key Features:**

✅ **Manual Control** – Use physical switches to toggle relays.  
✅ **Remote Control** – Control the relays from the **Arduino IoT Cloud Dashboard**.  
✅ **WiFi Connectivity** – Get real-time feedback on the relay status.  
✅ **Synchronization** – Changes from manual and cloud control stay updated.

**Components Required**

| **Component** | **Quantity** |
| --- | --- |
| **ESP8266 (NodeMCU)** | 1 |
| **4-Channel Relay Module** | 1 |
| **Push Buttons or Toggle Switches** | 4 |
| **Power Supply (5V/3.3V)** | 1 |
| **Connecting Wires** | As needed |

**Circuit Diagram**

🖼️ **Follow the wiring diagram below to connect your components:**

**Wiring Details:**

**Relays:**

* **Relay 1:** GPIO 5 (D1)
* **Relay 2:** GPIO 4 (D2)
* **Relay 3:** GPIO 15 (D8)
* **Relay 4:** GPIO 13 (D7)

**Switches:**

* **Switch 1:** GPIO 0 (D3)
* **Switch 2:** GPIO 2 (D4)
* **Switch 3:** GPIO 14 (D5)
* **Switch 4:** GPIO 12 (D6)

**Step-by-Step Instructions**

**1️⃣ Install Required Libraries**

Open the **Arduino IDE** and install the following libraries via the Library Manager:

* ArduinoIoTCloud
* Arduino\_ConnectionHandler

**2️⃣ Configure Arduino IoT Cloud**

1. Go to **Arduino IoT Cloud** and create a new **Thing**.
2. Add the following **Cloud Variables**:
   * relay1 (type: CloudSwitch)
   * relay2 (type: CloudSwitch)
   * relay3 (type: CloudSwitch)
   * relay4 (type: CloudSwitch)
3. Link these variables to a **toggle switch** in the **dashboard**.

**3️⃣ Upload the Code to ESP8266**

1. Connect the **ESP8266** to your computer.
2. Upload the following **Arduino Sketch** (after replacing **WiFi credentials** and **Cloud Keys**):

cpp

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#define RelayPin1 5 // D1

#define RelayPin2 4 // D2

#define RelayPin3 15 // D8

#define RelayPin4 13 // D7

#define SwitchPin1 0 // D3

#define SwitchPin2 2 // D4

#define SwitchPin3 14 // D5

#define SwitchPin4 12 // D6

CloudSwitch relay1;

CloudSwitch relay2;

CloudSwitch relay3;

CloudSwitch relay4;

void setup() {

pinMode(RelayPin1, OUTPUT);

pinMode(RelayPin2, OUTPUT);

pinMode(RelayPin3, OUTPUT);

pinMode(RelayPin4, OUTPUT);

pinMode(SwitchPin1, INPUT\_PULLUP);

pinMode(SwitchPin2, INPUT\_PULLUP);

pinMode(SwitchPin3, INPUT\_PULLUP);

pinMode(SwitchPin4, INPUT\_PULLUP);

}

void loop() {

if (digitalRead(SwitchPin1) == LOW) {

relay1 = !relay1;

digitalWrite(RelayPin1, relay1 ? LOW : HIGH);

}

}

**4️⃣ Test Your Project**

* Press the **physical switches** to control the relays.
* Use the **Arduino IoT Cloud Dashboard** to toggle the relays **remotely**.

**Demonstration**

📺 **Watch the project in action!**

**Future Improvements**

🔹 Add **real-time feedback** (LEDs for relay status).  
🔹 Expand control for **more devices**.  
🔹 Add **timer scheduling** for automation.

**Contact & Support**

📩 For any questions or suggestions, feel free to email: **electroiot@hotmail.com**

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