# Step-by-Step Guide to Creating the Blynk IoT App

## Prerequisites

- **Blynk App**: Download and install the Blynk app from the App Store or Google Play Store.
- **Blynk Account**: Sign up for a free account if you haven't already.
- **Project Auth Token**: Ensure you have your Blynk Auth Token from the provided code or email.

## Step 1: Create a New Project in Blynk

1. **Open the Blynk App**:
   - Launch the Blynk app on your smartphone.
2. **Create a New Project**:
   - Tap the **"+"** button to create a new project.
   - **Name** your project (e.g., "Home Automation").
   - **Device**: Select **ESP8266**.
   - **Connection Type**: Choose **WiFi**.
   - Tap **Create**.
3. **Retrieve Auth Token**:
   - After creating the project, Blynk will send an **Auth Token** to your registered email.
   - **Note**: Since you already have the Auth Token in your code you can use that directly.

## Step 2: Design the Blynk App Interface

You'll need to add several widgets to your Blynk project to control and monitor your devices.

### 1. Light Control (Virtual Pin V0)

- **Add a Button Widget**:
  1. Tap the **"+"** icon in the project dashboard to add a widget.
  2. Select the **Button** widget.
  3. **Configure the Button**:
     - **Name**: Light
     - **Pin**: V0
     - **Mode**: Switch (to toggle on/off)
     - **Color**: Choose a color (optional)
  4. Tap the **checkmark** to add the widget to your dashboard.

**2. Fan Manual Control (Virtual Pin V1)**

- **Add a Button Widget**:
    1. Add another **Button** widget.
    2. **Configure the Button**:
        - **Name**: Fan Manual
        - **Pin**: V1
        - **Mode**: Switch
    3. Tap the **checkmark** to add it.

**3. Fan Mode Control (Virtual Pin V2)**

- **Add a Switch Widget**:
    1. Add a **Switch** widget.
    2. **Configure the Switch**:
        - **Name**: Fan Mode
        - **Pin**: V2
        - **Mode**: Switch (to toggle between Auto and Manual)
        - **Labels**:
            - **Off**: Manual
            - **On**: Auto
    3. Tap the **checkmark** to add it.

**4. Temperature Display (Virtual Pin V3)**

- **Add a Value Display Widget**:
    1. Add a **Value Display** widget.
    2. **Configure the Display**:
        - **Name**: Temperature
        - **Pin**: V3
        - **Unit**: °C
    3. Tap the **checkmark** to add it.

**5. Humidity Display (Virtual Pin V4)**

- **Add a Value Display Widget**:
    1. Add another **Value Display** widget.
    2. **Configure the Display**:
        - **Name**: Humidity
        - **Pin**: V4
    3. Tap the **checkmark** to add it.

**6. Additional (Optional) Widgets**

- **Terminal Widget**: For debugging and real-time logs.
- **Graph Widget**: To visualize temperature and humidity trends over time.

## Step 3: Arrange and Customize Widgets

- **Organize** the widgets on your dashboard for easy access.
- **Customize** colors, sizes, and positions as desired for better user experience.

## Step 4: Connect Blynk App to Your NodeMCU

1. **Enter the Auth Token in Your Code**:
    - Ensure that the BLYNK_AUTH_TOKEN in your Arduino code matches the Auth Token provided by Blynk.
2. **Upload the Code**:
    - Use the Arduino IDE to upload your provided code to the NodeMCU ESP8266.
    - Ensure all libraries (Blynk, ESP8266WiFi, DHT) are installed.
3. **Power Up Your Hardware**:
    - Connect the NodeMCU, DHT11 sensor, relay modules, fan, and light as per your circuit diagram.
4. **Run the Blynk App**:
    - Open the Blynk app and select your project.
    - Ensure your smartphone is connected to the internet.

## Step 5: Test the Functionality

1. **Light Control**:
    - Tap the **Light** button to toggle the light on and off.
    - Verify that the light connected to **D2** responds accordingly.
2. **Fan Manual Control**:
    - Tap the **Fan Manual** button to turn the fan on and off manually.
    - Verify that the fan connected to **D4** responds accordingly.
3. **Fan Mode Control**:
    - Toggle the **Fan Mode** switch between **Manual** and **Auto**.
    - In **Auto** mode, the fan should turn on/off based on the temperature readings from the DHT11 sensor.
    - In **Manual** mode, the fan should respond only to manual controls.
4. **Temperature and Humidity Display**:
    - Check that the **Temperature** and **Humidity** values are updating in real-time on the app.
    - Ensure they reflect the actual readings from the DHT11 sensor.

### Step 6: Fine-Tuning and Enhancements

- **Adjust Thresholds**:
  - Modify the temperature threshold in your code (e.g., from 25°C to your desired value) for automatic fan control.
- **Add Notifications**:
  - Use Blynk's notification widgets to send alerts based on specific conditions (e.g., high temperature).
- **Security Enhancements**:
  - Ensure your Wi-Fi credentials are secure.
  - Consider using environment variables or separate configuration files to protect sensitive information.
- **Expand Functionality**:
  - Add more sensors or control additional devices like door locks, security cameras, etc.

### Visual Summary of Virtual Pins Mapping

| Widget | Virtual Pin | Description |
|---|---|---|
| Light Button | V0 | Toggles the light on/off |
| Fan Manual Btn | V1 | Toggles the fan on/off manually |
| Fan Mode Switch | V2 | Switches between Auto and Manual modes |
| Temperature Disp | V3 | Displays current temperature |
| Humidity Disp | V4 | Displays current humidity |

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# Additional Tips

- **Blynk Documentation**: Refer to the Blynk Documentation for more detailed information and advanced features.
- **Community Support**: Join the Blynk Community for support, ideas, and sharing your projects.
- **Code Optimization**: Regularly update your code for improvements and bug fixes. Consider implementing features like deep sleep for power saving if needed.