Instructions for Using the Smart Greenhouse System

1. **Hardware Setup:**
    - Connect the ESP32 board to the required sensors and modules:
        - **DHT11 Sensor** (Pin 13) for temperature and humidity monitoring.
        - **LDR Sensor** (Pin 34) for detecting light levels.
        - **Soil Moisture Sensor** (Pin 35) for soil moisture detection.
        - **Relays** for controlling fan 1 (Pin 23), fan 2 (Pin 22), LED (Pin 21), and water pump (Pin 19).
        - **LCD Display** (I2C address 0x27 or 0x3F) connected via **SDA (Pin 4)** and **SCL (Pin 5)**.
2. **Software Setup:**
    - Install the **Blynk** app on your mobile device and create a project with the required virtual pins (V1-V6).
    - Update the **Wi-Fi credentials** (SSID and password) in the code to connect to your network.
    - Upload the code to the ESP32 using the **Arduino IDE**.
3. **System Operation:**
    - The system automatically monitors **temperature, humidity, light intensity, and soil moisture**.
    - Based on sensor readings, it **automatically controls** the fans, LED, and water pump:
        - **Fan 1** turns ON if humidity exceeds **85%**.
        - **Fan 2** turns ON if temperature exceeds **35°C**.
        - **LED** turns ON when the environment is dark.
        - **Water pump** turns ON when the soil is dry.
4. **Manual Control via Blynk:**

- Users can **manually override** each device through the **Blynk app**:
  - **V1**: Fan 1
  - **V2**: Fan 2
  - **V3**: LED
  - **V4**: Water Pump
- When manually controlled, the device will stay ON for **5 seconds** before returning to automatic mode.

5. **LCD Display:**
   - The LCD screen continuously updates every **2 seconds** to display:
     - **Temperature (°C)**
     - **Humidity (%)**
6. **Data Logging to Blynk:**
   - The temperature and humidity data are sent to **Blynk virtual pins V5 and V6** every **5 seconds** for monitoring.
7. **Serial Monitor Debugging:**
   - Open the **Serial Monitor (115200 baud rate)** in the **Arduino IDE** to view real-time sensor readings and relay status.

Final Steps:

- Power the ESP32 and ensure all sensors are properly connected.
- Open the Blynk app to monitor and control the greenhouse environment remotely.
- Use the LCD for local monitoring of temperature and humidity.

This system helps automate greenhouse management by maintaining optimal conditions for plant growth through real-time sensor-based decisions and manual overrides.