SMART INTELLIGENT STREET LIGHT SYSTEM

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1. Software Installations

Ensure the necessary software and dependencies are installed on your system.

1. **Install Python and Required Libraries**:
   - Install Python (preferably version 3.9 or later).
   - Install the necessary libraries for your project:
     bash
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     pip install Flask RPi.GPIO requests
2. **Install Flask** (if not already installed):
     bash
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     pip install flask
3. **Set up Node.js and npm** (optional for additional frontend packages, if needed):
   - Install Node.js.
   - Use npm to install frontend dependencies if you plan to modify the index.html with additional tools.
4. **Enable GPIO Access**:
   - Ensure your Raspberry Pi is configured for GPIO access. Enable GPIO using the raspi-config tool:
     bash
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     sudo raspi-config
   - Navigate to *Interfacing Options* > *GPIO* and enable it.
5. **Install GPIO Support**:
   - Update your system and install required GPIO libraries:
     bash
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     sudo apt update
     sudo apt install python3-rpi.gpio

     2. Project Setup

     Prepare the project structure and integrate the components.

1. **Place Files**:

- Place app.py in the project root directory.
- Place index.html in a folder named templates inside the root directory (/templates/index.html).

2. **Set GPIO Pin Connections**:
   - Verify your Raspberry Pi's physical pin connections match the pin numbers specified in app.py.
3. **Configure API Keys**:
   - Replace the placeholders (API_KEY_LOCATION and API_KEY_WEATHER) in app.py with your actual API keys from OpenCage and OpenWeatherMap.
4. **Test Hardware Setup**:
   - Test all connected components (LEDs, light sensor, etc.) with a basic script to ensure proper functionality.

3. Running the Project

Run and test the project on your Raspberry Pi.

1. **Start the Server**: Run the Flask application:

   bash

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   python app.py

   The server will start on http://0.0.0.0:5000 by default.
2. **Access the Dashboard**:
   - Open a browser on your Raspberry Pi or any connected device.
   - Visit the URL http://<your-pi-ip>:5000 (replace <your-pi-ip> with your Raspberry Pi's IP address).
3. **Monitor Logs**:
   - Check the console for logs or errors while the server is running.
   - Verify that the LEDs and dashboard status updates reflect the hardware state and weather data.
4. **Test Endpoints**:
   - Test the API endpoint http://<your-pi-ip>:5000/api/status using a browser or tools like Postman.
5. **Continuous Monitoring**:
   - The LEDs will toggle based on light sensor input and weather conditions every 10 seconds (handled by a background thread in the script).

SCREENSHOTS