Solar Industry AI Assistant - Project Report

1. Project Overview

The Solar Industry AI Assistant is a web-based tool that enables users to upload rooftop satellite images and receive an AI-powered analysis for solar panel placement, estimated power generation, and financial return on investment (ROI).

2. Functionalities

- Upload rooftop image (PNG, JPG, JPEG)
- Prompt-based analysis of solar suitability
- Image-based estimation of usable area (m^2)
- ROI calculation based on panel efficiency, cost, and energy rates
- Visualization of results including savings, output, and payback period

3. Technical Details

- Developed using Python and Streamlit
- Image processing with OpenCV and Pillow
- Power and ROI estimates based on simple assumptions:
    - 1.6 m^2 per panel
    - 18% efficiency
    - Rs.6/kWh energy rate
    - Rs.50/watt installation cost
- Can be extended using deep learning-based segmentation

4. Sample Output

Solar Industry AI Assistant - Project Report

Prompt: Analyze this rooftop for solar panel suitability and give panel placement area, estimated power output (kWh/year), and shading issues.

Estimated Rooftop Area: 11.75 m²

- Suitable for ~7 panels
- Estimated Power Output: ~176 kWh/year
- Shading Issues: Minor near corners

ROI for 100 m² input:

- Estimated Output: 27000.00 kWh/year
- Annual Savings: Rs.162000.00
- Installation Cost: Rs.9000.00
- Payback Period: 0.1 years

5. Future Scope

- Integrate satellite map APIs for automatic image fetching
- Improve accuracy using ML-based segmentation
- Customize cost and tariff parameters by region
- Multi-language support for wider accessibility

6. Developer Information

Developed by: Mayank Arya

Date: May 30, 2025