

## Pre-Project SWOT Analysis: With Context

### Purpose

Before beginning any project, it's important to evaluate internal capabilities and the external environment. This pre-project SWOT analysis helps you assess whether you're strategically and operationally ready to launch—and what you should prepare for.

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### Project Overview

- **Project Name:** Solar Panel Degradation Predictor
  - **Project Objective / Goal:** To develop a CNN model that detects microcracks and soiling in thermal images of solar panels using drone data, and to create a real-time dashboard to automate maintenance alerts, thereby improving solar farm efficiency.
  - **Project Owner / Team:** Samiksha Yadav, Koppada Prudhvi Vinayak, Togaru Sri Harini
  - **Planned Start Date:** 2nd June 2025
  - **Key Stakeholders:** Solar farm operators and maintenance teams
    - 1M1B Green Internship mentors
    - Data science team for model building
    - Dashboard development team
    - Drone data acquisition specialists
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### SWOT Analysis

#### Strengths (*Internal, Positive Factors*)

What assets or capabilities currently support the project?

- Strong team skills in Python, ML (PyTorch/TensorFlow), and UAV/drone data collection.
- Motivated and adaptable team ready to learn and experiment.
- Clear sustainability focus, directly tied to renewable energy improvement.
- Ability to leverage drones for high-quality, consistent data capture.

### **Weaknesses (*Internal, Negative Factors*)**

What challenges within the team or organization might hinder success?

- Limited experience in processing thermal imagery data specifically for solar panels.
- Lack of standardized data labeling tools for microcrack and soiling classification.
- Time and resource constraints (30 hours) might limit depth of exploration.
- Potential gaps in dashboard-user experience (UI/UX) design.

### **Opportunities (*External, Positive Factors*)**

What favorable external trends or conditions can you take advantage of?

- Increasing push for predictive maintenance in renewable energy to reduce operational costs.
- Open-source ML and dashboarding tools are widely supported by active communities.
- Opportunity to showcase a scalable model for other green energy applications.
- Potential collaborations with green tech accelerators or sustainability competitions.

### **Threats (*External, Negative Factors*)**

What external risks could affect the project's progress?

- Drone usage regulations and licensing might limit full-scale deployment.

- Solar panel farms might have proprietary data restrictions (privacy/security).
- Weather variability impacting consistent data collection schedules.
- Risk of overfitting CNN models if data variability is low (bias towards specific images).

### ✓ Next Steps / Strategic Actions

- **Validate data collection approach with drone operators and farm stakeholders.**
- **Set up robust data annotation tools or processes to build training dataset.**
- **Build a minimal viable CNN model first—then iterate for higher accuracy.**
- **Create an intuitive dashboard that's easy to interpret for field technicians. Investigate integration challenges early (SCADA, maintenance scheduling APIs).**

