Track II: Implementation and Analysis

This project track is for students who want hands-on experience with existing 3D computer vision tools. Students will work on two separate projects, each focusing on applying 3D computer vision tools to a specific application.

Project Requirements:

- **Project Selection:**
  Students will choose **one application** for each project:
  - **Project I Applications:**
    - Monocular Depth Estimation
    - Pairwise Matching
    - NeRF vs. Gaussian Splatting
    - Text-to-3D
    - 3D Object Detection
  - **Project II Applications:**
    - Structure from Motion
    - SLAM
    - Inverse Rendering
    - Dynamic/Physics-Based Applications
- **Subtopic Selection:**
  For each application, students must select a **specific subtopic** (e.g., for Inverse Rendering: Intrinsic Decomposition, Material Estimation, or Lighting Estimation).
- **Model Selection and Evaluation:**
  - Identify **three different models** addressing the chosen subtopic.
  - Ensure the models have publicly available code and pre-trained checkpoints.
  - Use pre-trained models on a suitable dataset (either publicly available or collected) without additional training.
  - Identify **three instances of success** (where the model performed well) and **three instances of failure** (where it did not meet expectations).
  - Compare the three different models to determine their strengths and weaknesses.
- **Report Writing:**
  For each project, students will document their work in a **4-page report** (using the CVPR format). This includes:
  - Detailed model explanation.
  - Analysis of results.
  - Key insights and findings.
  - Promising future directions.

Grading Breakdown:

1. Project Pitch (5 points)

Present your project selection, subtopic and approaches.

2. Project I (20 points)

- **Presentation + Q&A (10 points):** Explain your results and answer questions.
- **Progress (10 points):**
    - Visual Results (6 points): 2 points per model.
    - Comparison (4 points): Analyze and compare the models.

3. Project II (20 points)

- **Presentation + Q&A (10 points):** Explain your results and answer questions.
- **Progress (10 points):**
    - Visual Results (6 points): 2 points per model.
    - Comparison (4 points): Analyze and compare the models.

4. Final Reports (15 points)

- **Project I Report (7.5 points):**
    - Introduction (1 point).
    - Explanation of 3 models (2 points).
    - Experiments (3.5 points).
    - Conclusion and future directions (1 point).
- **Project II Report (7.5 points):**
    - Same structure as Project I.

By the end, students will have completed two projects, presented their results, and submitted detailed reports totaling **8 pages (4 pages per project)** in the CVPR format.