**Project Design Phase**

**Proposed Solution Template**

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| Date | 27 June 2025 |
| Team ID | LTVIP2025TMID34533 |
| Project Name | Pollen Profiling |
| Maximum Marks | 2 Marks |

**Proposed Solution Template:**

Project team shall fill the following information in the proposed solution template.

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| **S.No.** | **Parameter** | **Description** |
|  | Problem Statement (Problem to be solved) | Manual classification of pollen grains is time-consuming, requires expert knowledge, and is prone to human error. This slows down research in environmental science, allergy diagnosis, and crop development, impacting public health, biodiversity studies, and agricultural productivity. |
|  | Idea / Solution description | Our solution is an AI-powered system that uses deep learning (CNN) to classify images of pollen grains. The system is integrated with a Flask-based web interface where users can upload pollen images and receive instant classification results. It automates analysis, improves accuracy, and reduces dependence on human expertise. |
|  | Novelty / Uniqueness | * Combines deep learning with image processing tailored for microscopic pollen images * Targets multiple domains: health, agriculture, and ecology * Provides a lightweight, web-based user interface for real-time classification * Can be extended with real-time environmental data for allergy alerts and forecasting |
|  | Social Impact / Customer Satisfaction | * **Environmental researchers** can save significant time in classification and get consistent data. * **Healthcare providers** can make more accurate allergy diagnoses and improve treatment plans. * **Farmers and agronomists** benefit from improved crop management based on pollination tracking. * Reduces costs and efforts involved in manual classification. |
|  | Business Model (Revenue Model) | * **Subscription-based SaaS** for research institutions, healthcare labs, and agri-tech companies * **Freemium model** with limited free usage for students or academic research * Custom integration and support as a paid service for enterprises * Licensing to educational and diagnostic platforms |
|  | Scalability of the Solution | * The model can be scaled to classify a wide variety of pollen species * Can be extended for real-time air quality monitoring and allergen detection * Capable of integrating mobile apps for field researchers * Deployable via cloud for global accessibility |