**Project Design Phase**

**Proposed Solution Template**

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| Date | 10 June 2025 |
| Team ID | LTVIP2025TMID38840 |
| Project Name | CleanTech: Transforming Waste Management with Transfer Learning |
| 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) | Improper segregation and management of solid waste results in increased environmental pollution and inefficiencies in recycling. Manual waste classification is time-consuming, inconsistent, and lacks scalability. |
|  | Idea / Solution description | "CleanTech" is an AI-powered smart waste classification system that leverages **Transfer Learning** to automatically identify and classify different types of waste (e.g., plastic, organic, metal, e-waste) from images. Users upload images via a web interface, and the model predicts the waste category, helping automate segregation and optimize disposal/recycling processes. |
|  | Novelty / Uniqueness | Unlike traditional rule-based or sensor-based waste management systems, Cleantech applies **deep learning with transfer learning**, allowing the model to adapt with fewer images and achieve high accuracy even in diverse real-world conditions. The solution is low-cost, flexible, and easily deployable on mobile/web platforms. |
|  | Social Impact / Customer Satisfaction | The solution promotes sustainable living, reduces landfill accumulation, and enhances recycling rates. Municipal bodies, recycling companies, and the general public benefit through improved awareness, cleaner surroundings, and easier waste handling. |
|  | Business Model (Revenue Model) | The model can be monetized through:  - Licensing to municipalities and waste management companies  - Subscription-based mobile app for residential and corporate users  - API integration for smart bins and IoT devices in smart cities |
|  | Scalability of the Solution | The solution is highly scalable:  - Can be trained on regional datasets to adapt to different waste types  - Deployable across devices (mobile, kiosks, smart bins)  - Cloud-based architecture allows for continuous updates and expansion |