**Project Design Phase-II**

**Solution Requirements (Functional & Non-functional)**

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| Date | 21 June 2025 |
| Team ID | LTVIP2025TMID32454 |
| Project Name | Clean Tech:Transforming Waste Management with Transfer learning |
| Maximum Marks | 4 Marks |

**Functional Requirements:**

Following are the functional requirements of the proposed solution.

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| **FR No.** | **Functional Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR-1 | Image Capture & Input | Image acquisition from conveyor belts, smart bins, factory disposal zones |
| FR-2 | Preprocessing Pipeline | Image resizing, normalization, noise removal, and data augmentation |
| FR-3 | Model Training & Classification | Fine-tune pre-trained models (e.g., ResNet, MobileNet); classify images into waste categories |
| FR-4 | Real-time Waste Categorization | Classify waste as recyclable, organic, hazardous, or general |
| FR-5 | Integration with Sorting/City/Fabrication Systems | Send signals to sorters, dashboard updates, or generate alerts for wrong waste types |
| FR-6 | Dashboard & Monitoring | Display classification logs, camera status, processing stats |

**Non-functional Requirements:**

Following are the non-functional requirements of the proposed solution.

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| **FR No.** | **Non-Functional Requirement** | **Description** |
| NFR-1 | **Usability** | Easy-to-use interface for admins to monitor the classification and system status |
| NFR-2 | **Security** | Secure access for image upload, model endpoints, and control interfaces |
| NFR-3 | **Reliability** | High-accuracy classification with minimal false positives/negatives |
| NFR-4 | **Performance** | Real-time inference capability under low latency (≤ 1s per classification) |
| NFR-5 | **Availability** | System should maintain 99.5% uptime for continuous operations |
| NFR-6 | **Scalability** | Able to scale across multiple bins, factories, or centers without degradation in performance |