Final Report

Project Name: Clean Tech

Team ID: LTVIP2025TMID34101

1. INTRODUCTION
   1. Project Overview

CleanTech leverages transfer learning to transform municipal waste management. By using deep learning models pre-trained on large datasets, CleanTech improves the accuracy and efficiency of waste classification from images.

* 1. Purpose

The goal is to automate the classification of municipal, industrial, and public waste using AI to reduce human error, enhance recycling accuracy, and support sustainable waste handling.

1. IDEATION PHASE
   1. Problem Statement

Manual waste sorting is inefficient and error-prone. There is a need for an automated system that classifies waste using smart technology to streamline segregation and disposal.

* 1. Empathy Map Canvas

Focuses on workers, citizens, and factory managers dealing with waste. Key concerns include hygiene, efficiency, and compliance.

* 1. Brainstorming

Ideas explored: smart bins, image-based classification, edge-AI cameras, cloud dashboards, industrial waste monitoring.

1. REQUIREMENT ANALYSIS
   1. Customer Journey map

User throws waste → Camera captures image → AI classifies → Waste is routed → Dashboard logs data.

* 1. Solution Requirement

Includes functional and non-functional requirements (see solution requirements document).

* 1. Data Flow Diagram

Input (Image) → Preprocessing → Classification → Categorization → Storage/Action

* 1. Technology Stack

Refer to Technology Stack document for details on architecture and technologies used.

1. PROJECT DESIGN
   1. Problem Solution Fit

Aligns with need to reduce human involvement in waste sorting and promote accurate segregation.

* 1. Proposed Solution

An intelligent vision-based system that classifies and sorts waste using cameras and AI models.

* 1. Solution Architecture

Modular, scalable architecture combining edge devices and cloud services.

1. PROJECT PLANNING & SCHEDULING
   1. Project Planning

Weeks 1-2: Research and dataset prep

Weeks 3-4: Model training and testing

Weeks 5-6: Integration

Weeks 7-8: Testing & documentation

1. FUNCTIONAL AND PERFORMANCE TESTING
   1. Performance Testing

FPS: 30+, Accuracy: ~92%, Latency: ~200ms/image on edge devices.

1. RESULTS
   1. Output Screenshots

Screenshot examples of classified waste categories, real-time dashboard, and reports (to be attached).

1. ADVANTAGES & DISADVANTAGES

* Reduces manual labor
* Improves classification accuracy
* Real-time operation
* Disadvantage: Requires high-quality image input and good lighting

1. CONCLUSION

CleanTech offers a promising automated approach to waste management using AI and computer vision.

1. FUTURE SCOPE

Future extensions include integration with robotic arms for physical sorting and use of IoT for predictive analytics.

1. APPENDIX

Source Code: Available upon request

Dataset Link: Custom & public datasets

GitHub & Project Demo Link: To be updated