

Project Design Phase-II

Technology Stack (Architecture & Stack)

Team ID: LTVIP2025TMID39058
Project Name: CleanTech: Transforming Waste Management with Transfer Learning

Technical Architecture:

The CleanTech system is designed using a modular architecture that integrates a mobile/web interface, backend logic, machine learning components, and cloud infrastructure. The architecture supports scalable deployment and integrates APIs for third-party services and real-time image classification.

[Architecture Diagram Placeholder]

Table-1: Components & Technologies

S.No	Component	Description	Technology
1	User Interface	User interaction via mobile/web	React Native, HTML, CSS
2	Application Logic-1	Backend API and ML control logic	Python (Flask/FastAPI)
3	Application Logic-2	Image preprocessing and validation	OpenCV, Pillow
4	Application Logic-3	Classification model interface	TensorFlow / PyTorch
5	Database	Stores user & image data	MongoDB / PostgreSQL
6	Cloud Database	Cloud-hosted DB for scaling	AWS RDS / Firebase
7	File Storage	Store uploaded images	AWS S3 / Google Cloud Storage
8	External API-1	Geo-location services	Google Maps API
9	External API-2	User verification	Aadhaar / Firebase Auth
10	ML Model	Predicts waste category	CNN Object Detection Model
11	Infrastructure	App hosting and compute	AWS EC2 / Lambda / Docker

Table-2: Application Characteristics

S.No	Characteristic	Description	Technology
1	Open-Source Frameworks	Frameworks used in CleanTech	TensorFlow, Flask, React
2	Security Implementations	Authentication, data privacy	OAuth2, HTTPS, IAM, AES Encryption
3	Scalable Architecture	Handles increasing data/users	Microservices on Kubernetes
4	Availability	Reliable uptime and failover	Load Balancer, Multi-zone deployment
5	Performance	Fast response, caching	CDN, Redis, Asynchronous API