CleanTech — Technology Stack and Architecture

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Team ID: LTVIP2025TMID38158

Project Name: CleanTech
Maximum Marks: 4 Marks

Technical Architecture

CleanTech is an AI-powered waste classification application that uses transfer learning with the VGG16 model. The system classifies images into **biodegradable**, **recyclable**, or **trash** using a Flask-based web interface.

Architecture Elements:

- **Frontend**: HTML/CSS for uploading and displaying predictions
- **Backend**: Flask server in Python handles model logic
- **Model**: Pre-trained VGG16 using Keras/TensorFlow
- **Storage**: Local file storage for uploaded images
- **Deployment**: Runs on localhost (can be containerized for cloud)

📋 Table-1: Components & Technologies

Component	Description	Technology

Component	Description	Technology
User Interface	Image upload & result display	HTML, CSS, JavaScript
Application Logic-1	Upload & handle input	Python, Flask
Application Logic-2	Predict using VGG16 model	TensorFlow, Keras
Database	Not applicable	—
Cloud Database	Not used	—
File Storage	Store uploaded files	Local Filesystem
External API-1	Not used	—
External API-2	Not used	—
Machine Learning Model	Waste classification	VGG16 (Transfer Learning)
Infrastructure	Hosted locally via Flask	Localhost, Python environment

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📋 Table-2: Application Characteristics

Characteristic	Description	Technology
Open-Source Frameworks	Flask, Pandas, TensorFlow, Keras	Python Libraries
Security Implementations	File type/size validation, basic auth possible	Flask Middleware
Scalable Architecture	Container-ready with Docker or cloud migration	Docker (Optional)
Availability	Deployable on cloud with load balancing	AWS EC2 / GCP
Performance	Optimized for small workloads	No CDN, Local Cache