

Methodology of Project

This AI-powered Swachhta monitoring system operates through dual data streams — CCTV camera feeds and citizen-reported uploads, both of which trigger auto-report generation. The system uses deep learning, smart alerts, and real-time dashboards to ensure cleaner public spaces and encourage civic participation.

1. Dual Data Acquisition

- CCTV Feeds (Automated Monitoring)
 - Live feeds or periodic snapshots from public cameras.
 - Captures waste, bins, littered areas, and vegetation.
- Citizen Uploads (Crowdsourced Reporting)
 - Citizens upload images via mobile/web interface.
 - Each upload includes a timetable, location, optional category, and remarks.

2. Auto-Report Generation (No Manual Gatekeeping)

- AI-Powered Reports (from CCTV)
 - YOLOv8 processes the feed and detects cleanliness violations.
 - Violation reports are automatically generated with:
 - Violation type
 - Location data
 - Cleanliness score
 - Image snapshot
- Citizen-Triggered Reports
 - Every valid citizen uploads a report instantly.
 - No AI moderation needed — fast-track logging and staff assignment.

Result: Dual auto-reporting ensures both proactive (AI) and reactive (public) cleanliness monitoring.

3. Task Assignment & Cleaning Workflow

- Violation reports (from either source) are assigned to staff/admins based on:
 - Violation category
 - Geo-tag and zone priority

- Staff receive tasks with image + location and clean the site.
- They upload "cleanup proof" images after resolution.

4. Feedback & User Notification Loop

- System compares new image (AI/manual) to verify the cleanup.
- Once confirmed:
 - Citizen reporters receive feedback:
 - Notification: "Your reported issue has been cleaned!"
 - Before/after image (optional)
 - Feedback form (thumbs up/down)
- Negative feedback re-initiates cleanup or flags for review.

5. Predictive Cleanliness Risk Analysis

- Uses:
 - Festival/calendar patterns
 - Public footfall data
 - Location types
 - Historical violation trends
- Generates risk heatmaps for proactive action by municipal authorities.

6. Admin Dashboard Capabilities

- Unified view of:
 - AI-generated and citizen-uploaded reports
 - Cleanup task progress
 - Real-time cleanliness map
 - User feedback and staff response logs
- Manual override for false positives/negatives

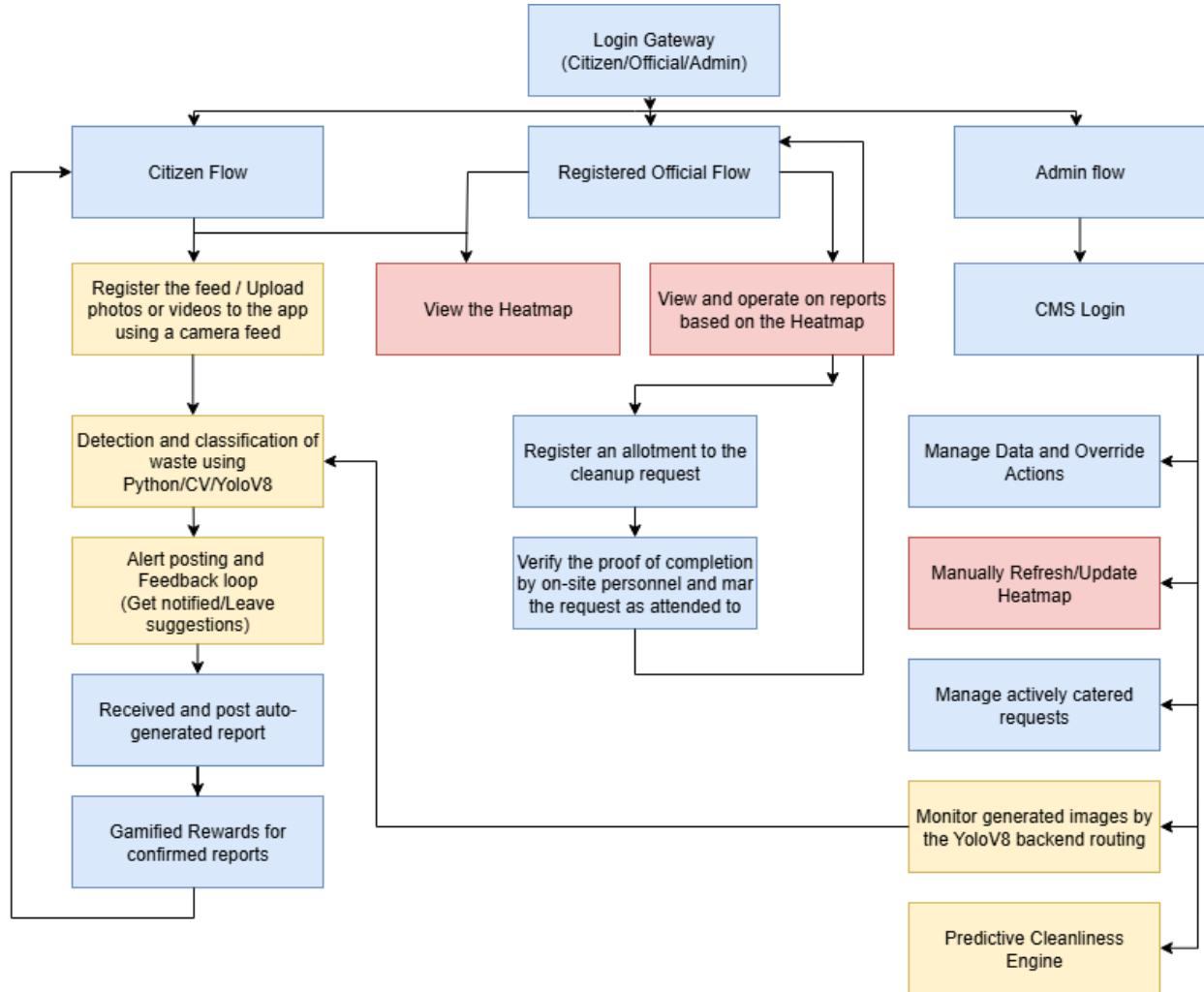
7. Gamified Citizen Participation (Optional)

- "Spot & Solve" module:
 - Badges or points for users who report valid violations.
 - Leaderboard for top reporters.
 - Community engagement and reward options.

Scalability & Government Integration

- Runs on existing public infrastructure (CCTV, mobile).
- Easily deployable across:
 - Schools, bus stops, post offices, smart cities
- Compatible with APIs from:
 - Swachh Bharat Mission
 - LiFE (Lifestyle for Environment)
 - MyGov platforms

Flow of the System



START: User Access

- User lands on Web/Mobile Platform
- Decision Node: Role
 - ▶ Citizen
 - ▶ Official (NGO/Govt/Volunteer)
 - ▶ Admin (System Manager)

1. Citizen Flow

1.1. Registration/Login

- Creates account or logs in

1.2. Submit Violation Report

- Uploads:
 - Image
 - Auto-location (GPS)
 - Optional: Category + Remarks
- Instant Auto-Report Created (No moderation)
- Stored in Report Database

1.3. View Public Cleanliness Heatmap

- Citizen views:
 - Nearby reported issues (crowdsourced + AI)
 - Cleanup status (open/resolved)
 - Risk zones (from prediction model)

1.4. Feedback After Cleanup

- If their report is resolved:
 - Gets notified with before/after images
 - Submits thumbs up/down
 - Negative? → Flags the report for re-verification

1.5. Gamified Rewards

- Earns points for valid reports
 - Leaderboard of top contributors
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2. Official (NGO / Volunteer / Gov Body) Flow

2.1. Registration/Login

- Registers as Official Role
- Assigned to zone/area of operation

2.2. Access Real-Time Heatmap

- Sees:
 - AI and Citizen reports (open only)
 - Location + Image + Violation type
 - Prioritized by:
 - Geo-zone
 - Severity

2.3. Claim Cleanup Task

- Selects open report
- Accepts/Confirms cleanup
- Task assigned in backend
- Receives route/location map + original image

2.4. Perform Cleanup + Upload Proof

- Uploads “after cleanup” image
- System auto-verifies (AI or Admin)
 - If verified: Marked Resolved
 - Else: Flagged for review

3. Admin Flow (via CMS Panel)

3.1. Admin Login (CMS Interface)

- Full access to:
 - User roles
 - Reports & moderation
 - System settings
 - Heatmap data
 - Task logs

3.2. Manage Data & Override Actions

- Monitor:
 - Citizen uploads
 - CCTV AI detections
 - Feedback flags
- Can:
 - Manually verify/reject reports
 - Reassign cleanup tasks
 - Edit zone data and heatmap thresholds

3.3. CCTV Feed (Automated Loop)

- Live/interval snapshots processed via YOLOv8

- Detects:
 - Litter, overgrowth, bins, etc.
- Auto-generates violation reports
- Feeds into:
 - Heatmap
 - Report DB
 - Official task list

3.4. Predictive Cleanliness Engine

- Uses:
 - Historical data
 - Footfall trends
 - Festival/calendar dates
- Generates:
 - Risk heatmaps
 - Zone priority suggestions
 - Shown to:
 - Admins
 - Officials
 - Citizens (read-only)

Core Shared Modules

Report Database

- Stores:
 - AI Reports (CCTV)
 - Citizen Reports
 - Cleanup status
 - Images, timestamps, location

Real-Time Heatmap

- Layers:
 - Open issues (red)
 - In progress (yellow)
 - Resolved (green)
 - Predictive hotspots (purple)

Feedback & Verification Loop

- Applies to:
 - Citizen feedback
 - AI confidence score
 - Admin override
- If flagged → routed back to Admin or Official