# 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.

1. 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.
2. 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.
3. 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.
4. 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
5. 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

**A diagram of a company

AI-generated content may be incorrect.**

START: User Access

* + User lands on Web/Mobile Platform
  + Decision Node: Role

▶ Citizen

▶ Official (NGO/Govt/Volunteer)

▶ Admin (System Manager)

1. Citizen Flow
   1. Registration/Login
      * Creates account or logs in
   2. Submit Violation Report
      * Uploads:
        + Image
        + Auto-location (GPS)
        + Optional: Category + Remarks
      * Instant Auto-Report Created (No moderation)
      * Stored in Report Database
   3. View Public Cleanliness Heatmap
      * Citizen views:
        + Nearby reported issues (crowdsourced + AI)
        + Cleanup status (open/resolved)
        + Risk zones (from prediction model)
   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
   5. Gamified Rewards
      * Earns points for valid reports
      * Leaderboard of top contributors
2. Official (NGO / Volunteer / Gov Body) Flow
   1. Registration/Login
      * Registers as Official Role
      * Assigned to zone/area of operation
   2. Access Real-Time Heatmap
      * Sees:
        + AI and Citizen reports (open only)
        + Location + Image + Violation type
        + Prioritized by:
          - Geo-zone
          - Severity
   3. Claim Cleanup Task
      * Selects open report
      * Accepts/Confirms cleanup
      * Task assigned in backend
      * Receives route/location map + original image
   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)
   1. Admin Login (CMS Interface)
      * Full access to:
        + User roles
        + Reports & moderation
        + System settings
        + Heatmap data
        + Task logs
   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. 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
   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

A diagram of a citizen flow

AI-generated content may be incorrect.