🔹 1. Citizen Interaction Layer (Mobile App – Java)

[User Launches App]

↓

[Login / Aadhaar Authentication]

↓

[Submit Civic Issue]

├── Capture Image

├── Auto-fill Summary (via on-device ML)

├── GPS Location

├── Category Selection

└── Language Selection (Multilingual UI)

↓

[Local Storage (RoomDB) if Offline]

↓

[Send to Backend via REST API]

🔹 2. Backend Gateway (Django REST + JWT)

[Receive Report]

↓

[Verify JWT Token + Aadhaar Status]

↓

[Store Metadata in PostgreSQL]

├── User ID

├── Location

├── Timestamp

├── Category

├── Language

└── Aadhaar Masked ID

↓

[Upload Image to AWS S3]

↓

[Trigger ML Pipeline via Flask Microservice]

🔹 3. ML Pipeline (Flask + TensorFlow + Transformers)

[Flask Endpoint: /validate-report]

↓

[Run Fake Report Detection]

├── Image Analysis (CNN)

├── Text Analysis (Transformer based architecture)

└── Duplicate Check (pHash)

↓

[If Valid → Proceed]

[If Fake → Flag User]

└── Increment Fake Count

└── If Fake Count > 3 → Restrict User + Notify Admin

↓

[Run Image Captioning Model]

└── Generate Auto-Summary

↓

[Return Summary + Validity Flag to Backend]

🔹 4. Community Layer

[Access Community Section]

├── View Local Issues

├── Comment / Discuss

├── Upvote / Downvote Reports

└── Multilingual Threads (Auto-translate via NLP)

↓

[Moderation Engine]

└── Flag Abuse / Spam

└── Aadhaar-linked identity for accountability

🔹 5. Backend Response Handling

[Update PostgreSQL Record]

├── ML Summary

├── Validity Status

├── ML Confidence Score

├── Fake Report Count

└── Community Engagement Metrics

↓

[Update Leaderboard (Redis)]

└── +Points for Valid Report

↓

[Notify Municipal Dashboard]

🔹 6. Municipal Dashboard (React.js + Leaflet.js)

[Officer Logs In]

↓

[View Dashboard]

├── Map View (Leaflet.js)

├── Filter by Category / Urgency / Location

├── View ML Summary + Image

├── View Community Feedback

└── Status Workflow: Pending → In Progress → Resolved

↓

[Auto-Generated Reports]

├── Issue Hotspots (Geo-clustering)

├── Category Trends (e.g., garbage, potholes)

├── Resolution Metrics

├── Citizen Engagement Stats

└── Monthly PDF / CSV Export

🔹 7. Predictive Analytics Engine (New Strategic Layer)

[Historical Civic Issue Logs (PostgreSQL)]

↓

[ETL Pipeline]

└── Clean, normalize, and aggregate data

↓

[Predictive Model]

├── Time Series Forecasting (ARIMA / Prophet / LSTM)

├── Geo-Spatial Clustering (DBSCAN / K-Means)

├── Category Trend Analysis (NLP + frequency modeling)

↓

[Output]

├── Heatmaps of predicted hotspots

├── Category-wise issue forecasts

├── Resolution bottleneck alerts

└── Monthly trend summaries

↓

[Dashboard Integration]

└── Visual overlays on Leaflet.js

└── Exportable insights for municipal planning

🔹 8. DevOps & Monitoring Layer

[GitHub Actions]

└── CI/CD for Flask + Django + React

[Prometheus + Grafana]

└── Monitor API Health, ML Latency, Dashboard Uptime

[AWS / GCP]

└── Host Services + Auto-Scale

[Docker + NGINX]

└── Containerization + Routing

🔹 **9. Security & Governance Layer**

[Aadhaar eKYC API]

└── OTP Verification

└── Masked ID Storage

[JWT Authentication]

└── Role-Based Access (Citizen / Officer / Admin)

[User Restriction Logic]

└── Flag + Lock after 3 fake reports

[Data Encryption]

└── AES for PII

└── HTTPS for All Traffic
