InfraTrack – Urban Infrastructure Issue Reporting System

1. Problem Statement

Urban infrastructure issues such as potholes, broken streetlights, fallen electric poles, and open manholes pose serious safety risks and significantly impact quality of life. Currently, these issues are largely identified through manual inspections or limited government patrols, which are neither scalable nor timely. As a result, many problems—especially in non-prime or remote areas—remain unresolved for long periods, leading to accidents, property damage, and loss of public trust.

2. Existing Challenges

1. Manual patrolling is inefficient and cannot cover all areas consistently.
2. Delayed reporting leads to increased accidents and infrastructure degradation.
3. Lack of a centralized, transparent system for issue tracking and accountability.
4. Duplicate or missed reports due to unstructured complaint mechanisms.

3. Proposed Solution

InfraTrack is a web-based, crowd-sourced infrastructure issue reporting platform that enables citizens to act as real-time sensors for urban maintenance. Users can report issues by uploading images along with automatic geo-location and timestamps. Authorities can then view, prioritize, and resolve issues through a centralized dashboard.

4. Key Features

1. Geo-tagged issue reporting with image and timestamp.
2. Issue categorization (potholes, streetlights, poles, manholes, etc.).
3. Duplicate report detection using location proximity and image similarity.
4. Severity-based prioritization to optimize response order.
5. Role-based dashboard for authorities to manage and update issue status.
6. Transparent status tracking for citizens.

5. Proposed Approach & System Design

The system follows a client-server architecture. The frontend allows users to submit and view reports using an interactive map interface. The backend exposes RESTful APIs for authentication, issue management, and status updates. A database stores user data, issue metadata, and resolution history. Duplicate detection logic reduces redundant entries and improves operational efficiency.

6. Tech Stack

1. Frontend: React, HTML, CSS
2. Backend: Node.js, Express.js
3. Database: MongoDB or PostgreSQL
4. Maps & Geo-location: OpenStreetMap or Google Maps API
5. Authentication: JWT-based authentication
6. Image Storage: Cloud-based object storage

7. Impact & Benefits

1. Reduces response time for identifying and fixing infrastructure issues.
2. Improves public safety by enabling faster visibility of hazardous conditions.
3. Ensures better allocation of government resources through prioritization.
4. Enhances transparency and accountability in urban maintenance.
5. Scales effectively across cities without increasing patrol costs.

8. Conclusion

InfraTrack demonstrates how technology and community participation can be combined to address real-world urban challenges. The project serves as a practical proof-of-concept showcasing system design, scalability, and problem-solving skills relevant to real-world software engineering roles.