PotHoleMapper: A Citizen-Powered Road Condition Monitoring System

Product Requirements Document (PRD)

# Overview

Municipal organizations often struggle to maintain up-to-date records of road damage, especially potholes, which can significantly affect daily commutes and road safety. Traditional methods of road inspections are resource-intensive and infrequent, resulting in delayed repairs and citizen dissatisfaction.

**PotHoleMapper** is a community-driven solution that leverages mobile devices and AI to detect and report potholes in real-time. By empowering citizens to participate in the data collection process, the application improves infrastructure visibility, reduces response times, and supports proactive maintenance efforts.

# Hero Scenario

* A commuter is heading to work on their bike.
* Before setting off, they launch the **PotHoleMapper** app and mount the phone to the front of their bike.
* As they ride, the app activates the phone camera and begins scanning the road surface.
* AI embedded within the app analyzes the video feed in real time, detecting potholes and tagging their exact GPS coordinates.
* This data is uploaded to a central server that maintains a real-time map of reported potholes.
* Municipal teams use the dashboard to view hotspots, prioritize repairs, and track resolution progress.

# Personas

**Commuter**: A daily road user who uses the PotHoleMapper mobile app to automatically detect and report potholes during travel.

**Municipal Engineer**: A city employee responsible for road maintenance, who uses the central dashboard to access pothole data, plan repair operations, and monitor improvements over time.

**AI Bot**: A backend service that processes live video streams from user devices, detects potholes using computer vision, and uploads validated data tagged with GPS metadata.

# Key User Stories

1. As a **commuter**, I want to turn on the app during my ride so that potholes are detected and reported without manual input.
2. As a **commuter**, I want to view a map of potholes in my area to stay informed about road conditions.
3. As a **municipal engineer**, I want to access a dashboard showing pothole locations and frequency so I can schedule timely repairs.
4. As a **municipal engineer**, I want the system to automatically archive potholes that are no longer detected in updated scans.
5. As an **AI bot**, I want to scan video input from users’ phones and identify road damage in real time, linking findings with precise geolocation data.

# Success Metrics

* Reduction in average time taken to identify and repair potholes after their formation.
* Increased participation rate from citizens using the PotHoleMapper app.
* Higher accuracy in pothole detection compared to manual reports.
* Improved citizen satisfaction with road conditions, as measured through periodic feedback surveys.