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Pothole Reporting System

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ABSTRACT- Potholes are a significant issue affecting road infrastructure, leading to vehicle damage, traffic congestion, and accidents. Traditional pothole detection methods rely on manual inspections and citizen complaints, resulting in delayed repairs and inefficient resource allocation. This paper presents a Pothole Management System (PMS) that integrates smartphone sensors, IoT devices, cloud computing, and machine learning to automate pothole detection, classification, and maintenance tracking. By collecting real-time data through GPS, accelerometers, and road-embedded sensors, the system enables automated pothole detection, severity analysis, and predictive maintenance planning. The proposed system enhances road safety, optimizes repair costs, and ensures timely maintenance.

Keywords— Pothole Detection, Smart Infrastructure, GIS, IoT, Machine Learning, Predictive Maintenance.

I. INTRODUCTION

POTHOLES ARE A MAJOR ISSUE AFFECTING ROAD INFRASTRUCTURE, CAUSING VEHICLE DAMAGE, TRAFFIC CONGESTION, AND ACCIDENTS. THEY RESULT FROM WEATHER CHANGES, WATER SEEPAGE, AND HEAVY TRAFFIC, LEADING TO ROAD DETERIORATION AND INCREASED MAINTENANCE COSTS. TRADITIONAL POTHOLE DETECTION METHODS, SUCH AS MANUAL INSPECTIONS AND CITIZEN COMPLAINTS, ARE SLOW, INEFFICIENT, AND COSTLY, OFTEN RESULTING IN DELAYED REPAIRS AND POOR RESOURCE ALLOCATION.

TO ADDRESS THESE CHALLENGES, WE PROPOSE A POTHOLE MANAGEMENT SYSTEM (PMS) THAT UTILIZES SMARTPHONE SENSORS, IOT DEVICES, AND MACHINE LEARNING FOR AUTOMATED POTHOLE DETECTION, CLASSIFICATION, AND PREDICTIVE MAINTENANCE. THE SYSTEM COLLECTS REAL-TIME DATA THROUGH MOBILE APPS, GPS, ACCELEROMETERS, AND ROAD-EMBEDDED SENSORS, STORING IT IN A CLOUD-BASED DATABASE FOR PROCESSING. MACHINE LEARNING MODELS ANALYZE THE DATA TO ASSESS SEVERITY, PREDICT FUTURE ROAD DAMAGE, AND OPTIMIZE REPAIR SCHEDULES.

maintenance costs, and improves infrastructure quality. This paper explores the architecture, implementation, and experimental validation of the system, demonstrating its effectiveness in improving road maintenance. By integrating real-time monitoring, predictive analytics, and automated alerts, the PMS enhances road safety, reduces

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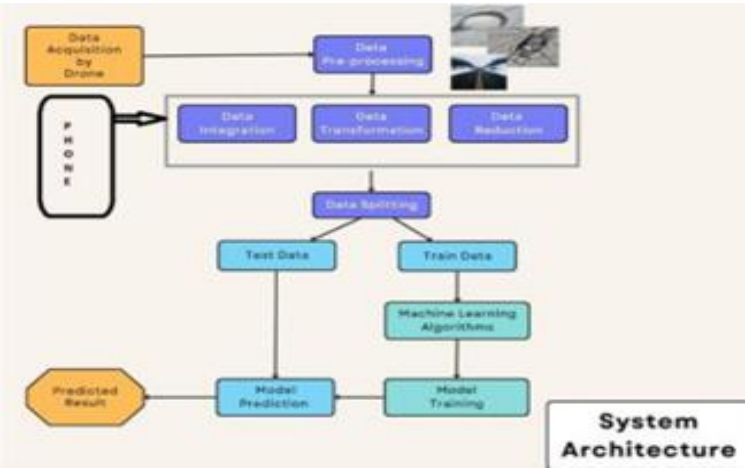
Problem Statement

- **Potholes cause vehicle damage, traffic congestion, accidents, and higher maintenance costs.**
- **Traditional detection methods are slow and inefficient, relying on manual inspections and complaints.**
- **Lack of real-time monitoring leads to delayed repairs and increased safety risks.**
- **An automated Potho le Management System (PMS) using IoT, GPS, machine learning, and cloud computing is needed.**
- **The proposed system enables timely detection, severity assessment, optimized repair scheduling, and improves road safety.**



System Architecture

- **User Interface**: Mobile/Web apps for manual reports and real-time alerts.
- **Data Collection**: Smartphone sensors, IoT devices, and crowdsourced reports.
- **Cloud Storage**: Centralized database and predictive analytics.
- **Processing & Analysis**: Machine learning models assess severity and optimize repair scheduling.

II. TECHNOLOGY STACK

- **Frontend**: React Native, HTML, CSS, JavaScript
- **Backend**: Node.js, Python Flask
- **Database**: Firebase, PostgreSQL
- **IoT**: Raspberry Pi, GPS-enabled devices
- **Machine Learning**: TensorFlow
- **Cloud**: AWS, Google Cloud

III. RESULTS AND FINDINGS

The Plant Disease Detection system significantly improved the accuracy of disease identification using deep learning models. Farmers benefited from early disease detection, which helped reduce crop losses and improve overall yield. The system also enhanced user engagement by simplifying the diagnosis process, making it easier for farmers to identify plant diseases and take timely preventive measures without requiring expert intervention.

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VI. OUTPUT

Fig 1. Landing Page

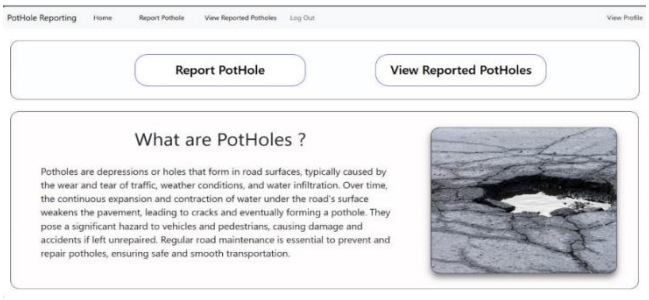
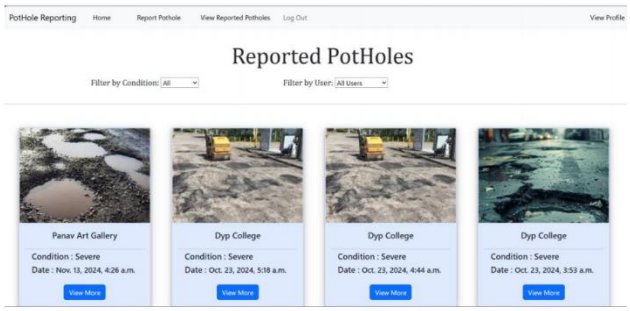


Fig 2. Result Page



IV. CONCLUSION AND FUTURE WORK

The proposed Pothole Management System (PMS) provides an automated, real-time solution for detecting and managing potholes using IoT, GPS, machine learning, and cloud computing. It enhances road safety, reduces maintenance costs, and ensures timely repairs. Future enhancements include integrating advanced sensors like LiDAR, scaling the system for urban deployment, improving predictive analytics, collaborating with government agencies for streamlined repairs, and refining the mobile app for better user experience.

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