Roadessy: A Smart Platform for Road Asset Mapping and Management in Ghana

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Abstract:

The development and maintenance of road infrastructure are critical for economic growth and social connectivity. However, Ghana faces significant challenges due to deteriorating road conditions and limited adoption of data-driven approaches for road asset management. To address these challenges, the Geospatial Innovation and Research Centre, Kumasi (GIRCK), in collaboration with The Regional Transport Research and Education Centre, Kumasi (TRECK), at Kwame Nkrumah University of Science and Technology (KNUST), is developing *Roadessy*—a comprehensive road asset mapping and management platform. *Roadessy* comprises four innovative modules designed to improve road maintenance planning through crowdsourced data collection and advanced analytics:

1. **PenDAT**: A mobile-based module that utilizes accelerometer and gyroscope sensors in smartphones to measure road roughness and compute the International Roughness Index (IRI). The results are comparable to those produced by traditional roughometers, offering a cost-effective solution for road condition monitoring.

2. **IIRISS**: This module detects specific road conditions such as potholes using smartphone sensors and provides measurements of their physical dimensions.

3. **Road Maintenance Prioritization Platform**: A decision-support tool that integrates engineering, social, and economic variables to prioritize road maintenance projects.

4. **GeoRod**: A geospatial module that visualizes and manages road condition data on an interactive map. It enables stakeholders to identify defect hotspots, track maintenance activities, and assess spatial patterns of road deterioration, facilitating data-driven planning and resource allocation.

Modules 1 and 2 are deployed within the *Roadessy* mobile app and allow users to contribute real-time data on road conditions via crowdsourcing. The curated data will populate an open-source inventory of road conditions in Ghana to improve transparency and accessibility for road agencies, policymakers, and other stakeholders. The platform offers scalable solutions for efficient road maintenance planning, resource optimization, improved road safety and transform road infrastructure management in Ghana. This presentation will explore its potential impact and scalability across Africa, positioning *Roadessy* as a model for leveraging technology in infrastructure development.