**AI-Driven Road Safety: Pothole Classification and Speed Breaker Detection for Accident Prevention.**

**Abstract**

Road safety is a critical concern worldwide, with potholes and unmarked speed breakers contributing significantly to accidents, vehicle damage, and traffic congestion. To mitigate these risks, this project proposes an AI-powered system that detects and classifies potholes while also identifying speed breakers to alert drivers in real-time. Leveraging deep learning and computer vision techniques, the proposed solution aims to enhance road safety and driving comfort.

The system utilizes a convolutional neural network (CNN)-based model trained on diverse road condition datasets to classify and detect potholes and speed breakers. Data is collected from dashcams, smartphones, and surveillance cameras, ensuring a robust model capable of identifying different road hazards under varying lighting and weather conditions. The AI model processes the input images and classifies road anomalies with high accuracy. Additionally, integrating GPS and IoT technologies allows real-time hazard reporting and mapping, enabling proactive measures for road maintenance.

For pothole classification, the model categorizes defects based on severity—minor, moderate, or severe—allowing authorities to prioritize repairs. The detection of speed breakers ensures that unmarked or poorly visible bumps are identified, reducing sudden braking incidents and vehicle damage. The system can be integrated with navigation applications to provide real-time alerts to drivers, improving road awareness and reducing accident risks.

**Key Highlights:**

* **AI-Powered Detection:** Utilizes deep learning and computer vision techniques for precise pothole and speed breaker identification.
* **Real-Time Hazard Alert System:** GPS-enabled notifications warn drivers about road anomalies in advance.
* **Classification for Effective Road Maintenance:** Categorizes potholes based on severity, aiding authorities in prioritizing repairs.
* **Integration with Navigation Systems:** Provides real-time alerts to drivers to enhance road safety.
* **Scalability and Adaptability:** Can be implemented in smart cities and integrated with existing traffic monitoring systems.

This project has the potential to significantly reduce road accidents and improve driving conditions by enabling timely interventions and informed decision-making. The combination of AI, IoT, and real-time data processing offers a scalable solution to enhance road infrastructure monitoring and ensure safer travel experiences.