**Abstract**

**Real-time pothole detection system on vehicle using improved YOLOv5 in Malaysia**

The deterioration of road surfaces, leading to the formation of potholes, is a significant concern in Malaysia, posing safety hazards to drivers and increasing the risk of accidents. This paper presents a real-time pothole detection system implemented on vehicles using an improved YOLOv5 model. The system aims to address the limitations of previous pothole detection methods, such as inconsistent shapes and inadequate real-time performance. The proposed solution leverages computer vision and deep learning techniques, specifically an optimized YOLOv5 model, to accurately and efficiently detect potholes in real time as the vehicle is in motion. The YOLOv5n6 model, chosen for its robust performance-to-size ratio, is deployed on an Nvidia Jetson Xavier NX supercomputer, which processes images captured by an Intel Realsense D435i camera. The system successfully detects potholes and estimates their distance from the vehicle, demonstrating effective real-time performance with a mean average precision (mAP@0.5) of 82.5%. Despite some imperfections, such as misidentifying manholes and shadows as potholes, the system represents a significant advancement in road safety technology. The findings suggest that further research could enhance detection performance under varying light conditions and improve the system's accuracy in distinguishing between potholes and other road surface features.

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