

## Road Condition Monitoring Using Built-in Vehicle Technology Data, Drones, and Deep Learning

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**Abstract :** Transportation agencies worldwide continuously monitor their roads' conditions to minimize road maintenance costs and maintain public safety and rideability quality. Existing methods for carrying out road condition surveys involve manual observations of roads using standard survey forms done by qualified road condition surveyors or engineers either on foot or by vehicle. Automated road condition survey vehicles exist; however, they are very expensive since they require special vehicles equipped with sensors for data collection together with data processing and computing devices. The manual methods are expensive, time-consuming, infrequent, and can hardly provide real-time information for road conditions. This study contributes to this arena by utilizing built-in vehicle technologies, drones, and deep learning to automate road condition surveys while using low-cost technology. A single model is trained to capture flexible pavement distresses (Potholes, Rutting, Cracking, and raveling), thereby providing a more cost-effective and efficient road condition monitoring approach that can also provide real-time road conditions. Additionally, data fusion is employed to enhance the road condition assessment with data from vehicles and drones.

**Keywords :** road conditions, built-in vehicle technology, deep learning, drones

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