Research Project Name: Building the Data Infrastructure for Monitoring Rural Roads
Recipient/Grant (Contract) Number: 69A3552348321
Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center
Research Priority: Transportation Safety
Principal Investigator(s): Ruwen Qin, Anil Yazici
Research Project Funding: $72,132 (Federal request); $39,815 (Non-Federal cost share)
Project Start and End Date: 12/19/2025 to 12/18/2026
Project Description: Automobiles are the dominant mode of transportation in the United States, especially in rural areas, supported by the nation's widely distributed road network as a critical component of infrastructure. However, driving on deteriorated roads not only imposes financial burdens on motorists but also reduces rural communities' mobility and, consequently, their access to jobs and economic development opportunities. Moreover, more than half of traffic fatalities in the U.S. are linked to deficient roadway conditions, such as fading pavement markings, missing guardrails or safety barriers, and damaged traffic signs, resulting in substantial crash-related costs. This project aims to develop the data infrastructure necessary to expand the use of sensing technologies and artificial intelligence (AI) methods for inventorying road assets and monitoring rural road infrastructure. A cost-effective multimodal sensing device will be prototyped to capture driving videos, GPS data, and vehicle movement information, all with synchronized timestamps. Using this device, sample datasets will be collected in rural areas, annotated, and made publicly available through a sustainable data hosting and sharing platform. Building on these datasets, domain adaptation methods will be developed to implement and tailor deep learning models for rural contexts, enabling applications such as road asset inventorying and road condition monitoring.
US DOT Priorities*:
Outputs: The data infrastructure, powered by sensing technologies and artificial intelligence (AI), enables automated monitoring of road assets and conditions across widely distributed rural areas.
Outcomes/Impacts: The delivered data infrastructure enables automated rural road monitoring, providing efficient and timely assessments. By supporting smarter, digitalized infrastructure management in rural areas, it enhances safety, mobility, and accessibility, while fostering economic opportunity.
Final Research Report: N/A

* *Section left blank until USDOT's new priorities and RD&T strategic goals are available in Spring 2026.*