

Research Project Name: Driving Assistance to Elderly Drivers in Rural Areas
Recipient/Grant (Contract) Number: Florida A&M University; Stony Brook University
Center Name: Rural Safe, Efficient, and Advanced Transportation (R-SEAT) Center
Research Priority: Improving Mobility of People and Goods
Principal Investigator(s): Ruwen Qin
Project Partners: -
Research Project Funding: \$100,000 (Federal request); \$58,027 (Non-Federal cost share)
Project Start and End Date: 6/1/2023 to 12/31/2024
<p>Project Description:</p> <p>The ultimate goal of this project to improve the mobility and safety of elderly drivers and their family passengers in rural areas, a group of people who require specialized visual driving assistance in their daily driving activities.</p> <p>In the United States, rural residents heavily rely on automobiles for transportation. 96% of rural households have one or more vehicles. 94% of women aged 65 to 74 in rural areas drive, and this percentage is 79% for women aged 75 to 84, and 54% for women aged 85 or older. The percentage of senior males in rural areas who drive is higher than that of females in the same age group. For example, 72% of males aged 85+ in rural areas drive. According to a study, seniors continue driving because of the lack of alternative means of transportation, and they start limiting their driving or stopping driving because of functional difficulties. On a short run, seniors in rural areas still heavily rely on driving their personal vehicles. Assisting this group of drivers in rural areas is imperative to ensure the quality of their lives.</p> <p>Vision provides about 85% of information we need to make safe decisions when driving. However, a 60-year-old person requires 10 times as much light to drive as a 19-year-old. A 55-year-old takes eight times longer to recover from glare than a 16-year-old. Senior drivers can take twice as long to distinguish the flash of brake lights as younger drivers. Besides the difficulty in seeing, stiff joints and weaken muscles, trouble hearing, slower reaction time and reflexes are other reasons that make it difficult for seniors to drive. Driving assistance technologies, especially from the aspect of visual perception and cognition, can help enhance the speed and accuracy of elderly drivers in response to risky traffic agents and dangerous scenarios.</p>
US DOT Priorities: This project aligns with the USDOT the strategic areas of safety and transformation
<p>Outputs:</p> <ul style="list-style-type: none"> • A draft project report that provides a summary of state-of-the-art and a gap analysis, metrics and methods to verify the vulnerability of elderly drivers in rural areas. • Li, Ke, Shizhe Li, and Ruwen Qin. "Development of a Causal Model for Improving Rural Seniors' Accessibility to Resources: Data-Based Evidence." In Proceedings of International Conference on Transportation and Development 2024, pp. 92-102. 2024. • Karim, Muhammad Monjurul, Zhaozheng Yin, Ruwen Qin. "Extended Abstract: An Attention-Guided Multistream Feature Fusion Network for Early Localization of Risky Traffic Agents in Driving Videos." In Proceedings of IEEE Intelligent Vehicles (IV) Symposium 2024. Jeju Island, South Korea. June 2-5, 2024, p. 3150. • Qin, Ruwen. "An Attention-Guided Multistream Feature Fusion Network for Early Localization of Risky Traffic Agents in Driving Videos", IEEE Intelligent Vehicles Symposium (IVS). Jeju Island, South Korea, June 2-5, 2024. • Qin, Ruwen. "Improving Data Annotation Efficiency for the Segmentation Task in Transportation Infrastructure Analysis: A Weakly-supervised Deep Learning Method" IEEE IVS Workshop of Infrastructure Support and Impact in Autonomous Vehicle Deployment, Jeju Island, South Korea, June 2, 2024. • Qin, Ruwen. "Dashcam Video Analysis for Road Traffic Safety Enhancement", the Pre-CICTP Workshop of Navigating the Future of Smart Mobility, Hong Kong University of Science and Technology, July 21, 2024. • Qin, Ruwen. "Learning and Accruing Knowledge from Diverse Datasets: A New Approach to Multi-label Driving Scene Classification", COTA International Conference of Transportation Professionals (CICTP), Shenzhen, China, July 23-26, 2024.

- Qin, Ruwen. "Computational Intelligence for Enabling Vehicles' Visual Perception of Crash Risks", the Post-CICTP Workshop of Traffic and Transportation Engineering, Changsha, China, July 27, 2024.

Outcomes/Impacts:

- A system framework of the visual perception and cognition assistance and a baseline model

Final Research Report: https://cdn.prod.website-files.com/656f7c66bed80d5266213809/6812dfa1c15143c65e24e2bc_Final%20Report_Qin%2020250430.pdf