Research Project Name: Development of Safety Performance Function Based on the Vehicle Automation Levels
Recipient/Grant (Contract) Number: Florida A&M University; Cleveland State University
Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center
Research Priority: Improving Mobility of People and Goods
Principal Investigator(s): Emmanuel Kidando, Josiah Owusu-Danquah, and Angela Kitali
Project Partners: TBD
Research Project Funding: $98,258.19 (Federal request); $49,130 (Non-Federal cost share)
Project Start and End Date: 9/1/2024 to 12/31/2025
Project Description: Vehicle automation improves highway safety by integrating advanced driving assistance systems (ADAS) into modern vehicles. These systems, such as automatic braking, lane keeping, and adaptive cruise control, not only prevent collisions but also contribute to a significant reduction in fatality rates on highway systems. Traditionally, transportation agencies and researchers have relied on safety performance functions (SPFs) and crash modification factors (CMFs) to identify high-risk road segments and establish the benefit of deploying a particular countermeasure. These analytical approaches are essential for network screening and safety analysis, as they quantify the relationship between roadway characteristics, traffic volume, and crash occurrences. Despite these advancements, studies calibrating SPFs for various ADAS technologies to assess the safety potential of ADAS technologies in terms of crash frequency and injury severity remain limited. To address this gap, the current research aims to develop SPFs and CMFs for various ADAS technologies. As a result, this work seeks to enhance our understanding of how different automated systems contribute to roadway safety and provide more accurate tools for network screening and targeted safety interventions.
US DOT Priorities: This project aligns with the USDOT strategic areas of Safety.
Outputs: The primary objective of this study is to develop SPFs and CMFs for vehicles with ADAS on highways. The research team will use crash data in Ohio as a case study for this project. The expected output for the project will be a well-written report documenting all the methods and procedures used to develop SPF on Ohio's highways. Furthermore, the project will produce journal articles to be published in highly reputable journals.
Outcomes/Impacts: Findings from this project demonstrate how ADAS technologies enhance roadway safety by establishing a scalable framework for developing Safety Performance Functions (SPFs) across different collision types. The study also introduces a systematic method for quantifying the effectiveness of ADAS in reducing crash occurrence. A manuscript has been developed that contextualizes this framework and articulates its application to real-world safety evaluation.; • Ngereza, A., Balyagati, P., Kidando, E., Raihan, A,Md., Kitali, A. "Disentangling ADAS Effects on Rear-End Crashes with a Correlated Safety Performance Function Framework: Evidence from Ohio Interstate Highways" (Under Review) *Accident Analysis & Prevention*
Final Research Report: Submitted