Research Project Name: Identifying and Analyzing Pass-by Crashes for the Purpose of Designing Proper Intervention Measures to Mitigate Crashes Involving Rural Population
Recipient/Grant (Contract) Number: 69A3552348321
Center Name: Rural Safe Efficient Advanced Transportation (R-SEAT) Center
Research Priority: Improving Mobility of People and Goods
Principal Investigator(s): O. Arda Vanli, Ren Moses, Emmanuel Kidando, Angela Kitali,
Project Partners: To be determined
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Project Start and End Date: June 1, 2024 – May 31, 2025
Project Description: The United States Census Bureau reports that rural areas cover about 97% of the nation's land area and are home to about 60 million people. About 19% of the American population lives in the rural area according to the Census Bureau. Although only 19% of the population lives in rural areas more than 70% of the 4 million miles of roadways in the United States are in rural areas. According to the NHTSA (2021) the fatality rate was 1.5 times higher in rural areas than in urban areas of the US. In Florida, the fatality rate per 100 million VMT (Vehicles Miles Travelled) in rural areas and urban areas were 2.06 and 1.64, respectively, giving a rural to urban fatality rate ratio of about 1.3. This research focuses on analyzing pass-by crashes in rural areas, particularly in FDOT District 3 (Northwest Florida). The primary goal is to identify trends and factors contributing to these crashes and propose interventions aimed at improving transportation safety for rural populations. By focusing on rural transportation, the study aligns with the broader objective of promoting safety in regions that often lack access to infrastructure and transportation resources. The project will explore innovative machine learning and statistical modeling methods to analyze the complex interactions between drivers' social characteristics and roadway features that influence the frequency and severity of rural pass-by crashes. The findings will inform the development of countermeasures to mitigate risks posed by transportation systems, particularly for populations who live or commute in rural areas. Data needed to train the models were sourced from the Florida Traffic Safety Dashboard, FDOT GIS Open Data Hub, and US Census, focusing on crash events, roadway characteristics, and driver demographics. To classify pass-by crashes, distances between crash locations and the drivers' home ZIP codes were calculated, with a threshold of 30 miles used to define a pass-by crash. Logistic regression and Random Forest models were used to analyze the factors influencing these crashes, with variables such as functional class, weather conditions, vision obstruction, and type of shoulder playing significant roles in predicting crash likelihood. Preliminary results indicate that certain factors, like severe crosswinds, paved shoulders, and specific road classifications, increase the probability of pass-by crashes. Additional future work will focus on refining the models, incorporating additional demographic and roadway data, and further validating the findings.
US DOT Priorities: Improving Mobility of People and Goods, focusing on rural transportation. In the 2022-2026 USDOT RD&T strategic plan. the proposed project predominantly addresses Safety as the strategic goal, and Data-Driven System Safety as the research priority. Specifically, within this priority, the tools and outcomes of this project will advance the knowledge and state of the art to help target the objectives to (1) identify and support strategies to increase user safety in rural

roads (e.g., pedestrians, bicyclists, motorcyclists, and people with disabilities) and (2) develop and promote effective methods to assess and address traffic safety risks in rural communities.
Outputs: A detailed analysis of crash data from FDOT District 3, focusing on pass-by crashes in rural areas. The dataset was refined to focus on relevant crash and driver information, and advanced statistical and machine learning models were applied. Logistic regression and Random Forest models have been developed to predict the likelihood of pass-by crashes, with initial results indicating key risk factors such as functional class, type of shoulder, and weather conditions.
Outcomes/Impacts: (1) The research identifies key factors contributing to pass-by crashes in rural areas, which will inform the development of interventions aimed at reducing accidents and fatalities. By enhancing safety, the project contributes to improved mobility for both people and goods in these regions. (2) Transportation planners, policymakers, and engineers will be able to use the findings from this research to better understand the risks associated with rural transportation and develop evidence-based policies and infrastructure improvements. (3) By focusing on rural populations, the study highlights transportation safety issues that disproportionately affect communities lacking access to modern transportation infrastructure. The outcomes of this research can contribute to transportation solutions that ensure safer, more reliable access to transportation by considering the needs of wider segments of users. (4) The project contributes to workforce development and ensures that the next generation of transportation professionals is equipped with the data analytics skills to address complex transportation challenges.
Final Research Report: N/A