

HSIS STUDENT RESEARCH PAPER COMPETITION
EXCELLENCE IN HIGHWAY SAFETY DATA AWARD
TIED FOR THIRD PLACE

Md Roknuzzaman with Nsong Ernest Asiedu
Auburn University

“From HSIS Datasets to Safety Solutions: Ranking Roadway Elements Elevating Motorcycle Crash Outcomes”



ITE—A Community of Transportation Professionals is pleased to recognize **Md Roknuzzaman**, with **Nsong Ernest Asiedu**, as a third-place recipient of the [2026 HSIS Excellence in Highway Safety Data Award Student Research Paper Competition](#) for their paper, **“From HSIS Datasets to Safety Solutions: Ranking Roadway Elements Elevating Motorcycle Crash Outcomes.”**

The Federal Highway Administration’s Highway Safety Information System (HSIS) Student Research Paper Competition encourages university students to use HSIS data to introduce future highway safety professionals to quality safety data, appropriate research methods, and the practice of using data to support transportation safety decisions.

The award-winning paper examines how roadway design elements influence motorcycle crash severity, with a focus on factors that can be addressed through engineering and policy interventions. Using HSIS data supplemented with Motorcycle Crash Causation Study crash-level variables, the study analyzed 351 injury crashes in Orange County, CA, USA, and evaluated 19 roadway design-related variables.

To account for different crash dynamics, the research classified crashes by location—roadway segments or intersections—and by collision type—single-vehicle or multi-vehicle crashes. The study used Injury Severity Score as the outcome measure and applied both XGBoost machine learning and stepwise regression to identify and rank roadway factors associated with more severe motorcycle crash outcomes.

The analysis found that roadway design factors influencing severity vary by crash type and location. For single-vehicle motorcycle crashes on roadway segments, travel speed and number of lanes were the most significant contributors to increased severity, while dedicated turn lanes were associated with

reduced severity. For multi-vehicle segment crashes, surface irregularities and pavement markings were key factors, with poor pavement conditions and one-sided markings associated with higher injury severity.

At intersections, speed-related variables were consistently influential. For single-vehicle intersection crashes, impact speed, on-street parking, and night lighting conditions were associated with higher injury severity, while for multi-vehicle intersection crashes, travel speed was the only statistically significant variable. These findings underscore the importance of speed management, visibility, and intersection design in reducing motorcycle crash severity.

The paper offers practical guidance for transportation agencies seeking to improve safety for motorcyclists and other vulnerable road users. Recommended strategies include improving pavement conditions, enhancing lane markings, strengthening speed management practices, and incorporating safer intersection features. The research also demonstrates the value of HSIS data in identifying infrastructure-related risk factors and supporting targeted, data-driven countermeasures.

ITE congratulates Md Roknuzzaman and Nsong Ernest Asiedu on this outstanding achievement and celebrates their contribution to advancing motorcycle safety research, HSIS data application, and roadway design strategies that can help reduce severe crash outcomes.

You can read about their research in an upcoming issue of *ITE Journal*. Learn more about [ITE's Awards Program](#).