MERGING AUTO TECHNOLOGIES WITH CRASH DATA SAVES LIVES ON U.S. ROADS

Auto manufacturer-government partnership meets critical need for data sharing and analytics.

Issue/Challenge

The National Highway Traffic Safety Administration (NHTSA) estimates that 2.38 million people were injured in traffic crashes on U.S. roadways in 2022. Advanced driver assistance systems (ADAS) in cars and trucks have the potential to reduce traffic crashes, prevent serious injuries, and save thousands of lives each year. But increasing safety on our nation's roads requires analysis of enormous amounts of data from industry and government stakeholders.

The Partnership for Analytics Research in Traffic Safety (PARTS), a unique data-sharing model, meets this critical need. Members voluntarily share proprietary and safety-related data with MITRE, as the operator/integrator, knowing the information is secure, aggregated, and never used for competitive advantage.

MITRE's Solution

As PARTS' technical lead, MITRE recently paired auto manufacturer equipment information with police crash report data covering 98 million vehicles and 21.2 million crashes to identify trends and the safety benefits and potential limitations of ADAS technologies.

Nine major auto manufacturers—Ford, Hyundai, General Motors, Honda, Mazda, Mitsubishi, Stellantis, Subaru, and Toyota—and the U.S. Department of Transportation's NHTSA contributed comprehensive datasets to MITRE for analysis. It is the largest study of ADAS to date.

Results

Our findings offer valuable insights into how, where, and when ADAS technologies are most effective—helping automakers identify opportunities to adopt best practices and make improvements to manufacture and field safer vehicles.

Key insights from "A Study on Real-world Effectiveness of Model Year 2015–2023 Advanced Driver Assistance Systems" include:

- A 49% reduction in front-to-rear crashes for vehicles equipped with automatic emergency braking (AEB) across all vehicle segments and model years.
- An improvement in AEB's ability to prevent rear-end crashes from 46% across model years 2015–2017 to 52% across model years 2021–2023, translating into substantial safety enhancements and economic benefits.
- A 9% reduction in single-vehicle frontal crashes with non-motorists, including pedestrians, cyclists, scooters, and wheelchairs, for vehicles equipped with pedestrian automatic emergency braking (PAEB) systems. Pedestrian crashes are among the most severe forms of traffic crashes, with deaths accounting for 18% of all traffic fatalities, according to NHTSA.

MITRE

> The size, growth, and iterative nature of this study are incredible. The industry has voluntarily developed and deployed these crash avoidance systems. We can now see a trend in their life-saving capabilities and can focus our efforts on continuing that trend.
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> **JENNIFER MORRISON,** PARTS COMMUNICATIONS CHAIR AND DIRECTOR OF VEHICLE SAFETY STRATEGY, MAZDA NORTH AMERICAN OPERATIONS

Technologic and Economic Implications

PARTS analysis provides robust, data-driven insights into the effectiveness of ADAS, further validating their life-saving potential.

As more automakers adopt and refine the most effective systems, the benefits extend far beyond saving lives—they transform the way we approach road safety and vehicle design. Advanced technologies such as AEB not only prevent crashes but also reduce the strain on emergency services, minimize roadway disruptions, and enhance public confidence in safer transportation systems.

The Future of PARTS

The PARTS initiative is expanding its scope to measure the effectiveness of ADAS and its impact on crash severity reduction. The next assessments will consider leveraging vehicle telematics—the use of on-board sensors to collect and transmit diagnostic vehicle data—to gain deeper insights into system performance.

The program is also broadening partnerships to include more U.S. states, industry stakeholders, and research institutions—ensuring a more diversified dataset.

MITRE's Work

MITRE's leadership and pioneering work in safety data sharing and analysis in aviation and cybersecurity set the foundation for the PARTS model.

Government agencies and industry trust us—as an independent, technical adviser—to protect their data and conduct analyses to reveal existing or potential safety issues. We broadly share our analysis of risks, efficiencies, trends, and best practices to shape life-saving mitigations, standards, and policies.

Motivated by what's in the best interest of our nation, we apply what we learn in one sector to significant challenges in other arenas.

For more information about PARTS, visit mitre.org/WorkWithUs.

Resources

A Study on Real-world Effectiveness of Model Year 2015–2023 Advanced Driver Assistance Systems

Real-world Effectiveness of Model Year 2015–2020 Advanced Driver Assistance Systems

PARTS website

MITRE Adds a Special Element of Trust to Data Sharing and Analysis

Largest Automatic Emergency Braking Study Finds Systems Improving Over Time

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As the not-for-profit operator of federally funded R&D centers, our work catalyzes industry's ability to meet critical national needs and fosters economic development. Learn more about our work in the public interest at mitre.org.