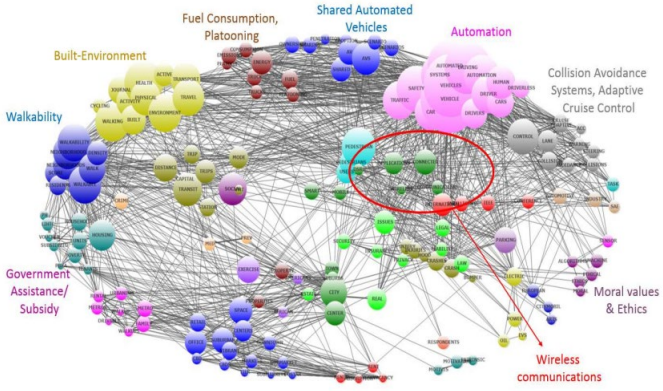
Collaborative Sciences Center for ROAD SAFETY

RESEARCH BRIEF

Connected and Automated Vehicles and Safety of Vulnerable Road Users: A Systems Approach

Technological advances of connected and automated vehicles (CAVs) will not uniformly decrease crash risks as some environments, crash types, and user groups will continue to experience elevated risks, particularly vulnerable road users such as pedestrians. This project addresses these critical safety issues by: 1) assessing the current and future landscape of pedestrian and vehicle conflicts; 2) identifying how vehicle technology, planning policies, and data analytics can provide systemic solutions to pedestrian-vehicle conflicts; and 3) using data analytics to identify dangerous pre-crash behaviors.

This trans-disciplinary and multimodal approach includes literature reviews on current patterns of pedestrian-vehicle conflicts, and assessment of how planning and physical design strategies can reduce pedestrian-CAV conflicts. Furthermore, a risk analysis was conducted using Fatality Accident Reporting System (FARS) data and SHRP2 Naturalistic Driving Study data.



Co-Presence Structure of Words Across Key Topics in Literature Review.

Overall, the study applied innovative statistical, artificial intelligence, and visualization tools (see figure) to extract valuable information from studies and data, with the purpose of improving safety across modes, especially for vulnerable road users. The report includes seven key recommendations:

1. Maintain infrastructure and policies to support conventional (human-driven) motor vehicles and non-vehicular travel modes.
2. Establish minimum criteria for the effectiveness of pedestrian detection and resolution technology.
3. Expand knowledge on likely relationships between CAVs and other travel modes.
4. Expand knowledge base regarding the impacts of CAV-supportive infrastructure investments on pedestrian comfort, safety, and the built environment.
5. Evolve and adapt to new conditions and demands imposed by a CAV-dominant system.
6. Support and test existing and new vehicle-to-pedestrian technologies that can result in better detection (by cameras and other sensors), processing of data in real-time, and user (pedestrian and vehicle driver) alerts and warnings through notification systems.
7. Build links among engineering, planning, policy, public health, and other fields, and account for the emergence and penetration of CAVs.

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