

A Novel Driver Warning System with Hedging to Promote Defensive Driving

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Project Overview

The research developed an enhanced Blind Spot Warning system (BSW-H) that issues warnings to nearby drivers when entering truck blind spots. This innovative "hedging" approach addresses a critical safety gap, as existing BSW technology warns only truck drivers, while data shows that most blind spot crashes are initiated by non-truck drivers surrounding commercial vehicles.

Methodology

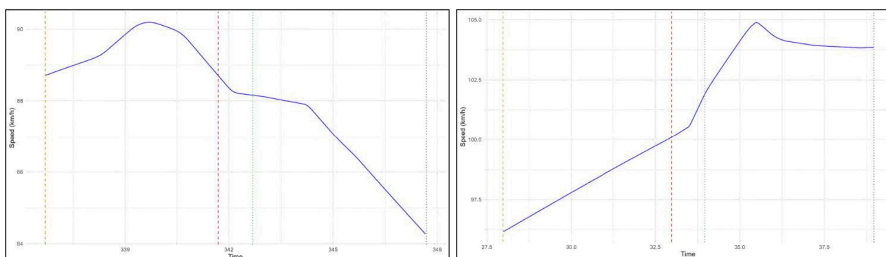
Researchers utilized a driving simulator to test the new BSW-H system with 43 licensed drivers. Each participant drove through three scenarios: no warning, combined visual and auditory warnings, and visual-only warnings when entering defined blind spot zones around simulated trucks. The study tracked driver behavior through two key performance measures—time spent in blind spots and speed difference before/after warnings—with trajectory data collected every 0.01 seconds and analyzed using statistical tests to identify significant behavioral changes.

Key Findings

- **Warning Effectiveness:** Combined visual and auditory warnings significantly altered time spent in truck blind spots compared to no warnings ($p=0.033$).
- **Speed Adjustments:** Participants significantly modified speed after receiving warnings in both the visual-audio and visual-only scenarios ($p=0.011$, $p=0.002$ respectively).
- **Driver Reactions:** Participants exhibited two primary responses—braking to maintain distance or accelerating to exit blind spots quickly.
- **Safety Perception:** 86% of participants believed the BSW-H system contributed to safer driving behaviors.
- **User Experience:** 90.7% of drivers rated their experience with BSW-H as either "Excellent" or "Good."

Key Figures

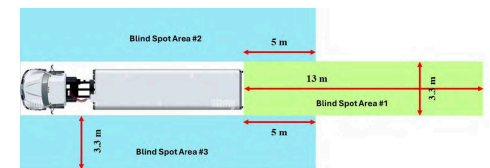
Drivers opted to either brake (left) or accelerate (right) when prompted by the warning system to exit the truck's blind spot.



Blind spot warning in simulator



Driving simulator used in the study



Blind spot warning areas



MORGAN
STATE UNIVERSITY

This research was led by faculty from Morgan State University

Notes for Policymakers

Regulators and manufacturers can use connected vehicle systems to support traffic safety by:

- **Implementing combined visual and auditory warning systems** in future vehicle safety requirements
- **Developing standardized definitions** for truck blind spot zones to ensure consistent warning applications
- **Promoting adoption of BSW-H technology** in fleet vehicles to reduce truck-related crashes