

Naturalistic Study of Farm Equipment and Vehicle Interactions on Iowa's Roadways

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Each year in the Midwest, more than 1,100 crashes between farm equipment and other vehicles are reported. Usually, these crashes are caused by the non-farm vehicle and occupants of the non-farm vehicle are also more likely to be injured. The most common types of crashes with farm equipment involve rear-end collisions, passing, and turning. However, very little is known about the interaction of farm equipment with other vehicles on the roadway.

The Farm Equipment Roadway Study has four main objectives. The first is to design and build a data collection instrument to observe driver behavior as vehicles approach, follow, and overtake farm equipment. We have developed a device called SaferTrek, which when mounted to farm equipment, continuously monitors speed and begins recording video when the speed is above a pre-defined threshold. The SaferTrek device can reliably operate for 8 or 9 days in most conditions before the rechargeable power source needs to be replaced.

The second objective of the project is to use the SaferTrek devices to measure farm equipment exposure to the roadway (e.g., miles traveled, location, road class) and the frequency with which cars approach the farm equipment. This objective is currently in progress. A total of 1765 videos and GPS logs were recorded during the fall 2018 harvest with the cooperation of nine operators in two counties. Our team is currently working to code and quantify farm equipment exposure from these data and will collect additional data through the 2019 and 2020 growing seasons.

Third, this project aims to quantify and classify behavior of vehicle drivers as they approach farm equipment from behind. Behaviors to be examined include speed, deceleration while approaching farm equipment, following distance, number of passing attempts, and passing. We are collaborating with researchers at Iowa State University Realtime Analytics of Transportation Data Lab (REACTOR) who will develop algorithms to process the video data into numerical data for analysis, which will be validated using distance data from a radar sensor.

Finally, our team aims to use SaferTrek devices to evaluate the impact of a community-based campaign on driver behavior around farm equipment. An evaluation will be conducted using a two-community blocked design (non-contiguous communities with similar population and agricultural production). The two communities have been identified and a community advisory board (CAB) has been formed in the intervention community. The CAB provides insight on the target audience for the community campaign, reviews draft campaign materials and provides feedback on content, format, and placement in the community.

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Keywords: driver behavior; rural roads; community campaign; intervention