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ITS and Vision Zero 2025

Vision Zero is a strategy of reducing road transportation-related fatalities to zero, while improving mobility (1). This is a large challenge with 40,000 traffic fatalities per year in the United States (1). Intelligent transportation systems are a powerful tool to address this challenge. If Vision Zero were achieved by 2025, there are three major ways in which intelligent transportation systems would (and can) help us achieve Vision Zero. The first is through communication technologies that allow vehicles to communicate with other vehicles and infrastructure in ways that are not possible by a driver. The second is through improved enforcement of traffic safety laws. The third is through improved data collection possibilities that allow for research not previously possible.

One piece of Vision Zero's shift from traditional thinking is acknowledging human error and integrating that into the safety of the system. Connected vehicle technologies and advanced driver assistance systems, one way of addressing human error, are becoming increasingly common. These technologies allow for vehicles to communicate both with each other and with the surrounding transportation infrastructure. Many new vehicles have anti-collision, self-braking, and lane-tracking technologies. The anti-collision technologies can reduce the risk of rear-ending accidents. They also allow for coverage in blind spots that drivers are not able to address. Lane-tracking reduces risk of side-swipes on the interstates and other roads, especially powerful for impaired drivers, such as those suffering from sleep deprivation or who chose to driver under the influence. But, the potential of these technologies goes far beyond what is common now. As more vehicles are equipped with communication technologies, the possible vehicle-to-vehicle interactions increase. For example, brake warning could be possible in the future where one vehicle warns those nearby that it is braking, which can provide warning sooner than when proximity increases beyond an acceptable threshold as an anti-collision sensor would do. Vehicles, including highly deadly semi-trucks, could also detect a potential accident with pedestrians and cyclists. Additionally, interaction with infrastructure, such as traffic signals, could reduce risk of the dilemma zone that can occur when driver speeds do not match what the signal was timed for. If travelling too fast, this can result in a zone where a driver can neither decelerate nor drive through the signal without entering on a red. This can greatly increase the risk of an angled crash, which is likely to cause more serious injury than a rear-end or side-swipe. Additionally, on interstates vehicles will be able to chain, travelling as a pack and reducing the need for driver intervention, removing risk of human error. Reducing potential for human error is the greatest source of impact for ITS technologies in safety.

Similarly, improving law enforcement can reduce risky driving behaviors that may not be accidental error but willful error. Anecdotally, speeding is unlikely to result in a ticket as the odds that a police officer is nearby and tracking vehicle speed when a driver passes are low. But speed can have a large influence on risk of death in accidents. This is especially true in locations where pedestrians, cyclists, and drivers are likely to interact. At 30 mph, the likelihood of death for a pedestrian hit by a vehicle is only 20%, but at 50 mph, that percentage increases to 60% (2). Automated enforcement, although controversial in the United States, is used in many countries around the world. These systems increase the likelihood of being fined for a traffic violation, reducing speeds and inappropriate actions, thus decreasing the severity of accidents. It has been shown most effective at reducing speed violations, with violations being reduced 10-50% depending on the region and implementation (3). Rather than

enforcement, haptic feedback could be used in vehicles when a driver is above the speed limit, cueing the driver to go slower and making it challenging to speed. Furthermore, enforcement is not only effective for speed reduction. It has also been shown to reduce right angle crashes at intersections but has shown some increase in rear-end crashes (3). However, rear-end crashes are less likely to cause a casualty, so this can be considered an improvement in safety. Another use for automatic enforcement that could benefit pedestrians would be enforcing vehicles stopping for pedestrians in a crosswalk. This is less common than it should be. But, everyone must be a pedestrian for at least some portion of their trip, and its likely they will need to cross the street at some point. By improving compliance with crosswalks, automatic enforcement could bring value back to the marking, which can in turn reduce risky crossing behaviors and pedestrian fatalities.

ITS technologies also open the door for improved data collection. Data regarding accidents and near accidents is very poor unless a fatality occurs. By understanding near accidents though, we can improve our understanding of accident-causes and prevention without relying only on the after-math of a fatal traffic accident. The technologies such as the collision-detection technologies could be used to measure near accidents. When one occurs, the occurrence can be logged and uploaded to the cloud. This is just one data collection improvement that could aid in furthering research on accident prevention. ITS technologies can also help us improve data on where and when people are driving, which is a basic level of information needed in most studies, but often extrapolated or assumed. Safety is an important consideration in research, and research is necessary for improved technologies leading to improved safety, so enabling that research is a powerful step towards Vision Zero.

Overall, Vision Zero is focused on eliminating road fatalities and severe injuries, envisioning a safer, more mobile future. ITS technologies will be key in meeting this vision through their improved communication systems, opportunity for enforcement, and data collection possibilities.

Citations

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