

Role of ITS and Traffic Technologies in Achieving Vision Zero by Year 2025

Intelligent Transportation System (ITS) and traffic technologies have huge potentials for contributing to achieving the goal of Vision Zero. In this essay, I list four strategies of how to get ITS involved with Vision Zero: (1) constructing a preventable system, (2) improving during-crash and post-crash care, (3) connecting Vision Zero with autonomous vehicle strategies, and (4) connecting Vision Zero with shared mobility strategies.

Constructing a preventable system is to get each component in the onroad system fully prepared before interacting with other components in the system. The system consists of roadway infrastructure, vehicles, drivers, passengers and non-motorized roadway users. First, designing and operating safer and smarter streets is of vital importance to ensure safe travel. ITS can build collision avoidance system at intersections, which uses sensors to monitor approaching vehicles and warn drivers if there are cross traffic at roadside signage. Other roadway warning system, such as real-time vehicle speed, wildlife detection, road weather, can also provide drivers with useful information to reduce the safety concerns. Sensors, like cameras, can also monitor driver behavior under different innovative safety-oriented roadway designs, and provide solid suggestions to policy-makers about the most-efficient alternatives to reduce crashes and near-collisions. Second, cars that can see, think, and act will prevent safety risks. Cars can use sensors to detect dangerous situations, such as providing automated braking assistance when vehicles in the front make sudden brakings, and alerting drivers when they show signs of fatigues or when the vehicle drifts from its lane without using the turn signal. Third, ITS can facilitate public education on safe driving. Personal driving behavior can be captured via cell phones and other ready-to-use sensors like OBD loggers, and safe-driving guidance can be tailored to individuals. Drivers will then have a better understanding of their personal tendencies and situations, like locations and time of day, that may lead to risky driving. Fourth, cars could install equipment like active buckle lifter to alert passengers to buckle up high enough and tighten seat belts to an optimally safe position. Fifth, ITS can provide innovative ways for pedestrians and cyclists to travel safer, such as generating safe-walking routes with less exposure to traffic and using high-tech helmets with head-up displays of navigations.

Improving during-crash and post-crash care is to minimize the damage and injuries when accidents happen due to inevitable mistakes. Vehicle frontal structures can be specially designed to reduce impact forces on pedestrians and bicyclists. Sensors can be used to detect areas with high safety concerns to install crash cushion system, which can pop out cushions during a crash to absorb the energy of collision and reduce damage. In addition, ITS can significantly improve post-crash response efficiency. This can increase survival chance because delays in detecting and providing care for people involved with crashes increase the severity of injuries. Collisions can be detected via automatic crash notification systems and the information is automatically sent to call center, which is especially critical in rural areas. With real-time data sharing, signals can be synchronized and give priority to emergency vehicles. Also, adaptive traffic signals and real-time navigation system can help reduce traffic congestion and thus reduce secondary incidents.

Connecting Vision Zero with autonomous vehicle strategies is to use autonomous vehicles to support the goal of Vision Zero. Even though uncertainties still exist about autonomous vehicles in terms of adoption rate, locations, service and fleet types. It is highly possible that in the upcoming decade, autonomous vehicles will play a substantial role in the future mixed traffic. Drivers can be relaxed in their seats while still be ready to take control of the vehicles. Vehicles have sensors to build a complete picture of the road without blind spots and plan its routes with real-time traffic information. They can also make real-time decisions such as avoiding pavement potholes and approaching cross vehicles. In addition, ITS should assist preparing the transportation system for incorporating autonomous vehicles as interactions between

conventional vehicles and autonomous vehicles could raise safety uncertainties. It will be very useful to employ pilot projects for mixed traffic with partial or fully autonomous vehicles, and in larger geographic scales. Using sensors and machine learning techniques to recognize the behavioral changes of drivers will help the development of autonomous vehicles and ensure public safety.

Connecting Vision Zero with shared mobility strategies is to increase vehicle occupancy and thus reduce auto miles traveled and relieve traffic. This strategy is based on the proven fact that transit-oriented communities have lower rates of traffic fatalities and injuries than automobile-oriented communities. Nowadays, shared mobility come in various forms, such as public transit, shuttles, ridesharing, car/bike sharing. However, one critical reason for the low public transit ridership is that people are not accessible to public transit or other shared mobility services. Increasing the density of transit routes and facilities result in high capital and operating cost. An intelligent shared mobility management system can alleviate the cost. The system predicts potential riders and peak periods based on historical trip data, generates operational plans of public service, and identifies cost-effective alternatives for selecting facility locations. In-vehicle sensors can identify the status quo of vehicle conditions and alert maintenance service. In addition, shared trips, signal timing, and real-time navigation can be optimized altogether, which will achieve the goal of safer travels.

In summary, ITS and traffic technologies can be beneficial to reaching the goal of Vision Zero in various fields. Proactive measures can be taken by getting each component in the transportation system well prepared. Traffic incidents can be addressed effectively to reduce fatalities and severe injuries. Additionally, marrying strategies of autonomous vehicles and shared mobility with Vision Zero can be advantageous.

Manyan Li

Number of Words: 936