By Mohsen Kamrani

As per National Highway Traffic Safety Administration (NHTSA), vehicles that can operate without direct human driver’s actions in terms of physical control and constant monitoring, when they are in driver-less mode, are called Autonomous Vehicles¹. This or similar definition of autonomous vehicle (AV) implies why this type of vehicles has the potential to revolutionize the future of traffic safety and mobility because the human driver is the main contributing factor in crashes.

Looking at Tennessee traffic crash report² indicates among 389,237 crashes in 2016, in 216,136 cases (56%), human drivers’ action is the contributing factor. It is noteworthy that out of above mentioned human drivers involved crashes, 24,754 (11.5%) of crashes were due to distracted driver factors related to electronic devices activities such as texting, GPS, computer, etc.³ In addition, 7,519 (3.5%) and 6,244 (2.9%) of crashes were speeding and alcohol-related incidents respectively⁴. The same trend can be observed in fatal crashes in Tennessee. In 2016, Tennessee fatal crashes (1,041) show an 8.2% increase compared to 2015 of which 182 (17.5%) of them were alcohol impaired driver incidents⁵. In my book, autonomous vehicles, by keeping human drivers out of the loop, could avoid if not all, most above-mentioned crashes. The positive impact of AVs is not solely limited to crash frequency. In situations where some crashes are inevitable, AVs are able to take necessary actions faster than human driver and mitigate the crash severity.

AVs benefit are not limited to passenger cars and their safety. When it comes to trucks and freights, a small portion of saving in fuel consumption can bring about significant savings annually. As a PhD student working on an NSF granted project titled “Driving Volatility in a Connected and Cooperative Vehicle

³ https://www.tn.gov/assets/entities/safety/attachments/CellPhoneUsage.pdf
⁴ https://www.tn.gov/assets/entities/safety/attachments/CountyRankings.pdf
⁵ https://www.tn.gov/assets/entities/safety/attachments/dailyfatality2016.pdf
Environment: Algorithms for Driver Warnings and Control Assists” for two years, I have come across different platooning projects and research focused on platooning vehicles especially trucks. To name a few, Safe Road Trains for the Environment (SARTRE)⁶ and European Truck Platooning challenge⁷ try to test and facilitate implementation of vehicle platooning in real world. Through platooning, follower vehicles need less energy due to reduced air resistance. In addition, calm, smooth, and less volatile driving will reduce fuel consumption. Reduction in logistic and good movement expenses will lead to lower prices and economic growth. However, connectivity between AVs is an essential part to platoon vehicles. An automated vehicle will be far better off if it can communicate to other vehicle (V2V), infrastructure (V2I) and more vulnerable users such as bicyclist and pedestrian (V2X). I believe Tennessee has a huge potential to lead platooning projects. I-40 corridor and existence of freight and car manufacturing companies such as FedEx and Volkswagen in this state is an advantage that cannot be neglected in this regard. For instance, similar to Michigan Safety Pilot Program that is pioneer in testing Connected and Automated Vehicles (CAVs) technology, Tennessee might be able to lead the implementation of freight platooning under connected vehicle environment.

Although it is unknown if AVs would decrease or increase traffic congestion, the change in car ownership will be a certain happening. Even now, some people in big cities are considering using shared ride rather than owning a vehicle. That coupled with the fact that an AV does not have to sit in a parking lot the whole day, users might consider shared ownership due to its lower costs. One implication of shared ownership and shared rides will be fewer vehicles in the road and possibly less congestion. However, the notion of induced demand should also be considered. AVs will offer rides to users who are not able to use current vehicles such as old and disabled people. Although, some of the mentioned users would probably need someone to get in or out of an AV, the ability of AVs to move such users will increase the demands. According to US census estimation, more 15% of the Tennessee population were more than 65 years old⁸.

⁶ https://en.wikipedia.org/wiki/Safe_Road_Trains_for_the_Environment
⁷ https://www.eutruckplatooning.com/default.aspx
⁸ https://www.census.gov/quickfacts/table/AGE775215/47
Therefore, an increase in travel demand is expected to occur in Tennessee by the time AVs technology has become a part of Tennesseans’ daily lives. However, the increase might be counterbalanced to some extent by the decrease in number of vehicle travels, due to shared rides and shared ownership.

All in all, it seems the combination of automation and connectivity to form Connected and Automated vehicles is a phenomenon that leads to considerable changes to the transportation in terms of safety, mobility, accessibility, etc. Although, some concerns such as cyber security, liability, legal and insurance issues exist about AVs, overall, this technology is a change for the betterment of human life. I think CAVs will revolutionize how humans go to places. When it comes to safety, undoubtedly, Vision Zero whose goal is no fatalities or serious injuries in the traffic network is not achievable without this technology. We are close more than ever to see real and operationalized AVs on roads and we should prepare and adopt ourselves to new lifestyle as we did when internet and smart phones came into our lives. Since this change is inevitable, it depends on us how quick we adapt ourselves at person, family, city, state and nation levels. Nelson Mandela once said, “Education is the most powerful weapon to change the world.” Raising people’s knowledge and mindsets about this technology and its advantages and even disadvantages will hasten the transition to new era where not many people die or suffer from injuries in roads. As mentioned earlier, Tennessee has enough motivations as well as advantages to be a pioneer state to adopt AVs technology in order to achieve the benefits in terms of safety, mobility, accessibility and economic growth.