Driverless Cars

John L. Wagner, Ph.D.
Director, Bi-State Development Research Institute

Most of us love our cars. The automobile has long been an emblem of our personal liberty and they're an important part of our cultural history in America. But the concept of driverless cars has seemingly been in the news every day. While the notion of having a computer do our driving may seem like the stuff of science fiction, the technology is real and is evolving quickly.

Not everyone is convinced that autonomous vehicles are for them, though. A recent survey by AAA found that 75% of drivers were nervous about ceding control of their auto to a computer (Njus, 2016). Most, however, still want their next car to include some autonomous features, as many already have, such as the capability to parallel park without the driver's help. Other issues like cybersecurity, privacy and safety certification also make people wary of this new technology (Miller, 2015).

Driverless cars – or autonomous vehicles – operate inherently different than human-driven vehicles. They can be programmed not to break traffic laws. They do not drink and drive. Their reaction times are quicker and they can be optimized to smooth traffic flows and improve fuel economy while reducing emissions. They can deliver freight and unlicensed drivers to their destinations (Fagnant and Kockelman, 2015).

Almost every major car maker is working on some form of automation (Waldrop, 2015). General Motors, Mercedes Benz and BMW are all working on driverless car technology, and Ford has been working on what the company calls the "Connected Car." Elon Musk, chairman and CEO of Tesla, announced at a product launch on March 31, 2016 that the Model 3 — the lowest-priced Tesla car

yet at $35,000 — will come standard with Autopilot. The feature, which has already been rolled out in more expensive Tesla models, is capable of maintaining and changing lanes, avoiding objects and parking itself without human control (GovTech, 2016B).

While a majority of these car makers have only developed "driver-assisted" technology, which automates certain elements of the driving experience without providing a completely driverless capability, the one fully automated car, and the one that has garnered the most attention, is not being produced by a traditional car maker. In 2010, Google announced that the prototype of a driverless car - the Google Car – was complete. According to Google executives at the time, the goal of the Google Car was to help prevent traffic accidents, free up people's time and reduce carbon emissions by fundamentally changing car use. One drawback of the Google car, though, is that its top speed is only 25 miles per hour (Njus, 2016), perhaps an issue of minor importance when the car's occupants are busy with other things. But its passenger compartment has been transformed: former drivers may work on their laptop computers, eat meals, read books, watch a movie or call a friend – safely (Fagnant and Kockelman, 2015).

There are many advantages to autonomous vehicles, and some drawbacks that might not seem so obvious. Autonomous vehicles have the potential to dramatically reduce crashes, according to some estimates, by as much as 90% (Fagnant and Kockelman, 2015).[1] With 1.24 million traffic fatalities every year worldwide (Waldrop, 2015), that's a lot of lives saved. Driverless cars would also be 10% more fuel-efficient and reduce wasted commute time and energy by 90% (Waldrop, 2015).

One barrier to large scale market adoption of driverless cars is the cost of their "platforms." The technology needed for this infrastructure includes the addition of new sensors, communication and guidance technology and software for each automobile. (Fagnant and Kockelman, 2015). Although,

[1] Meirav Moran (2016) notes that Dr. Ian Noy does not believe there is any factual basis to the claim that autonomous cars will prevent 90% of traffic accidents.

these cars filled with high-end technology will likely cost several thousand dollars more than conventional cars, owners will, according to some, save money in the form of regained time (spending their commute working instead of driving) and fewer accidents (Davies, 2015), at least that's the idea.

Groups who will likely not be in favor of driverless vehicles are those who drive for a living. Approximately four million people in the United States work as drivers of cars, buses and trucks – about 2.5% of the workforce. If driverless vehicles become commonplace, all of those jobs are in jeopardy, likely causing a tremendous economic disruption (Hayes, 2011), albeit a gradual one.

Think about the implications, though, and the benefits gained by those who distribute products. A driverless truck does not have to stop for meals or sleep, or for anything other than fuel. A coast-to-coast trip with a solo human driver may take four days, obeying speed limits and regulations on hours of work, while an automated truck could cover the same route in two days. Taxi service presents similar issues. Eliminating the driver would dramatically lower costs for both the operator and the customer (Hayes, 2011). Just when companies such as Uber and Lyft are gaining traction, we're working on ways to make them obsolete.

Driverless technology, though, would unquestionably be welcomed by a large segment of the population: people who cannot drive because of age or disability (Hayes, 2011). No doubt this would affect organizations that provide public transportation throughout the country, although it does create some interesting opportunities for innovative partnerships.

One not-so-obvious consequence is that driverless cars would slash hundreds of billions of dollars of annual revenue, or even trillions, from all sorts of organizations: car makers, parts suppliers, car dealers, auto insurers and financiers, body shops, emergency rooms, health insurers, medical

practices, personal-injury lawyers, government taxing authorities, road-construction companies, parking-lot operators, oil companies, owners of urban real estate, just to name a few (Mui, 2013B).

With a car you can go just about wherever you want, whenever you want to go. Ironically, though, owning and operating a vehicle is perhaps the most heavily-regulated aspect of our lives. The car has to be registered and inspected; the driver has to be licensed; both of them have to be insured. You need to obey the speed limit and other traffic laws. With few exceptions, most of us have gotten used to these restrictions.

The layers of regulation would surely increase, though, with computer-driven cars. When groups of automated vehicles are driving in tight formation, weaving through cross-traffic on a millisecond schedule, every car has to trust all the rest to behave predictably. Before being allowed to join the traffic stream, each car would have to provide some assurance that its hardware and software are functioning correctly and have not been tampered with. Tinkering with your car, as many of us enjoy doing on the weekends, except for the most superficial changes, would likely be forbidden (Hayes, 2011).

Lastly, similar to today's smart-phones, autonomous vehicles also present a new frontier of data gathering. They will necessarily have lots of computing power and contact with outside systems such as GPS and automakers. Those automakers might be able to collect information about where people are going and when, the health of the vehicles, or any number of things they decide to build into the cars. Regulations might even require those automakers to keep on hand such circumstances surrounding accidents (GovTech.com, 2016A). This may be too much for some drivers.

What about land use implications? Cars sit unused about 95% of the time. That leaves a lot of room for improvement in terms of how we allocate resources (Davies, 2015). By some estimates, there

are roughly 800 million parking spaces (Waldrop, 2015), perhaps two or three for every car in the United States – one space at home, one at work, and a share of one at the mall (Hayes, 2011). Driverless cars would allow us to share vehicles, thereby reducing the number of them on the road. With fewer cars, we can begin to undo many of the accommodations made for personal vehicles, starting with the vast quantities of real estate devoted to parking, which could be adapted to more productive uses (Waldrop, 2015). In addition, approximately 60% more self-driving cars can be squeezed into a parking garage because they need less room to self-park. The garage itself no longer would need to be located downtown, and existing parking structures and curbside spots could be freed up for other uses (Graves, 2015).

So when will driverless automobiles become mainstream? The optimistic estimates of the automakers and regulators may sound overblown, but a report from consulting firm McKinsey & Company says it is actually pretty accurate (Davies, 2015).

The report, based on research by McKinsey analysts and interviews with industry experts, notes a gradual introduction of driverless cars into society, dividing its findings into three phases. In the first, which runs through 2020 or so, the impact of autonomous technology will be limited. The technology will experience growing pains in Phase 2, between 2020 and 2035, as the knowledge and equipment begin entering society on a more regular basis. Cabbies and Uber drivers will become irrelevant. So too could long-haul truckers. In Phase 3, after 2040, we will be at the point where autonomous cars become our primary means of transportation (Davies, 2015).

By all estimates, roads would be safer with driverless cars. If robotic drivers were as dangerous as human ones, then computer-controlled cars would never be allowed on the roads. We hold our machines to a higher standard than ourselves (Hayes, 2011). What we need now – in 2016 – is

forward thinking, a plan that will create a smooth regulatory road as automated and driverless vehicles become more common in the coming decades.

Bradley Lane, an assistant professor in the School of Public Affairs and Administration at the University of Kansas notes that: "…automated-vehicle and driver-assisting technology has been around for quite some time. But the major concern (going forward) is coordinating the rollout of the adoption of this technology. There are lots of questions about how you regulate it, how the cars interact with each other and the road network, and it can get very complex" (University of Kansas, 2016). He also observes that the absence of forward-thinking has likely harmed the implementation of other new technologies in transportation, such as electric vehicles, where issues still surface with technological interfaces.

Nevertheless, planning efforts notwithstanding, driverless cars are on the way, and will likely be embraced by the next generation of drivers. Jon Sotsky, director of strategy and assessment at the Knight Foundation adds that: "*The more people use technology as consumers, the more they expect technology to shape their experience as citizens*."

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