Self-Driving Cars

When No One's in the Driver's Seat, Who's in Charge?

By Andrew L. McNichol, Esq.

Introduction

At 9:47 p.m., Brad Sullivan pulled out his iPhone and opened the Uber app. The phone's GPS pinpointed his location and, with nothing more than a few taps, Brad summoned a ride. Seven minutes later, an unremarkable white Volvo XC90 pulled up in front of his house. Brad climbed into the back seat, eyes still glued to his phone as he typed in his destination. He had taken countless Uber rides; some drivers were talkative, most were not. But this driver, it seemed, was unusually quiet. In fact, during the 17-minute ride, the driver said absolutely nothing. It was not that the driver was rude or unfriendly, it was that he did not exist.

Brad's tale is one of the future but only just so. Uber, the ubiquitous Silicon Valley-based ride-sharing company, recently deployed pilot programs of self-driving Volvos in Tempe, Arizona, and San Francisco, California, with additional cities on the horizon. Users in those cities who request a ride through the Uber app may discover a computer—rather than a human—driving their ride. The computer steers, turns, accelerates, brakes, parks, and otherwise controls the car just as a human would. Save for the periscope-like camera and sensors perched on the roof, the vehicle has no discernable difference from any other car. Other drivers on the road are not likely to notice any unusual or noteworthy driving habits. However, at least for the time being, an Uber engineer still sits in the driver's seat and has the ability to reclaim control with the push of a button or touch of the wheel or brake.[1]

Like time machines and lasers, self-driving cars have long held a place in American folklore. At the 1939 World's Fair in New York, General Motors' Futurama exhibit depicted a visionary city where cars drove themselves.[2] In the Jetsons, which premiered in 1962, members of a prototypical suburban American family of the future travel to and from their mundane daily errands in autonomous vehicles. The occupant need only speak a destination into the computer system and the vehicle—usually depicted as more transport pod than car—does the rest. The vehicle's cheerful occupants are free to converse, play games, or even take a nap on the way to their destination. The self-driving car, so the myth goes, makes travel accessible to previously disenfranchised groups: children, the blind, the disabled, and the elderly. While these futuristic utopias portray the upsides of autonomous vehicles—safety, convenience, ease of use—they rarely consider the downsides—costs, job loss, and the potential for vehicle malfunction.

The Technology in Self-Driving Vehicles

Uber's self-driving vehicles rely on a technology called lidar to detect the world around them.[3] Lidar uses infrared light to detect the shapes and distance of objects around it. The lidar system, which presently has an effective range of up to 120 meters, generates three-dimensional images of its surroundings and, unlike traditional cameras, is not fooled by sunlight or shadows.[4] The vehicle's built-in computer uses algorithms to process the lidar data on a real-time basis to identify other vehicles, pedestrians, objects, and signs on the road and predict movement patterns. Uber is far from the only company designing and testing self-driving cars. Uber's biggest American competitor, Lyft, has partnered with General Motors to build and deploy autonomous vehicles.[5] Silicon Valley tech giant Google has also deployed a fleet of self-driving cars, although exclusively for internal use rather than consumer use. Most preeminently, Tesla vehicles offer an "autopilot" mode to consumers. The term "autopilot" is perhaps

a bit overgenerous; when autopilot is engaged, a Tesla vehicle will autosteer to stay within its lane, increase or decrease speed to keep pace with traffic, and, if the vehicle detects a hazard, employ emergency braking features.[6] However, drivers are required to place their hands on the wheel every few seconds and retake control as necessary. In October 2016, Tesla announced that the hardware in its vehicles will eventually permit fully autonomous driving, although it did not offer a time frame for doing so.

And although late to enter the fray, nearly every traditional auto manufacturer has started developing automated vehicles: Toyota, Ford, GM, Volvo, Audi, BMW, and Mercedes-Benz. While all of the pilot programs provide for human oversight and control, the transition to self-driving vehicles which operate without any human oversight is no longer just a possibility but an inevitability. The only question is when such vehicles will arrive; the answer is sooner rather than later.

Self-Driving Vehicles Raise Novel Legal Issues

Technology in cars is nothing new. Rearview cameras, parallel parking assist, blind spot warnings, lane departure alerts, automatic braking, and even autosteer have become commonplace in most new vehicles. Nearly all new cars include at least one of these features, often many. In fact, starting in May 2018, all new vehicles sold in the U.S. must include a rearview camera.[7] Yet no one would confuse a car with a blind spot warning for an automated car. A driver who backs into another car while using a rearview camera is not absolved of liability because the camera malfunctioned. What about a driver whose self-driving car runs a red light and hits another?

Like all technological change, the transition from human-driven cars to autonomous ones will not be seamless. There will be winners and losers. The winners: tech companies, car manufacturers, and delivery companies will benefit from the new technology. If self-driving cars are safer than human-controlled ones—and by the time they are available to the mass market they almost certainly will be—the general public will benefit from the increased safety. The losers: taxi drivers, truckers, and delivery drivers may find themselves out of jobs. Fewer accidents mean less need for auto repair shops. And, paradoxically, the safer cars are, the worse off auto insurers would be. Drivers purchase auto insurance to protect against risk. The greater the risk, the greater the need for insurance and the higher the premiums. In a world where auto accidents no longer existed, there would likewise be no need for auto insurance.[8] The automobile sector currently accounts for approximately $125 billion in losses per year.[9] Even before self-driving vehicles, cars are getting safer and accidents are declining.[10] Although a world with zero auto accidents will likely never come to fruition, one estimate predicts that within 25 years, annual losses will be reduced by more than half, to $50 billion, thanks to self-driving vehicles.[11]

The emergence of self-driving cars and their impending arrival to consumers presents a number of important legal questions. Is a driver's license required to "operate" such cars? Can the owner of a self-driving vehicle summon it using his smartphone, or does he have to sit in the driver's seat any time the vehicle is on the road? After spending Friday night at the bars, can the owner of a self-driving car climb in for a safe ride home or is he driving under the influence? But the most pressing question to the average driver is: who is responsible if the self-driving vehicle causes an accident—the driver or the manufacturer?

Framework for Liability

State tort law governs liability arising from car accidents. But, as always, technology leads while the law lags. This is a feature not a bug. At the time traffic laws were written, legislators could no more regulate automated cars than legislators today could regulate teleporters. State laws regarding fault and liability arising from car crashes all presume a human operating the vehicle.[12] Tort law serves several fundamental purposes. It breeds certainty by establishing the duties of care owed to society. It allocates liability for losses occasioned by tortious conduct. When an individual's behavior falls below the acceptable standard and causes injury, tort law punishes the tortfeasor and provides victims a way to seek redress for their injuries.[13] In the realm of auto collisions, state tort law sets forth bright line rules which allocate liability to minimize litigation. Most drivers are familiar with these rules.

Under existing state laws, the driver of a vehicle has a duty to comply with traffic laws and operate the vehicle in a reasonably prudent manner.[14] A driver who deviates from the standard of care and causes an accident is liable to the parties injured by his conduct.[15] But as vehicles transition from limited autopilot to complete automation, the tort paradigm applicable to human drivers becomes less and less suitable to automated vehicles. Suppose a simple two-car accident. The driver of Car A, momentarily distracted by a text message, drifts into the adjacent lane and strikes Car B. Under traditional tort law principles, the driver of Car A is liable for all damage caused to Car B and its occupants.[16] It would be strange to excuse the driver of Car A from liability because his vehicle's blind spot warning system malfunctioned and failed to alert him to Car B's presence. That system, like the car's mirrors, helps the driver perceive the world around him and improves the driver's awareness. But the camera does not replace the driver or absolve him of liability, even if the blind spot monitoring system indeed malfunctioned.

Now, instead, suppose an autonomous vehicle driving in stormy weather. As the vehicle approaches a red light, a glitch in the vehicle's programming, combined with the suboptimal driving conditions, causes the vehicle's

computer to interpret the light as green rather than red. The vehicle continues through the intersection and T-bones a human-operated Toyota. The injured driver of the Toyota hires a lawyer to file a lawsuit. Unsure who is ultimately responsible, the lawyer names both the manufacturer and driver of the autonomous vehicle as defendants. Both defendants file motions to dismiss, pointing the finger at each other. "Driver exercised no control over the vehicle and therefore could not and did not act negligently," reads the driver's motion. The manufacturer's motion to dismiss cites public policy reasons, arguing that if the manufacturer were held liable for every accident involving one of its vehicles, the potential liability would overwhelm the price of the car and thus the manufacturer would cease selling automated cars.

The judge finds both sides' arguments compelling. Existing case law provides no guidance, nor has the state enacted a statutory framework to assess liability arising from the operation of self-driving vehicles. The judge is hesitant to grant either motion for fear of making bad law. "Besides," thinks the judge, "isn't this a policy decision better resolved by the legislature?" The judge, sympathetic to the victim's right to recover, denies both motions and the case proceeds to trial. The jury finds both the manufacturer and driver of the automated vehicle jointly and severally liable for the injuries. Both defendants appeal, and the case reaches the state's supreme court.

Imposing Liability on the Driver is the Only Practical Solution and Will Provide Certainty

Faced with the legal issue for the first time, the state supreme court should impose liability on the driver of the autonomous vehicle, rather than the manufacturer, to the same extent the driver would be liable if the vehicle were nonautonomous. Courts should look not to the driver's conduct, but rather to the conduct of the vehicle itself. If the vehicle falls below the standard of care—drifting into the adjacent lane, running a red light, or failing to yield—the driver is liable for all resulting damage, even though the vehicle was controlling itself. Put another way, the driver of an autonomous vehicle involved in a collision is liable if the vehicle is liable.

At first blush, this may seem an unjust result. After all, what wrong has the driver of the vehicle committed? The vehicle ran the red light, not the driver, and he had no opportunity to avoid the collision. But this overlooks one crucial detail: the driver elected to purchase and use a self-driving vehicle. The driver has a duty to operate the vehicle in a reasonably-prudent manner, including the decision to use or not use the vehicle's automated systems. To the extent the vehicle's self-driving systems are imperfect, the driver assumed the risk of computer error resulting in a collision. The driver could have declined to use the vehicle's computer and instead manually driven the car.[17] Just as the driver cannot absolve himself of liability because the rearview camera or blind spot alert malfunctioned, neither can he relieve himself of liability because the vehicle's other sensors malfunctioned.

Back to the second example above. Suppose that instead of an autonomous vehicle, a human-operated vehicle ran the red light and crashed into another. Liability would be straightforward: the human driver who ran the light is liable to the driver and occupants of the other vehicle. The driver's conduct—running the red light—fell below the standard of care and caused injury to others. At the time of the accident, the victim has no knowledge as to whether the other vehicle is human- or computer-driven. Nor should the victim's right to recover against the driver of the other vehicle differ simply because the vehicle was piloted by a computer instead of a human.

Imposing liability on the driver does not mean the driver is liable for every accident in which the vehicle is involved. Traditional tort law principles still apply. That is, if a nonautonomous car strikes the autonomous car because of the negligence of the driver of the nonautonomous car, that driver is still at fault and thus liable. Likewise, imposing liability on the driver does not eliminate the concept of contributory negligence in the states which still retain it. Suppose an autonomous vehicle strikes a pedestrian crossing the street outside of a crosswalk. The autonomous vehicle is negligent for failing to yield, but the pedestrian is likewise negligent. A jury could apportion liability, i.e., 75% to the vehicle for failing to yield and 25% to the pedestrian for crossing the street outside a crosswalk. Pursuant to the doctrine of comparative negligence, the pedestrian's recovery against the driver of the autonomous vehicle is reduced by 25%, just as it would be against any other driver.[18]

To summarize: the driver of an autonomous vehicle is not liable for accidents which are not caused by his vehicle.

Insurance

Nor would imposing liability on the drivers of autonomous vehicles leave the drivers high and dry. First, the primary reason autonomous vehicles are involved in accidents is that they encounter unfamiliar situations. But as autonomous vehicles travel more and more miles, they collect an abundance of data. Vehicle manufacturers use this data to update the vehicles' software and teach them how to respond in similar situations. The manufacturers constantly wirelessly update existing vehicles' software. So each day, self-driving vehicles—not unlike human drivers—get smarter and learn how to react in new situations. As more and more contingencies are programmed into the vehicles' software, the number of accidents caused by autonomous vehicles will continually decrease. Early adopters of the technology accept the risk of the imperfections in the vehicles' programming. But as self-driving vehicles get safer and safer, and

the cost of such vehicles decreases, it is likely that more and more drivers will embrace the technology.

Second, owners of autonomous vehicles can protect themselves by purchasing insurance. Automobile insurance is already mandatory in all 50 states. Insurance companies are already writing policies which cover autonomous vehicles. If autonomous vehicles are safer than human-driven ones—which they almost certainly will be by the time they are available to consumers—insurance premiums on self-driving vehicles will be lower than their human-driven counterparts to reflect the decreased risk.

Finally, the biggest selling point of self-driving vehicles is, of course, safety. If all human error were eliminated, the number of car accidents could fall by as much as 92%. While self-driving cars are unlikely to ever entirely eliminate car accidents (after all, there are forces even a computer cannot control or account for), they are likely to greatly reduce the number of accidents. Owners of self-driving cars would greatly benefit from the vehicle's increased safety, even at the expense of the occasional computer-caused accident.

Conclusion

There is something about autonomous cars which makes people uneasy. Perhaps it is the fear of relinquishing control and putting your life in the hands of a computer. After all, when a human is behind the wheel, at least she has control over her own fate. When she gets in an automated vehicle, she trusts her life to a computer she hopes is more C-3PO than HAL 9000. Or perhaps people see automated cars as an attack on a way of life. Driving represents a special part of the American identity, a slice of Americana that evokes memories of passing a driver's test and road trips and first dates. If drivers can be replaced by a computer, what other job or experience is not at risk of being automated out of existence?

Computer glitches are frustrating and perhaps costly, but rarely fatal. The same is not true of crashes in a self-driving vehicle's computer. On May 7, 2016, an Ohio man was killed when his Tesla, on autopilot mode, failed to detect and brake for a white tractor trailer against the skyline.[19] On March 24, 2017, a self-driving Uber in Tempe was involved in a high-speed crash. Photos showing the Uber overturned on its side and significant damages to the other car spread like wildfire.[20] Never mind that the other car ran a red light and the Uber was not at fault; the headlines wrote themselves: Self-Driving Uber Involved in Crash, Should They be Outlawed?, Are Self-Driving Cars Safe?

Consumers often interpret media coverage as a proxy for frequency. Crashes involving self-driving cars are statistically rare but highly publicized.[21] There are hundreds of thousands of car crashes every day. Only the most sensational make the headlines. In 2014, there were 32,675 deaths in the United States from car crashes and over 1.25 million worldwide.[22] Advocates of autonomous vehicles point out that a staggering 94% of crashes in the United States involved human choice or error, which is to say every one of those crashes could, one day, theoretically be avoided through the use of autonomous cars.[23]

Just as seat belts, airbags, rearview cameras, blind spot warnings, and other technology in cars has made society as a whole better off, so, too, will self-driving cars. Unlike humans, computers do not drive drunk, text at the wheel, or do their makeup in the mirror. Computers react to familiar situations only in the ways in which they are programmed. Although they will never be able to account for every conceivable contingency, they will be, on the whole, much safer than human drivers.

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Endnotes

1. *See [Andrew J. Hawkins, "Uber's Self-Driving Cars are now Picking up Passengers in Arizona," THE VERGE (Feb. 21, 2017),] http://www.theverge.com/2017/2/21/14687346/uber-self-driving-car-arizona-pilot-ducey-california.*
2. *See [Marc Weber, "Where to? A History of Autonomous Vehicles," COMPUTER HISTORY MUSEUM (May 8, 2014),] http://www.computerhistory.org/atchm/where-to-a-history-of-autonomous-vehicles/.*
3. *[John R. Quain, "What Self-Driving Cars See," N.Y. TIMES (May 25, 2017),] https://www.nytimes.com/2017/05/25/automobiles/wheels/lidar-self-driving-cars.html.*
4. *Id.*
5. *[Danielle Muoio, "These 19 Companies are Racing to put Driverless Cars on the Road by 2020," BUSINESS INSIDER (Aug 18, 2016),] http://www.businessinsider.com/companies-making-driverless-cars-by-2020-2016-8/#honda-is-aiming-to-have-fully-autonomous-cars-on-the-road-in-2020-13.*
6. *[Jacob D. Walpert, "Carpooling Liability?: Applying Tort Law Principles to the Joint Emergence of Self-Driving Automobiles and Transportation Network Companies," 85 Fordham L. Rev. 1863, 1879 (2017).]*
7. *[Doug DeMuro, "New Backup Camera Rule: Cameras Will be Mandatory by 2018," AUTOTRADER (April 2014),] http://www.autotrader.com/car-news/new-backup-camera-rule-cameras-will-be-mandatory-by-2018-223739.*
8. *See [KPMG White Paper, "Marketplace of Change: Automobile Insurance in the Era of Autonomous Vehicles" (October 2015),] https://assets.kpmg.com/content/dam/kpmg/pdf/2016/06/id-market-place-of-change-automobile-insurance-in-the-era-of-autonomous-vehicles.pdf.*
9. *[Aaron M. Cargain & Tad A. Devlin, "What Road Lies Ahead for Driverless Cars?," 27 Westlaw Journal Product Liability 11 (2016).]*
10. *KPMG, supra note 8.*
11. *Id.*
12. *See [John Markoff, "Google Cars Drive Themselves, in Traffic," N.Y. TIMES (Oct. 9, 2010),] http://www.nytimes.com/2010/10/10/science/10google.html; see also, e.g., [Mass. Gen. Laws ch. 90, § 13A; Tenn. Code § 55-50-301.]*
13. *See [Jacob D. Walpert, "Carpooling Liability?: Applying Tort Law Principles to the Joint Emergence of Self-Driving Automobiles and Transportation Network Companies," 85 Fordham L. Rev. 1863, 1879 (2017).]*
14. *See, e.g., [A.R.S. § 28-701(A).]*
15. *See, e.g., Pacific Employers Ins. Co. v. Morris, [275 P.2d 389, 392-93 (Ariz. 1954).]*
16. *[While auto insurance generally covers some or all of the damages resulting from an accident, it is not, itself, a method of determining liability.]*
17. *[It is no stretch of the imagination to picture cars that one day will not permit for "manual" driving and may not even have a steering wheel or pedals. Such vehicles seem*