Pied Piper and Autonomous Vehicles

Clara Sloan was in her new semiautonomous car as it drove down California Route 101 when she hit typical morning traffic. The car changed the arrival time to 10 minutes later than she had planned. She hoped to make it to her office in Mountain View, California, by 11:00 a.m. for a meeting with her team. Sloan worked at Pied Piper, a growing tech firm that had earned its stripes in Silicon Valley after creating an impressively fast compression algorithm for eventual use in a wide array of applications, including the most anticipated products of artificial intelligence, drone racing, and autonomous vehicles (AVs).\(^1\)

Promoted to senior product manager of Pied Piper’s AV division a year ago, Sloan and her team had chalked up some wins, most notably by accomplishing more than 70,000 miles of AV test drives with no accidents. On two occasions, the Pied Piper car had collided with a utility pole and a fire hydrant, but no humans or other cars were involved. Despite its success, Sloan knew that her team faced fierce competition from Ford, Lexus, and even Tesla (she had bought her Model Z before she joined the group) in bringing AVs to market. A rumor had swept through Silicon Valley that Ford was a year away from launching the next Fusion equipped with an autonomous feature. The race to launch the first mass-market AV program was on, and Sloan’s development team was not about to lose that honor to what it called “a pack of programmers” from Detroit, Michigan.

The stakes regarding this morning’s meeting could not have been higher. Sloan and her team had just learned the night before that Pied Piper’s first driverless car had been in an accident that had killed a 26-year-old jogger. News of the accident and outrage over the death of a well-loved community member were appearing on social media sites. Sloan felt a deep sadness for the victim’s family, and was disappointed and alarmed because like so many others she had optimistically thought driverless cars would eventually lead to total elimination of driving fatalities. But the technology and its various complexities were still in a nascent stage; just yesterday, Sloan had read in a Business Insider article that in 2016 AVs were still “sort of in the Wild West of self-driving cars’ ethics.” Nonetheless, Sloan and her team needed to decide if their car’s algorithm was responsible for this death and, if so, what the plan of action should be.

In a brief conference call early that morning, Sloan had discovered a divided AV division team. Some argued that despite the terrible outcome, the algorithm performed as intended, while others thought it was the driver’s fault. Sloan and her team needed to resolve this division quickly because Pied Piper’s CEO had asked Sloan to brief the senior executive team that afternoon in preparation for explaining the crash to the press and

---

\(^1\) There are various names and different levels of complexity for vehicles developed to drive themselves. Self-driving cars, driverless cars, autonomous cars, semiautonomous cars, among others. For the sake of simplicity, these cars—despite their differences—will primarily be referred to as “autonomous vehicles,” or AVs, in this case.

the public. Sloan wondered how she could best lead her team through these issues; the world of driverless cars was fraught with many ethical complexities, none of which could be decided quickly and decisively. She also realized that the company’s values-driven reputation, which motivated many Pied Piper employees, was potentially at risk.

Automobile Accidents and Injuries

After a decades-long decline in motor vehicle accidents and fatalities, the trend had reversed alarmingly. In 2015, there had been approximately 35,092 motor vehicle–related fatalities and 2.44 million injuries in the United States. According to the National Safety Council, these figures made 2015 one of the “deadliest driving” years in almost a decade, and there was a big jump (7.2%) even from 2014, which had seen 32,675 fatalities and 2.3 million injuries. Although the year was barely half over, 2016 was looking even worse, with traffic deaths up 9% from 2015. These increases were the largest since the mid-1960s. Of the fatalities, 36% were passenger car occupants, 28% were light truck occupants, 32% were nonoccupants (pedestrians, bicyclists, motorcyclists), and 4% were large truck or bus occupants.

While the rise in vehicle miles traveled in 2015 could be the reason for some of this increase, distracted driving (e.g., talking or texting on a cell phone) and digital diversion (e.g., using Snapchat or playing video games) were also important culprits. According to the National Highway Traffic Safety Administration’s (NHTSA) most recent figures, 3,154 people died, and 424,000 were injured in distracted driving–related accidents in 2013. The largest proportion of distracted drivers was in the 15- to 19-year-old bracket (see Exhibit 1 for vehicle accident fatalities statistics).

Globally, the conditions were worse. The World Health Organization estimated that in 2013, there were 1.25 million road accident–related deaths or nearly 3,500 deaths daily. The estimates of people injured annually ranged from a minimum of 20 million to a high of 50 million. Statistically, in 2013, for every 100,000 persons in the United States, about 10.6 died in vehicle accidents. Globally, for every 100,000 persons, more than 17 people died in road accidents. The majority of the fatalities occurred in developing nations in both Asia and Africa. Among the worst, Libya had approximately 73.4 deaths per 100,000 people, and Thailand had 36.2 deaths per 100,000 people.

Despite the alarming rise in accidents and fatalities, driving safety had improved significantly since the 1970s, when there were nearly 60,000 deaths annually in the United States despite fewer cars and lower average speeds. Such numerous automotive safety features as mandatory seat belts, air bags, and antilock brakes, among others, were responsible for the decline in accidents and deaths. Programmed to drive so that the majority of the time their occupants were merely passengers, AVs were expected to help this decline continue. Industry analysts, technologists, and government regulators all viewed AVs as a way to reduce the deaths and injuries involved in personal transportation.


Distributed by IESE Publishing. If you need copies, please contact us: www.iesep.com. All rights reserved
Autonomous Vehicles

As of mid-2016, there were four levels of autonomous cars:

- **Level 1** (function-specific automation) had some specific programmed functions such as precharged brakes, which assisted the driver in stopping or regaining control of the car.
- **Level 2** (combined-function automation) had at least two features (e.g., adaptive cruise control and lane centering) that functioned simultaneously without the driver’s control.
- **Level 3** (limited self-driving automation) allowed the driver to give control of critical safety functions to the car in various conditions (e.g., heavy traffic), rather than to retain control (with a slow transition). Google cars were an example of Level 3.
- **Level 4** (full self-driving automation) performed all driving functions, with the occupant only providing the destination or navigation inputs. Cars at this level could be either occupied or unoccupied.

AV technology promised many benefits, one of which was the elimination or drastic reduction of human error in operating vehicles. In addition to lowering the accident/fatality rates—90% of crashes were caused by human error⁴—these cars conserved fuel more efficiently than with human drivers, therefore helping to reduce greenhouse gases. By making more intelligent computerized route selections, these cars would reduce road congestion and would enable easier and more efficient car sharing. For instance, New York City had struck a deal with Google to launch driverless taxicabs summoned by touching a mobile phone button and expected to reduce congestion in the city since driverless cars would be more efficient than cabs in picking up customers and navigating busy traffic. The NHTSA projected that the prevention of crashes and fatalities and the resulting emotional toll would also “greatly reduce the enormous related societal costs—lives lost, hospital stays, days of work missed, and property damage—that total in the hundreds of billions of dollars each year.”⁵

At the same time, there was fear that semiautonomous driving features would create a false sense of security for some drivers. For example, drivers criticized Tesla for not building in safeguards to protect against “a mind-wandering sense of false security.” Keeping that criticism in mind, GM installed a driver-monitoring camera beside the rearview mirror of its new 2017 Cadillac sedan. If the driver took his or her eyes off the road for more than a few seconds, an alarm sounded, and lights flashed. The upcoming Mercedes-Benz semiautonomous car had a program, Drive Pilot, with its own alarms and lights that encouraged drivers to keep their hands on the steering wheel even when they were not in control. Other carmakers, including Audi, planned to follow in GM and Mercedes’s footsteps. However, these safeguards would not work on country roads that were more secluded. The nascent car technology allowed self-driving cars to distinguish between basic objects (e.g., pedestrians and bicyclists), and more sophisticated future technology would allow these cars to recognize far more objects such as “baby strollers, shopping carts, plastic bags, and actual boulders.”

Most of the companies making the cars opted for a gradual introduction of the automated features, in part to help drivers get used to the technology and gain driving experience. Ford and Google were the exception, having seen too many potential flaws (including the classic handoff dilemma, or a person trying to “correct” a perceived mistake in automatic driving) in the semiautonomous cars, the two companies planned only to make fully self-driving cars. Tesla had been first out of the gate, selling 20,000 or more cars that featured Autopilot.

---


