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Autonomous vehicles: Where are they taking us next?

As carmakers, tech companies and policymakers edge closer to deployment, safety and convenience remain at forefront of Americans' minds

As emerging technologies such as connected and autonomous vehicles are deployed on a wider scale, disruptive innovations are poised to revolutionize surface transportation infrastructure and personal mobility.

Americans can see the future taking shape and anticipate dramatic changes. In a recent HNTB America THINKS survey, *The Road to Autonomous Vehicles - 2018*, seven in 10 Americans said they believe autonomous vehicles will routinely navigate the nation's streets and highways within 15 years. This is in line with what many experts predict.

If this kind of rapid adoption indeed takes place, tomorrow's transportation systems will look and operate much differently than they do today. Autonomous vehicles – from cars, to shuttles and buses, to freight trucks – will communicate with each other and with related highway infrastructure, which can improve safety while delivering benefits to all road users. For example, for every driver unexpected starts and stops on highways would virtually disappear, and safety for a variety of travelers would improve.

With these aims in mind, industry and government are moving toward the creation of a safe connected vehicle environment. Many states are tracking with this technological evolution, even if they are proceeding at different speeds. According to a report by the Governors Highway Safety Association, 37 states and the District of Columbia had enacted autonomous vehicle-focused legislation or issued related executive orders as of June 2018. A dozen states had cleared the way for testing or deployment (with some conditions) without a human in the vehicle. Federal legislation to enable self-driving vehicles – which would help to stitch together this patchwork of state and local policies – is moving forward in Washington, D.C., as well.

Innovation from every direction

The private sector has been gearing up for the change for many years, with automakers and technology companies racing to bring effective solutions to market.

Major companies like Waymo, Tesla and GM routinely get headlines for their on-the-road test cars, but many hundreds of small companies and researchers are working to solve myriad technical problems. For example, in mid-2018 a research team from Stanford University brought forth a new “hybrid” optical-electrical camera that promises to crunch more visual and sensor data, more quickly and in a smaller, lighter package.

Given the amount of attention and resources being poured into research and development, a consumer-grade, fully automated vehicle likely will be available for purchase within the next five years. However, due to cost, policy and regulatory issues, formal consumer adoption on roadways might take another five to 10 years after the initial vehicles hit the market. Within the next couple of years, companies such as Waymo, GM, Ford and others are poised to initiate ride-hailing and package delivery services in which the costs of automated vehicles can be spread across multiple users and more hours of the day. This type of fleet-ownership model also will simplify some of the policy and regulatory issues associated with personal vehicle ownership.

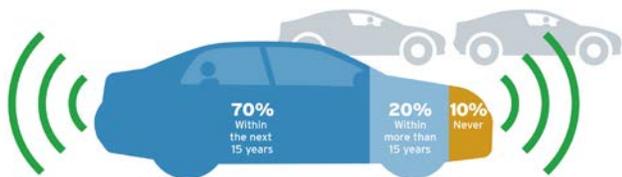
Some deployments are already occurring in smart city programs around the nation, and autonomous shuttles can be seen at airports and in cities around the world. These eight- to 16-passenger shuttles can be used to connect passengers to the first and last mile of transit systems, extending the reach of existing bus and rail service into neighborhoods. These deployments also may soon include smaller vehicles, operating on-demand, and driving on mixed-use road facilities where some of the policy, regulatory and insurance factors can be more readily addressed than on public roadways.

Safety is the driving issue

As the nation moves toward deployment of autonomous and connected vehicles, safety remains a top priority for public and private sector leaders alike. Self-driving technology promises to improve safety by removing the potential for human error, which contributes to an estimated 95 percent of accidents. However, highly publicized accidents involving autonomous test vehicles have raised the question: *Can such vehicles truly be safe?*

According to the HNTB survey, almost six in 10 (59 percent) Americans believe that autonomous vehicles are not as safe as vehicles operated by people, and 55 percent would be unwilling to ride in an autonomous vehicle today. It's likely that some of this perception stems from intense media coverage of any crash involving self-driving vehicles. However, safety concerns appear to vary based on age. A majority of millennial respondents (54 percent) believe that self-driving vehicles are safer, and 60 percent of this same group would be willing to ride in such a vehicle today. This indicates that emerging generations, accustomed to adopting the latest technologies, may represent a wide-open market for autonomous vehicles and services as these capabilities become more refined.

Here in America, about 40,000 people die in traffic crashes each year. Globally, road traffic injuries are the leading cause of death for young people (ages 15-29) and the ninth leading cause of death for all age groups. There is general agreement that technology refinements in vehicles and the infrastructure along our roadways can someday enable us to travel our roads without crashing. This is why, despite the risks endemic to testing, automakers and other innovators must continue to experiment, with great diligence to ensure that these new vehicles can react safely to every possible scenario that they encounter in the real world.



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HNTB America THINKS survey: The Road to Autonomous Vehicles - 2018

Illuminating the benefits

Beyond ensuring safety, all of us in the transportation sector must help to communicate the many benefits that these emerging technologies will bring to society. For one thing, widespread availability of autonomous vehicles may help commuters turn currently idle time into productive output. The average American now spends just under an hour, round trip, in a daily commute, according to the Census Bureau. Imagine the potential economic impact when people can choose to work while traveling in autonomous cars. The car becomes another workplace.

This new technology can bring entirely new transportation options to those who currently have limited mobility. When HNTB survey participants were asked to identify benefits that automated vehicles will bring, 51 percent identified new transportation options for non-drivers, such as the elderly or people with disabilities, as the single most important benefit. Providing improved mobility to these population segments would be transformative. Significant economic benefits also could accrue to currently underserved populations who would have access to broader mobility options to get to and from jobs and health care providers.

Intermodal connectivity will mean that people can more easily transfer between modes of travel, from bikes to cars to buses and ships, to trucks to trains and airplanes. Autonomous vehicles can provide the bridge between modes, as users share rides and vehicles to spark "mobility as a service" on a grand scale. In such a scenario, people could electronically "hail" an autonomous vehicle to their

front door from a smartphone, and then ride to the nearest train station or airport. This idea holds some appeal already. When the HNTB survey asked people about the potential use of autonomous vehicles once they are readily available, 37 percent overall cited travel between transit stations and airport terminals as the most common usage. That number was higher, 52 percent, among seniors (age 69+).

As this transportation revolution accelerates, it is important that we create long-range plans that are ready to take advantage of what the tech-driven future has to offer. This way we can ensure that our system will not only look significantly different from what we see today, but it also will provide smoother connections between transportation modes, and broader mobility options for all.

Most importantly, safety will continue to be the primary driver of our efforts. As these automated systems advance, we will move toward our ultimate goal – zero traffic fatalities nationwide.

About the authors

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