

REFLECTIONS

A thought series

AUTONOMOUS VEHICLES: DRIVING CHANGE

Automation is now a part of our daily lives, including our vehicles. Autonomous, or self-driving, vehicles will present economic and accessibility advantages that didn't exist before. Autonomous vehicles can reduce traffic delays, increase mobility options, and change how we work, purchase goods and services, and invest in major infrastructure projects. This change will bring challenges and opportunities.

Traditional automotive companies, such as the Ford Motor Company and General Motors, as well as the newer Tesla Motors, ridesharing companies, like Uber and Lyft, and technology giants Apple and Google dedicate tremendous amounts of man-hours and dollars to the development of autonomous vehicle technology. According to Statista, the global market will reach \$36 billion for partially autonomous vehicles by 2025.¹

These technological strides hint at significant benefits to our day-to-day lives. These opportunities will also result in changes to the character of our region, necessitating a shift in short- and long-term planning efforts. This requires growing cities, counties, and the Houston-Galveston Area Council to work together to lead the way in preparing the region for autonomous vehicles.

PREPARING FOR AUTONOMOUS VEHICLES

The Houston-Galveston Area Council developed this document for the cities and counties it serves, providing a foundation of ideas and options that should be considered to ensure the region stands ready to accommodate autonomous vehicles.

Pilot programs across the country are underway for grocery and goods delivery. Delivery by autonomous robots will likely be the first implementation wave in autonomous vehicles, as there are fewer legislative, infrastructure, and safety concerns to overcome when transporting goods as opposed to people.²

¹[Online Article] Autonomous vehicle technology - Statistics & Facts. Retrieved from <https://www.statista.com/topics/3573/autonomous-vehicle-technology>

²[Online Article] How Robots and Drones Will Change Retail Forever. Retrieved from <https://www.wsj.com/articles/how-robots-and-drones-will-change-retail-forever-1539604800>

QUALITY OF LIFE BENEFITS

Autonomous vehicles can significantly benefit users, reducing traffic congestion and roadway fatalities that result from driver error. Without the need for an engaged driver, individuals are free to pursue other activities while en route. But it is important to note that current attitudes surrounding the technology vary.

The Pew Research Center conducted a survey in 2017 analyzing attitudes toward automation. According to the survey, 44 percent of Americans would ride in a driverless vehicle if given the opportunity. This attitude is largely attributed to concern over “a lack of trust in technological decision-making and an appreciation for the unique capabilities and expertise of humans.”³

Some communities may see greater benefits from autonomous vehicle integration. Vulnerable populations, such as the elderly and disabled, may particularly benefit from a technology that removes the need for specific abilities or skillsets to operate a vehicle, thus allowing those individuals greater freedom, autonomy, and employment options. Future input from municipalities and advocacy groups will be necessary to ensure safety and certification requirements guiding autonomous vehicles serving vulnerable populations are met.

The Takeaway

For this technology to be successfully integrated, it is essential that residents, business owners, and visitors understand how autonomous vehicles will safely and effectively function within their communities and provide a benefit to their daily lives. Investments in education and engagement campaigns for the region’s residents will be needed.

Cyber security and the looming threat of identity theft, hackers, and malware is at the forefront of national security concerns. Ensuring autonomous vehicles are secure from cyber security breaches to protect people, information, infrastructure, and property will be a continually evolving process.

THINKING ABOUT INFRASTRUCTURE

Infrastructure that accommodates and interacts with autonomous vehicles is necessary for future integration. However, such an endeavor can be costly – particularly when retrofitting existing systems.

The primary technology associated with partially and fully autonomous vehicles is a detection system that uses lights from a laser to navigate spatially. For the system to fully interact with infrastructure, uninterrupted communications between the vehicle and wireless sensors and cameras along roadways must exist. Autonomous vehicles must be able to detect, interpret, and transmit those communications for safe passage. This requires high-speed broadband internet. Future technologies may require even faster communications infrastructure. Roughly 40 percent of rural communities in the United States lack minimum broadband internet speeds to sustain uninterrupted communications with autonomous vehicle technology. Investments in high-speed broadband internet across the region are necessary to ensuring residents outside metropolitan areas aren’t left behind.⁴

³[Survey] Automation in Everyday Life. Retrieved from <http://www.pewinternet.org/2017/10/04/americans-attitudes-toward-driverless-vehicles>

⁴[Editorial] High-speed broadband, autonomous vehicles and small-town and rural communities. Retrieved from <https://www.smartcitiesdive.com/news/high-speed-broadband-autonomous-vehicles-rural-communities/526783>

In addition to digital infrastructure, planning for built infrastructure, such as curb cuts, highway lane widths, building setbacks, and parking, must be explored. Today's roadway design standards may not appropriately accommodate autonomous vehicles. Retrofitting roadways is extremely disruptive and expensive. Communities and state agencies may want to consider design standards that can accommodate technology and utility upgrades.

The Takeaway

Significant investments in digital and built infrastructure are required to successfully implement autonomous vehicles in the Houston-Galveston region. Cities and counties can begin planning for such expenditures when developing capital improvement plans, modeling various scenarios that demonstrate low versus high rates of change, and by

Across the country, policy and legislation associated with autonomous vehicles is still in development. In 2017, Texas passed Senate Bill 2205, which seeks to better position Texas for investments from companies working on autonomous vehicle and self-driving technologies.⁵ In its 2018 Call for Projects, the Houston-Galveston Metropolitan Planning Organization added selection criteria related to autonomous vehicles, setting the stage for future regional projects related to self-driving technologies.

participating in coordinated planning efforts with entities such as the Houston-Galveston Metropolitan Planning Organization.

IMPACT ON THE ECONOMY

Historically, significant leaps in technology have directly impacted employment trends. The integration of autonomous vehicles into the mainstream of American life will be no different.

There are many economic opportunities for the transport of goods from ports to distribution centers, then to stores or directly to businesses and residences. Vehicle-centric businesses, such as trucking companies, gas stations, mechanic shops and car dealerships, will likely see shifts in staffing needs, expertise requirements, and inventory. Municipalities and other entities that use revenue from traffic fines, parking fines, and other associated fees will likely see a shift in revenue as autonomous vehicles become more widely used. Whether autonomous vehicles are resident-owned, or a component of larger, for-hire fleets, could further affect revenue generated from fees and fines. Eventually, jobs dependent on drivers – such as freight delivery and taxis – will likely need to evolve.

Employment related to autonomous vehicles is expected to increase proportionally. According to ZipRecruiter, job listings related to autonomous vehicles, including engineering jobs, increased 27 percent between January 2017 and January 2018. This trend will likely continue as autonomous vehicles for transport of goods and, eventually, people, become more commonplace.⁷

⁵[Texas Legislature Online] SB 2205. Retrieved from <https://capitol.texas.gov/billlookup/History.aspx?LegSess=85R&Bill=SB2205>

⁶[Article] The impact of technology on labor markets. Retrieved from <https://www.bls.gov/opub/mlr/2017/beyond-bls/the-impact-of-technology-on-labor-markets.htm>

⁷[Article] This is Who's Driving the Autonomous Car Revolution. Retrieved from <https://www.ziprecruiter.com/blog/this-is-whos-driving-the-autonomous-car-revolution>

Opportunities for rural communities to become freight and goods movement distribution centers exist in the Houston-Galveston region, due to the greater availability of affordable real estate and lower population density. Closed-loop autonomous vehicles within the distribution centers, as well as in ports and other major freight hubs, can lead to greater on-site efficiencies, cost savings, and reductions in congestion and air pollution.

The Takeaway

New employment opportunities will increase; however, skilled and non-skilled job training is necessary to support a robust and prepared workforce. In addition, entities that use revenue from traffic fines and fees should conduct a cost-benefit analysis to determine how and if changes in revenue streams will impact organizational budgets.

CONCLUSION

Many factors in the autonomous vehicles landscape remain undefined, and legislation and best practices are still being created. However, the technology is already being implemented as circulators on college campuses and package delivery vehicles for residential online shopping.

Short- and long-term planning efforts to integrate autonomous vehicles are necessary

The Metropolitan Transit Authority of Harris County, in partnership with Texas Southern University and the Houston-Galveston Area Council, plan to begin a closed-loop pilot program running a bus along a shared-use path that cuts across the university's campus in 2019. Future phases of the pilot may include operating the bus on Cleburne Street. This project is a significant component of Texas' designation as an autonomous vehicle proving ground by the U.S. Department of Transportation in 2016.⁸

to ensure regional readiness to adapt to new technologies. As the regional planning agency and an authority in transportation, the Houston-Galveston Area Council and the Houston-Galveston Metropolitan Planning Organization are uniquely positioned to study this issue and work closely with area governments and state and federal legislators to lead the way in preparing the region for autonomous vehicles.

To learn more about autonomous vehicles, visit www.h-gac.com/go/autonomous.

REFLECTIONS: A thought series is a quarterly publication produced by the Houston-Galveston Area Council to spur conversation among leaders and decision-makers in the region on a variety of topics that impact the community.

E-mail Reflections@h-gac.com or visit www.h-gac.com/go/reflections to learn more, or to request a guest speaker.

⁸[Press Release] Metro Board gives automated vehicle pilot green light. Retrieved from <https://content.govdelivery.com/accounts/TXMETRO/bulletins/1ec180a>