BENEFITS AND CHALLENGES OF AV TECHNOLOGY

An overview created by Walker Consultants

Image Source: (http://www.cnbc.com/2015/01/05/015-the-future-of-autonomous-cars.html

SUMMARY

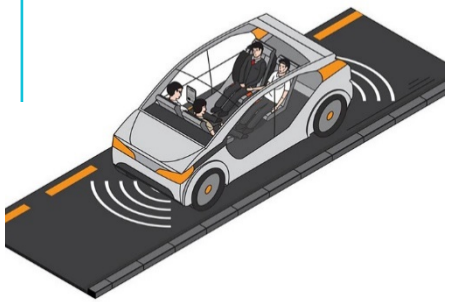
The benefits of autonomous vehicles (AVs) could be significant, and include such public benefits as safety on the road, fewer hours spent actively driving, improvement of the urban landscape, and economic growth. Development of AV technology could ultimately alter the way society views transportation and the urban environment. However, fully-AV technology, in which a driver would never be needed to take control of the vehicle, is still in the testing phase. Furthermore, several challenges to the development of AV technology, including cost of the technology and consumer acceptance, improvements to AV technology, and improvements to the transportation infrastructure, have also delayed the possibility of the aforementioned benefits to society.

Benefit

- Safety
- Quality of Life
- Urban Landscape
- Economic Impacts

Challenge

- Cost
- Consumer Acceptance
- Technology Development
- City Infrastructure



BENEFITS OF AV TECHNOLOGY

SAFETY

In the U.S. in 2013, there were 35,000 fatalities and 2.4 million injuries caused by car accidents, and the vast majority of these accidents were due to human error. Adoption of fully-AVs could potentially reduce worldwide traffic related fatalities by 90% (compared to 2013 accident levels), or save about 1 million lives per year.

QUALITY OF LIFE

Quality of life is another potential benefit. If AVs become prevalent enough to be used for daily work commutes, other activities could be performed during this time without loss of door-to-door travel convenience. AVs could also provide access to locations that are difficult to reach for those who cannot drive (e.g., children, the elderly, and people with disabilities).

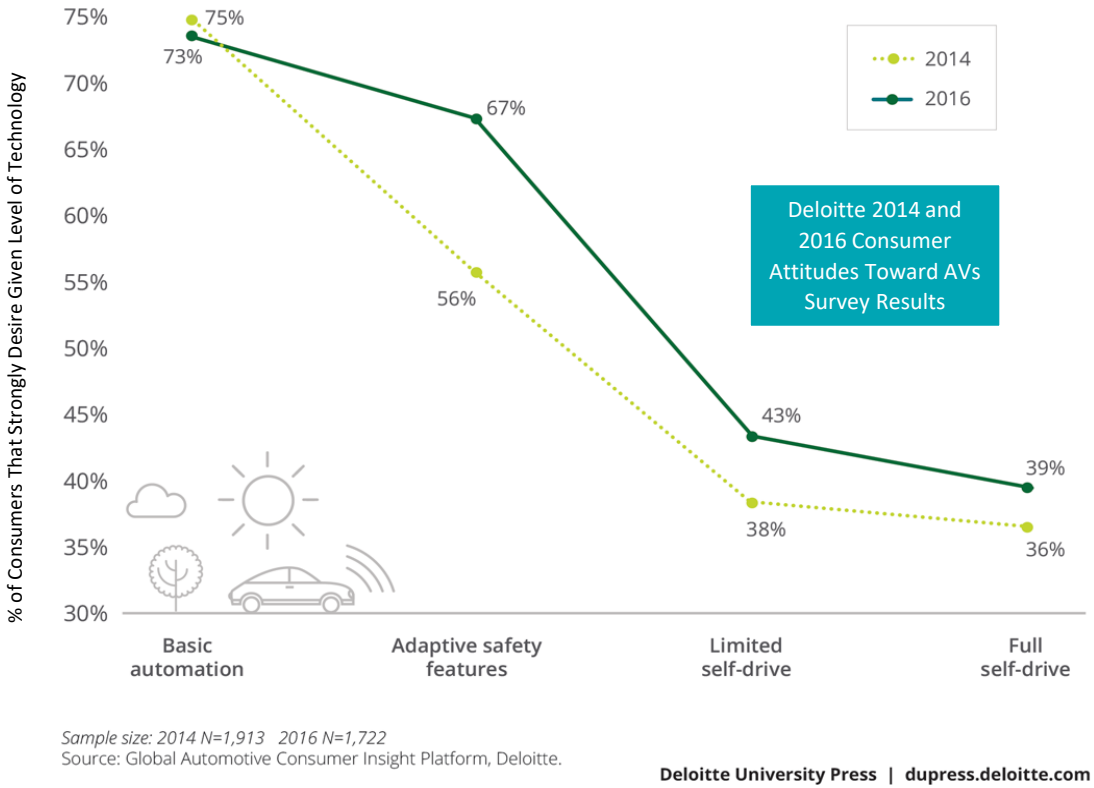
URBAN LANDSCAPE

AVs could potentially require less area to park, reducing the amount of land dedicated to parking uses and allowing for alternative uses to occupy the space, including green space in urban areas. There is potential for an urban environment in which transportation network companies, like Uber and Lyft, utilize AVs, and daily commutes could become seamless trips which incorporate multiple modes of transportation.

ECONOMIC IMPACTS

One study, from the University of Texas, estimated the impacts of AVs on the U.S. economy. This study used various analyses from a range of reports to compile economic effects across 13 industries. It was found that industries that could experience losses, in terms of "societal savings that would feed back into the economy through business and to consumers," from AVs were insurance, personal transportation, auto manufacturing and repair, medical, construction, traffic police, and legal professions. Economic gains from AVs could take place in the freight transportation, land development, automotive, electronics and software, digital media, and oil and gas industries. The total dollar change from these industries was estimated to be net gains of $1.217 trillion.[1] Furthermore, fully-AVs could provide personal economic gains in the form of decreased mobility costs as low as $0.20 to $0.50 per passenger mile.[2]

Image Source: Futurism, https://futurism.com/images/7-benefits-of-driverless-cars/



Sample size: 2014 N=1,913 2016 N=1,722
Source: Global Automotive Consumer Insight Platform, Deloitte.

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CHALLENGES TO AV DEVELOPMENT

CONSUMER ACCEPTANCE

Consumers must trust technology completely to ride in or purchase a fully AV, and must be willing to forgo a level of convenience to agree to share rides on a regular basis. Deloitte surveyed consumers' level of interest in AV technology, assuming cost was not a factor. The different levels of autonomy in vehicles ranged from "basic automation," "adaptive safety features," "limited self-drive," and finally "full self-drive." In general, people reported more interest than they did in a similar survey in 2014, and younger respondents reported more interest than older respondents.

The level of autonomy that increased in interest the most from the 2014 study was the adaptive safety features level, which increased 11% to 67% in 2016. This also matched Deloitte's finding in 2016 that consumers' biggest concern with AVs was safety.[3] It is important to note, however, that this is merely a snapshot of peoples' views at this time. It is difficult to know what views will be once AV technology becomes prominent, and it is likely that once the technology proves itself through use, attitudes will become more accepting.

AV TECHNOLOGY AND COST

Many AV models use Light Detection and Ranging (LIDAR) technology to allow the vehicle to "see", and it is generally the costliest component to equip a vehicle with autonomous capabilities. Today, a LIDAR sensor costs $75,000. Gains toward cost savings have been made, but have resulted in decreased sensor imaging quality. However, there is debate whether a high imaging quality is necessary, as more information gained from the high imaging may not increase the driving ability of the AV. Tesla, for example, only uses RADAR instead of LIDAR and their sensors cost about $7,000.[4]

CHALLENGES TO AV DEVELOPMENT

TECHNOLOGICAL DEVELOPMENT

The Rocky Mountain Institute (RMI) issued a report in which it expressed that the other "turning point" besides cost that would most impact AV widespread deployment was the AV technology's ability to navigate in inclement weather. Without this ability, its deployment could be limited to urban areas with consistently clear weather.[5] AV technology currently struggles under adverse conditions. If lanes are covered in snow, AVs cannot find the road. If snow or rain is falling, the LIDAR sensors cannot reach beyond the precipitation to see.

Ford has improved their AV technology's capability at driving over snow covered roads. Ford is creating high quality, 3D maps in its testing areas so that the AV can pick up whatever information that is not covered by snow, and fill in the gaps with data from the maps, which helps with snow covered roads. [6]

CITY INFRASTRUCTURE

AVs also work best under specific circumstances. For example, if lane demarcation is unclear or worn off or signage is blocked, the vehicle has difficulty driving safely. One way to overcome this hurdle would be to use vehicle-to-infrastructure (V2I) connectivity. V2I connectivity could help AVs navigate landscapes by connecting the vehicle to the surrounding infrastructure.

For example, a stop light could transmit the status to the vehicle, or a chip in the road could alert the vehicle to come to a stop. This would especially allow the AVs to navigate in adverse conditions, a challenge AV companies are working to overcome. In this case, the vehicle would know when to stop without having to "see" a stop sign, which AVs cannot currently do when a sign is obstructed, or when it is raining.

These changes point to the need for cities to "integrate transportation technology into long-term plans, and consider how new transportation technologies can complement existing public transportation." [7]

Image Source: Shutterstock, https://www.shutterstock.com/image-photo/smart-car-hud-autonomous-selfdriving-mode-680966149?src=8UdzOJx68TT4jybl7Mfb7w-2-74

CONCLUSION

Fully autonomous vehicles could increase safety on roads, improve quality of life and enhance the urban landscape, but their success will likely hinge on how well challenges to development are addressed and overcome.

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ABOUT THE AUTHOR

Walker Consultants is the global leader in providing parking consulting and parking design services. Founded in 1965, we pioneered the field of parking consulting. Today the firm has over 300 employees delivering a wide range of parking planning, design, engineering, and restoration services.

The firm is based in the U.S. with 17 domestic offices and 1 in the United Arab Emirates, is ranked #240 in Engineering News Record's Top 500 Design Firms and #13 in Building Design + Construction's Giants 300 Engineering/Architecture Firms.

We serve a broad spectrum of markets including healthcare, education, government, aviation, residential, retail and commercial development, entertainment, hospitality and athletic venues. This diversity allows our staff the luxury of collaborating with a large cross section of client types and developing best practices for their specific development needs, helping them unlock the potential of their projects.

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