

The Contested Future of Autonomous Vehicles in the US

A Sociotechnical Research Paper
presented to the faculty of the
School of Engineering and Applied Science
University of Virginia

by

Alicia Brasselle

April 6, 2021

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

Alicia Brasselle

Sociotechnical advisor: Peter Norton, Department of Engineering and Society

The Contested Future of Autonomous Vehicles in the US

Surface transportation in the United States is constantly evolving, from the institution of interstate highways in 1956 (FHWA, 2017) to the introduction of hybrid vehicles in mid 1990s (Valdes-Dapena, 2019). The latest in transportation technology is the autonomous vehicle, first tested in Germany in 1987. Tech companies, automakers, city planners and sustainability advocates compete to influence the future of surface transportation in the United States. Tech companies and car manufacturers advertise their efforts to develop AV technology and market the technology to individuals, while sustainability advocates and city planning cooperatives favor bicycles, scooters, and public transportation over cars, especially in congested urban settings. City planners compete to improve walkability in cities, and favor planning policies that reduce distances between destinations, reducing demand for cars.

Major participants working to shape the future of US surface transportation include Tesla Motors and other car manufacturers, Apple, city planning initiative Street Plans Collaborative (SPC), as well as environmental groups like the Sierra Club and Greenpeace. Tech companies and automobile manufacturers are primarily concerned with improving efficiency and human experience in regard to road transportation; environmental advocates and city planning groups aim to protect the public and the environment.

Congested urban areas are targets for environmental advocates, yet other forms of transportation are required for suburban and rural areas. Though there is some contention, participants agree that there will not be one universal form of transportation; transportation methods must be optimized for population density, climate conditions, and city layout.

Review of Research

Diverse studies have been conducted on the effects of AVs on public health, the economy, and crime. Researchers acknowledge the detriments and the benefits of AVs; some argue that AVs will be detrimental unless strictly regulated (Sohrabi, Khreis, & Lord, 2020).

AVs are anticipated to have wide-reaching effects on the economy, due to job elimination. Hancock et al. explain that truck and taxicab driver jobs “may well diminish” in the coming years, and that AV technology will “deleteriously [impact] the economics of bus operations in urban areas” (Hancock, Nourbakhsh, & Stewart, 2019). The authors acknowledge that some supervisory roles will be created (managing AV fleets from a control center), but such positions will not completely offset the elimination of driving jobs. The development of AVs would mean that time spent commuting can now be used to work, read, or spend time with others, increasing productivity lost during conventional driving. Such free time may also lead to large increases in digital revenue as passengers consume media while commuting (Lilly, 2015).

Researchers have also investigated the safety implications of AVs. Woods (2019) explains AV technology would reduce instances of escalation during traffic stops, and reduce the vulnerability of minority groups, who are much more likely to be pulled over by police. Woods also argues that AVs would be inherently safer than manual driving, as human error, which accounts for 94% of road accidents, would be eliminated (Woods, 2019); others have refuted such claims. Woods’ claim that human error accounts for 94% of road accidents is misinterpreted from a 2008 study of US traffic crash data; in the study, human error is listed as a reason for the crash if the driver could have avoided incident but did not (NHTSA, 2008).

Koopman contests that AVs would “more likely [cut] fatalities perhaps in half if we can achieve

parity with an average well behaved human driver ... the 94% number so often quoted will take a lot more than that” (Koopman, 2018).

Sohrabi et al. (2020) examine the effects of AVs on public health; if AVs are to have a positive impact on public health, ride sharing policies, traffic demand, and urban development should be controlled. The authors also suggest that AVs may play a pivotal role in increasing transportation equity for people unable to drive. Other metrics, including noise pollution, were studied; though each AV will make less noise than a conventional car, overall noise pollution is expected to increase as more AVs are used (Sohrabi, 2020). In this and other ways, successful introduction of AVs would have effects consistent with Jevons’ paradox (Jevons, 1865).

The Federal Bureau of Investigation (FBI) has also raised concerns about the use of AVs for criminal purposes. The bureau noted in a 2014 report that AV technology “will have a high impact on transforming what both law enforcement and its adversaries can operationally do with a car” (Harris, 2014). The report elaborates, “bad actors will be able to conduct tasks that require use of both hands or taking one’s eyes off the road which would be impossible today” (Harris, 2014). The FBI also noted the possibility of terrorism using AVs, citing the possibility for terrorists to pack a self-driving car full of explosives to create a self-driving bomb. Along with its concerns, the FBI lists several benefits of AV technology, especially when used in emergency response vehicles or police cars. The report posits, “surveillance will be made more effective and easier, with less of a chance that a patrol car will lose sight of a target vehicle” (Harris, 2014).

The Race to Develop Autonomous Vehicles

AV technology is in development at companies in both the transportation and technology sectors. Car companies like General Motors, Nissan, and Tesla Motors are developing AV

technology to accompany their own car models, while robotics and technology companies including Argo AI, Waymo, and nuTonomy have designed AVs from scratch, or partnered with car companies to implement their technology. Tesla (2020) promises “full self-driving capabilities in the future” though such claims have been controversial. Apple is also developing autonomous systems. Its CEO, Tim Cook, says they are “a core technology” to the company (MacRumors, 2020).

Though the approaches of each company differ their goals are largely similar: reducing road accidents, increasing the efficiency of transportation, and making cars more accessible for those with disabilities. General Motors states, “We believe that [AVs] will have enormous potential benefits for society in the form of increased safety and access to transportation ... these efforts will clearly advance our vision of zero crashes, zero emissions and zero congestion” (GM, 2021). Kia Motors claims their technology, DRIVE WiSE, “is aimed at eliminating accident risks at the source ... thereby providing a safer, more convenient and more efficient mobility solution” (Kia Motors, 2021).

Companies developing AV technology appeal to a wide customer base to generate interest in AVs, emphasizing convenience, safety, and accessibility. Waymo, formerly Google’s Self-Driving Car Project, claims, “[our] mission is to make it safe and easy for people and things to get where they’re going” (Waymo, 2021). Argo AI’s CEO, Bryan Salesky says, “our mission is not to replace the personal freedom that driving provides, but rather to build technology to empower mobility products that offer choice” (Salesky, 2021). Argo AI claims it is “designing self-driving technology to benefit everyone” (Argo AI, 2021). Karl Iagnemma, CEO of nuTonomy, says, “Our mission has always been to radically improve the safety, efficiency, and accessibility of transportation worldwide” (Burns, 2017). Amazon acquired self-driving car

company Zoox in mid-2020 and has since tested a prototype AV in various cities, including Las Vegas and San Francisco. Zoox says, “Our vehicle ... marks a key milestone towards our vision of building an autonomous robotaxi fleet and ride-hailing service” (Palmer, 2020).

Besides consumer use, AV technology is being considered for use in logistics and shipping applications; trucks that do not rely on human drivers can operate continuously, increasing shipping speed and efficiency. Shipping company DHL endorses AV technology, indicating that “the all-too-familiar time limitations on freight trucks will be removed” by using AVs. DHL also notes that “we are prepared to innovate and navigate ... we are ready to take a front seat” (DHL, 2021). Shipping company UPS has also invested in AV development; the company partnered with TuSimple in 2019 to test autonomous delivery trucks. UPS’ chief strategy and transformation officer Scott Price says, “UPS is committed to developing and deploying technologies that enable us to operate our global logistics network more efficiently ... UPS will be there as a leader implementing these new technologies in our fleet” (Gilroy, 2019).

AVs are also being considered for use in policing, as law enforcement agencies plan to capitalize on autonomous technology to streamline traffic law enforcement. Ford Motor Company, via a patent submitted in mid-2016, argues that “A human driver can override [AV] programming ... when a vehicle is under the control of a human driver there is a possibility of violation of traffic laws ... there will still be a need to police traffic” (Holley, 2018). Ford’s patent indicates that the police vehicle would use the same AV technology available to consumers but would come equipped with automated license plate scanners and artificial intelligence (AI) capable of issuing tickets to vehicles automatically.

AV technology is also attractive to law enforcement agencies as its use would provide officers with more time to complete tasks while driving. The increased awareness would be

especially useful in urban areas, as officers can observe more of their surroundings without having to concentrate on driving. Patrick Hurtado, Commander of Irvine, California Police Department, says, “modern-day police officers deal with multitasking more than ever”; an AV “will allow the officer to multitask while still driving safely” (Hurtado, 2018).

Regulation of Autonomous Vehicles

Another hurdle that AVs face is regulation. Because AVs are a revolutionary technology, laws must be made to regulate them without precedent. According to former Secretary of Transportation Elaine Chao, USDOT will “promote voluntary consensus standards” from industry (Cao, 2020). The USDOT’s approach to regulating AVs changed with the election of President Joe Biden; the department now aims to “promote access to clear and reliable information ... regarding the capabilities and limitations of [AVs]” (USDOT, 2021). USDOT also plans to “develop safety focused frameworks and tools to assess the safe performance of [AV] technologies” (USDOT, 2021). This development is cautiously welcomed by developers of AVs. Shawn Kerrigan, cofounder of self-driving truck company Plus, says, “We welcome strong and clear safety-focused regulations at the local, state and federal levels that are necessary to provide the industry and consumers the confidence needed to roll out this transformative technology” (Baker, 2020).

Though the approach to regulation may differ, USDOT’s goal remains largely the same; Robert Brown, head of government relations at self-driving truck company TuSimple, says, “road safety is not a partisan issue ... increased safety and a reduction of accidents will always be supported by USDOT” (Baker, 2020). To achieve such a goal, USDOT must unify the various

companies working to develop AV technology. According to Kalra et al. (2016) with a shared definition of “safe AVs” competing interest groups may find common ground.

USDOT is joined by state and municipal legislatures in efforts to regulate AVs. The National Conference of State Legislatures (NCSL) indicates that 41 states have considered legislation regarding AVs, and 29 have passed legislation pertaining to AVs (NCSL, 2020). To bridge the gap between the federal and state governments, the National Highway and Transportation Safety Administration (NHTSA) has released “A Vision for Safety 4.0” a guidance for legislatures attempting to regulate AVs. The guidance “offers a flexible, nonregulatory approach to automated vehicle technology safety, by supporting the automotive industry and other key stakeholders as they consider and design best practices for the safe testing and deployment of [AVs]” (NHTSA, 2016). Also included in the guidance is a delegation of responsibilities within the US government; the guidance notes actions for different agencies including

Some experts worry about how legislation of AVs will shape transportation. Don Anair, deputy director at the Union of Concerned Scientists, says, “smart policies are critical for ensuring self-driving car technology ushers in a new era of clean, affordable, and efficient transportation rather than the zombie car apocalypse” (Anair, 2019). Others are skeptical of AVs’ ability to prevent road accidents. Jessica Cicchino, vice president for research at the Insurance Institute for Highway safety (IIHS) says, “It’s likely that fully self-driving cars will eventually identify hazards better than people, but we found that this alone would not prevent the bulk of crashes” (IIHS, 2020).

Just as legislative bodies struggle to regulate AVs, law enforcement agencies have mixed opinions about AVs. One of the biggest concerns is lost revenue from traffic tickets, used to fund

various police programs. Dan Fink, a lieutenant with the San Rafael Police Department in California, asks: “Where will the funding for public safety programs come from”? The programs “will be significantly impacted by the loss of their traditional funding sources” (Fink, 2014). Fink notes another vital function of traffic stops, saying, “The most impactful effect would be losing the traffic stop as a means of identifying offenders” (Fink, 2014). Law enforcement agencies also recognize that the advent of AV technology will significantly reduce the need for traffic cops. Patrick Hurtado says, “agencies need to prepare now for the significant reduction in the size of their traffic divisions” (Hurtado, 2018). Though facing lost revenue and reduction in agency size, Hurtado is optimistic about the future of AVs, saying, “there are more benefits than negatives to this technology” (Hurtado, 2018).

AV technology is new and rapidly developing; insight into possible regulation and the effects of the technology on society and public safety can be gained by studying other autonomous technology like drones. The Federal Aviation Administration (FAA) has regulated autonomous drones in U.S. airspace to protect privacy (Freeman et al., 2014). Similar regulations may govern tech companies’ collection of diagnostic information from AVs to improve their AVs. Regulatory groups agree that the AVs have many benefits but emphasize that immediate action is needed to ensure AVs are integrated on American roads safely. Hurtado says, “municipal law enforcement will ultimately benefit as long as they take steps now to embrace this technology and ensure a better future” (Hurtado, 2018).

The Rise of Environmentally Friendly City Planning

Following trends in Europe, the United States has seen the rise of city planning initiatives that favor the use of bikes over vehicles. The new designs repurpose streets and parking spaces

for use by city residents and businesses, making efficient use of limited space within the city. One such city planning initiative is Street Plans Collaborative (SPC), whose principal, Mike Lydon, “encourages you to trade four wheels for two” (Street Plans, n.d.). SPC has launched an initiative called “Open Streets” to reclaim roadways from cars and create safe space for pedestrians and bicyclists. Capital Bikeshare, a company providing a fleet of shared bikes for Washington, D.C. and its suburbs since 2008, aims to “transform our community by providing a ... bicycle transit system that will connect people ... in the region” (Capital Bikeshare, 2021)

Bicycles are not the only method of transportation seeking to replace cars. Electric scooter company Bird operates in over 100 cities around the globe (Bird, 2021). Bird’s mission is to “make cities more livable by reducing car usage, traffic, and carbon emissions” (Bird, 2021). Rival electric scooter company Lime believes that “all communities deserve access to smart, affordable mobility” (Lime, 2021). Both companies are part of a growing “micromobility” industry, which “electric scooters ... are shrinking the physical footprint needed to move people over relatively short distances” (Zarif, Pankratz, & Kelman, 2019).

City planners understand that bicycles work well in densely populated regions but may not work for more rural or suburban areas where homes and businesses are spread out and driving is a necessity. Users of Reddit community r/UrbanPlanning note that the American suburb is designed around “automobility,” or the necessity of automobiles as transportation (Barbarossa3141, 2020). User CoffeePorterStout (2020) says, “we need a moderate level of density to increase the amount of housing, improve walkability, and foster good transit.” Others worry that AVs will increase sprawl as drivers can divert attention away from the road to focus on other matters while commuting, tolerating longer commutes (TheMotAndTheBarber, 2021).

Americans rely on cars for transportation due to what one Reddit user calls “forced reliance” (Shanks_So_Much, 2021). Another user states, “I’d get rid of my car in a heartbeat ... I hate the fact that I basically have to own one” (serialhypocrite, 2021). The National Association of City Transport Officials (NACTO) opposes such car dependency; their mission is to “raise the state of the practice for street design that prioritizes people walking, biking, and taking transit” (NACTO, 2021). Alice Bravo, Director of Transportation for NACTO member Miami-Dade County, says, “Our goal at Miami-Dade County is to create a “car optional” city with a clean, safe, reliable and convenient transportation system” (Engel, 2016). Such sentiment is welcome for groups like SPC but worrying for those developing AVs.

Environmental advocates are placated by the advent of electric vehicles over the traditional fossil fuel powered cars, but ultimately wish to see a movement from vehicles to other forms of transportation, including bicycling and walking. Richard Casson, a writer for environmental advocacy group Greenpeace, says, “Though the rise of electric cars should be celebrated, a truly sustainable support system ... is about constructing roads which encourage a more diverse range of travel” (Casson, 2018).

Environmental advocates and city planning organizations aim to reduce the American reliance on cars for different reasons. Environmental advocates view the shift as a way to appreciably reduce greenhouse gas emissions. Greenpeace argues, “bikes are the original zero-emission vehicle ... cycling helps cities respond to ... air pollution and climate breakdown” (Tobert, 2019). City planners see a shift from cars to bicycles and scooters as a way to make cities more inclusive and reclaim space for recreation and businesses. SPC says, “we thrive on working ... to improve the quality and function of the built environment” (Street Plans Collaborative, 2021).

Conclusion

Car companies like Tesla Motors, General Motors, and Kia Motors, and technology companies including Argo AI, nuTonomy, and Waymo are competing to develop autonomous vehicle technology for use in the United States. Though each company's approach is unique, all are working to make roads safer, more efficient, and more accessible for those with disabilities. Standing in their way are government officials, who must adequately regulate the new technology to ensure the safety of US citizens, and urban planning advocates, who favor keeping cars out of cities in favor of bicycles and scooters. Companies developing AV technology promise increased comfort and convenience to appeal to their customer base, but governmental bodies like USDOT are focused mainly on the safety of AVs. Regardless of how AV developers wish to market their technology, both innovators and regulators must agree on a common definition of a "safe autonomous vehicle" to streamline development and application of AV technology.

REFERENCES

- Anderson, J., Kalra, N., Stanley, K., Sorensen, P., Samaras, C., & Oluwatola, O. (2014). Brief History and Current State of Autonomous Vehicles. In *Autonomous Vehicle Technology: A Guide for Policymakers* (pp. 55-74). RAND Corporation. JSTOR.
- Anair, D. (2019, February 7). Self-Driving Cars Need to be Steered in a Climate-Smart Direction. Union of Concerned Scientists: <https://blog.ucsusa.org/don-anair/self-driving-cars-need-climate-smart-direction>
- Argo AI. (2021). Our Purpose. Argo AI: <https://www.argo.ai/purpose/>
- Baker, L. (2020, November 8). What a Biden Presidency Means for Zero Emission and Autonomous Vehicles. <https://www.freightwaves.com/news/how-a-biden-presidency-will-impact-freight-tech>
- Barbarossa3141. (2020). Suburbs Are Not the Problem. Reddit: https://www.reddit.com/r/urbanplanning/comments/be0cs0/suburbs_are_not_the_problem/
- Bird. (2021). Life at Bird. Bird: <https://www.bird.co/about/>
- Burns, M. (2017). Delphi Buys NuTonomy for \$400 Million to Scale and Deliver Autonomous Vehicles. TechCrunch: <https://techcrunch.com/2017/10/24/delphi-buys-nutonomy-for-400-million-to-scale-and-deliver-autonomous-vehicles/#:~:text=Emilio%20Frazzoli%2C%20Nutonomy%20is%20Boston,that%20develops%20autonomous%20vehicle%20technology.&text=%E2%80%9COur%20mission%20has%2>
- Capital Bikeshare. (2021). Press Kit. <https://www.capitalbikeshare.com/press-kit>
- Casson, R. (2018). We Don't Just Need Electric Cars, We Need Fewer Cars. Greenpeace: <https://www.greenpeace.org/international/story/13968/we-dont-just-need-electric-cars-we-need-fewer-cars/>
- DHL. (2021). Self-Driving Vehicles in Logistics. PDF.
- Engel, A. (2016). NACTO Welcomes New Transit Members, Reinforcing Transit's Central Role on City Streets. NACTO: <https://nacto.org/2016/10/12/new-transit-members-seattle-portland-miami/>
- FHWA. (2017). Federal Highway Administration. History of the Interstate Highway. Highway History: <https://www.fhwa.dot.gov/interstate/history.cfm>

- Fink, D. (2014). Autonomous Cars: Driving on Autopilot. Police Chief Magazine: <https://www.policemag.com/341158/autonomous-cars-driving-on-auto-pilot>
- General Motors. (2021). Path to Autonomous. General Motors: <https://www.gm.com/commitments/path-to-autonomous.html#:~:text=Our%20vision%20is%20that%20autonomous,positively%20change%20people's%20lives%20forever.>
- Gilroy, R. (2019). UPS Invests in TuSimple to Pursue Self-Driving Trucks. Transport Topics: <https://www.ttnews.com/articles/ups-invests-tusimple-pursue-self-driving-trucks>
- Hancock, P., Nourbakhsh, I., & Stewart, J. (2019). On the Future of Transportation in an Era of Automated and Autonomous Vehicles. PNAS: <https://www.pnas.org/content/116/16/7684>
- Harris, M. (2014). FBI Warns Driverless Cars Could Be Used As 'Lethal Weapons'. The Guardian: <https://www.theguardian.com/technology/2014/jul/16/google-fbi-driverless-cars-lethal-weapons-autonomous>
- Holley, P. (2018). Ford Wants to Patent a Driverless Police Car that Ambuses Lawbreakers Using Artificial Intelligence. The Washington Post: <https://www.washingtonpost.com/news/innovations/wp/2018/01/30/ford-submitted-a-patent-for-an-autonomous-police-car-the-u-s-government-just-approved-it/>
- Hurtado, P. (2018). Implications of Self-Driving Vehicles. Police Chief Magazine: <https://www.policechiefmagazine.org/implications-of-self-driving-vehicles/>
- IIHS. (2020). Insurance Institute for Highway Safety. Self-Driving Vehicles Could Struggle to Eliminate Most Crashes. IIHS HLDI: <https://www.iihs.org/news/detail/self-driving-vehicles-could-struggle-to-eliminate-most-crashes#:~:text=%E2%80%9CIt's%20likely%20that%20fully%20self,a%20coauthor%20of%20the%20study.>
- Jevons, William Stanley (1865). The Coal Question; An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal Mines (1 ed.). London & Cambridge: Macmillan & Co.
- Kia Motors. (2021). Autonomous - Future of Autonomous Vehicles. Kia Motors: <https://pr.kia.com/en/innovation/autonomous/autonomous.do>
- Koopman, Phil. (2018). A Reality Check on the 94 Percent Human Error Statistic for Automated Cars. Safe Autonomy: <http://safeautonomy.blogspot.com/2018/06/a-reality-check-on-94-percent-human.html>

- Lilly, P. (2015). Autonomous Cars Could Lead to Billions in 'Digital' Revenue by 2025. Hot Hardware: <https://hothardware.com/news/autonomous-cars-could-lead-to-billions-in-revenue-by-2025>
- Lime. (2021). About Lime. Lime: <https://www.li.me/about-us>
- NACTO. (2021). National Association of City Transport Officials. About NACTO. NACTO: <https://nacto.org/about/>
- NCSL. (2020). National Conference of State Legislators. Autonomous Vehicles - Self-Driving Vehicles Enacted Legislation. NCSL: <https://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx>
- NHTSA. (2008). National Highway and Traffic Safety Administration. National Motor Vehicle Crash Causation Survey. NHTSA: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811059>
- NHTSA. (2016). National Highway and Traffic Safety Administration. Automated Vehicles for Safety. NHTSA: <https://www.nhtsa.gov/technology-innovation/automated-vehicles-test>
- Palmer, A. (2020, December 14). Amazon Zoox Unveils Self-Driving Robotaxi. CNBC Tech: <https://www.cnbc.com/2020/12/14/amazons-self-driving-company-zoox-unveils-autonomous-robotaxi.html>
- Salesky, B. (2021). Agro AI - Our Mission. Argo AI: <https://www.argo.ai/#:~:text=Our%20mission%20is%20not%20to,mobility%20products%20that%20offer%20choice.>
- serialhypocrite. (2021). There's One Big Problem With Electric Cars: They're Still Cars. Technology Can't Cure America of its Addiction to the Automobile. Reddit: https://www.reddit.com/r/urbanplanning/comments/lmy10e/theres_one_big_problem_with_electric_cars_theyre/
- Shanks_So_Much. (2021). There's One Big Problem With Electric Cars: They're Still Cars. Technology can't cure America of its Addiction to the Automobile. https://www.reddit.com/r/urbanplanning/comments/lmy10e/theres_one_big_problem_with_electric_cars_theyre/
- Sohrabi, S., Khreis, H., & Lord, D. (n.d.). Impacts of Autonomous Vehicles on Public Health: A Conceptual Model and Policy Recommendations. PDF.
- Street Plans Collaborative. (2021). Projects. Street Plans Collaborative: <http://www.street-plans.com/projects-2/>

- TheMotAndTheBarber. (2021). The real scary thing is self-driving cars. How long of commutes are people going to be willing to tolerate.
- Tobert, A. (2019, September 16). The Future of Transport is Zero-Carbon. Greenpeace: <https://www.greenpeace.org/international/story/24312/the-future-of-transport-is-zero-carbon/>
- USDOT. (2021). United States Department of Transportation. Automated Vehicles Comprehensive Plan. USDOT: <https://www.transportation.gov/av/avcp>
- Valdes-Dapena, P. (2019). Electric Cars Have Been Around Since Before the US Civil War. CNN Business: <https://www.cnn.com/interactive/2019/07/business/electric-car-timeline/index.html>
- Woods, J. B. (2019). Autonomous Vehicles and Police De-Escalation. PDF.
- Zarif, R., Pankratz, D., & Kelman, B. (2019, April 16). Small is Beautiful. Deloitte Insights: <https://www2.deloitte.com/us/en/insights/focus/future-of-mobility/micro-mobility-is-the-future-of-urban-transportation.html>