ADA Compliance and Autonomous Vehicles: Surveying Accessibility Features and Best Practices

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ABSTRACT

A significant percentage of the United States population faces disabilities that can impact an individual's ability to travel. The Americans with Disabilities Act (ADA), passed in 1990, requires that places of public accommodations, including public transportation, are accessible to disabled individuals. As autonomous vehicle (AV) transportation services grow in popularity, certain provisions of the ADA will likely apply to the industry as well. This white paper explores example accessibility measures taken by public and private AV projects and includes accessibility related recommendations for Washington State to consider as it begins regulating the presence of AVs in the state.

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INTRODUCTION

A significant portion of the United States population lives with a disability that impacts their work, errands, social life, and more.[1] Disabilities often limit the types of transportation that these individuals can take, resulting in fewer trips per day on average than those without disabilities.[2] Mobility and cognitive disabilities are the most common among American adults, making up almost 14% and 11% of the disabled population, respectively.[3] Other significant disabilities include difficulties in independent living, hearing, and vision.

The self-driving design features of autonomous vehicle (AV) systems may help improve the mobility of disabled individuals. However, to better serve disabled communities' needs, AV systems must account for a number of transportation concerns that disabled individuals face when navigating public spaces.

Transportation concerns relate to planning trips, difficulties en route posed by physical obstacles and fellow passengers, as well as technology shortcomings.[4]

Planning Concerns

- Changes in transportation mode: Routes requiring multiple transportation modes can be difficult to plan. These include routes that recommend a combination of buses, trains, and/or walking.

- Visually unmapped spaces: While mapping services (e.g., Google and Apple Maps) cover most of the roadways in urban and suburban spaces, images of street views (e.g., Google Street View) may not be as complete. Individuals with mobility

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[1] Stephen Brumbaugh, *Travel Patterns of American Adults with Disabilities*, U.S. Department of Transportation Bureau of Transportation Statistics, https://www.bts.gov/sites/bts.dot.gov/files/2022-01/travel-patterns-american-adults-disabilities-updated-01-03-22.pdf (Sept. 2018).
[2] *Id.*
[3] *Disability Impacts All of Us*, Center for Disease Control and Prevention, https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html (Sept. 16, 2020).
[4] *Mobility Justice & Transport Inclusivity*, Cross River Partnership, https://crossriverpartnership.org/wp-content/uploads/2019/06/Mobility-Justice-and-Transport-Inclusivity-Healthy-Streets-Everyday-CRP-FINAL.pdf#page=5 (Jan. 2021).

issues, for example, may rely on street view to check for ramps, curb cuts, and sidewalk access when planning a trip.

<u>Physical Obstacles</u>

- Stairs and no ramps: Pathways and storefronts may pose challenges to those with mobility issues if they are only accessible by stairs and do not have ramps.

- Limited wheelchair accessibility: Public transportation may have a set number of wheelchair accessible spaces, limiting the number of disabled individuals that may safely ride at a time. Similarly, rideshare services (e.g., Uber and Lyft) that can accommodate wheelchairs may not be immediately available in the area.

- Safe street spaces: Busy urban spaces, particularly in rush hour traffic, may not have sufficiently safe space for a disabled individual to travel to or wait for public transportation. For example, narrow sidewalks or unevenly paved sidewalks, such as in older cities, may be challenging for those with mobility issues to traverse. Portions of sidewalks may also be blocked by illegally parked vehicles, trash cans, and the like.

<u>Fellow Passenger Related Difficulties</u>

- Lack of personal space: Individuals with disabilities report a lack of personal space when on public transportation with other non-disabled passengers. This includes people offering to help, or helping or handling a disabled individual without permission.

- Inadequate training of public transportation officials: Officials, like bus drivers or train conductors, may not be adequately trained to assist disabled individuals. For example, they might incorrectly secure wheelchairs and other equipment, posing a risk to the disabled individual while the vehicle is in motion.

<u>Technology Shortcomings</u>

- Faulty automatic stop announcements: Faults in automatic stop announcement systems can cause challenges for those who rely on them, such as individuals with hearing impairments.[5]

- Inadequate number of accessible vehicles: As mentioned above, public transportation often includes a limited number of accessibility options. From increasing the amount of equipment designated to secure wheelchairs to adding uniform braille or auditory aids for those who are visually impaired, there is room for improvement.

I. BACKGROUND ON AMERICANS WITH DISABILITIES ACT

A. Generally

The Americans with Disabilities Act (ADA) was passed by Congress and signed into law by President George H.W. Bush in 1990. The ADA consists of five titles. The five titles are (1) employment, (2) public entities, (3) public accommodations, (4) telecommunications, and (5) miscellaneous provisions. In 2008 Congress amended the ADA, and those amendments were signed into law by President George W. Bush. The amendments primarily widened the definition of disability. Currently, disability includes "a physical or mental impairment that substantially limits one or more major life activities of such individual; a record of such impairment; or being regarded as having such an impairment."[6] Examples of major life activities were added in the 2008 amendment and include, but are not limited to, "caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning,

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[5] *Equity in Transportation for People with Disabilities*, American Association of People with Disabilities, https://www.civilrightsdocs.info/pdf/transportation/final-transportation-equity-disability.pdf#page=2.
[6] 42 U.S.C. § 12101(1)(A)-(C).

reading, concentrating, thinking, communicating, and working."[7] Additionally, the term disability is construed broadly, favoring covering as many individuals as possible.[8] Title I, covering employment, applies to employers that have more than 15 employees and is enforced by the Equal Employment Opportunity Commission. This provision requires that employers make reasonable accommodations for employees with disabilities.

Title II prohibits discrimination by public entities at all levels of government. Title II is enforced by multiple federal agencies. The U.S. Department of Justice promulgates regulations under Title II for governmental entities at the local, county, and state level. The U.S. Department of Transportation promulgates regulations Title II as it relates to public transportation provided by public entities. For example, the ADA requires that public entities which operate a bus system to purchase or lease buses which are "readily accessible to and useable by individuals with disabilities, including individuals who use wheelchairs.[9] This is separate from other disability enforcement laws that the U.S. Department of Transportation is responsible for, such as the Air Carrier Access Act which applies to airlines.

Title III prohibits discrimination when it comes to public accommodations, and requires public accommodations be made accessible for those with disabilities. Public accommodations include hotels, restaurants, and stores, among other publicly available locations. In addition, the ADA has been found to apply not only to a store's physical location, but also its website as well.[10]

Title IV amended the Communications Act of 1934 by requiring telecommunications companies to ensure equivalent services for customers with disabilities. Finally, Title V mostly

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[7] 42 U.S.C. § 12101(2)(A).
[8] 42 U.S.C. § 12101(4)(A).
[9] 42 U.S.C. § 12142(a).
[10] https://www.latimes.com/politics/story/2019-10-07/blind-person-dominos-ada-supreme-court-disabled

consists of technical provisions, such as clarifying that the ADA does not override the Rehabilitation Act of 1973 and includes an anti-retaliation provision.

B. Accessibility In Transportation

Who is Regulated?

According to the FTA, the ADA "applies to almost all providers of transportation service, whether public or private, and whether or not an entity receives Federal financial assistance." However, the degree to which transportation providers are regulated by the ADA varies widely, with the FTA noting that "almost all" transportation providers are obligated to comply with the ADA "in one form or another."[11]

Rideshare companies including Benteler, Beep and Mobileye continue to develop autonomous vehicles (AVs) and are beginning to offer commercial AV transportation services.[12] Private transportation services like these are subject to a small subset of ADA requirements. While the law is still settling on how these new service models are classified, early lawsuits have revealed a few patterns.

Likely ADA Requirements for Near-Future AV Transportation Providers

49 CFR 27, 37, 38, and 39 each contain different requirements depending upon the status of the regulated entity.[13] Demand responsive transportation services operated by private entities primarily engaged in the business of transportation that are not FTA funding recipients are governed by the DOT ADA regulations for private entities primarily engaged in the business of transportation. Taxi companies, for example, are regulated by 49 CFR 37.29 (37.29) and other provisions regulating demand-responsive transportation services including 42 CFR 12184

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[11] https://www.transit.dot.gov/regulations-and-guidance/fta-circulars/americans-disabilities-act-guidance-pdf
[12] https://www.masstransitmag.com/alt-mobility/autonomous-vehicles/press-release/21256941/intel-corporation-autonomous-movers-set-for-us-launch-in-2024.
[13] https://www.transit.dot.gov/regulations-and-guidance/fta-circulars/americans-disabilities-act-guidance-pdf

(12184). Therefore, those provisions are the ones most likely to apply to early commercial autonomous vehicles transportation services.

37.29 prohibits discrimination against individuals with disabilities by (1) refusing to provide services to individuals with disabilities who can use the service; (2) refusing to assist in stowing mobility devices; or (3) charging higher fares or fees than they would charge other persons.

12184 prohibits discrimination on the basis of disability in the "full and equal enjoyment of specified public transportation services provided by a private entity that is primarily engaged in the business of transporting people and whose operations affect commerce." Included in this definition of discrimination is: (1) unnecessary imposition or application of eligibility criteria tending to screen out disabled persons; (2) failure to make modifications for accessibility that would not fundamentally alter the nature of the service; (3) failure to provide auxiliary aids and services for accessibility that would not fundamentally alter the service; and (4) failure to remove physical and communication barriers where such removal is readily achievable.[14]

These requirements are more demanding than those of 37.29, but the applicability of this statute to early AV transportation providers is also less certain. It requires the providers to be classified as "primarily engaged in the business of transporting people," and as providing "specified public transportation services." Uber has strenuously objected to both of these characterizations but cases alleging them have survived summary judgment.[15] If the companies do not fall within the scope of 12184, but are still found to operate a demand-responsive system, they must additionally comply with 12184(c). This requires them to operate a system that "when viewed in its entirety" ensures an equal level of service between those with disabilities (including wheelchair uses) and those without.

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[14] 42 USC 12184.

[15] Ramos v. Uber Techs., Inc., No. SA-14-CA-502-XR, 2015 WL 758087 (W.D. Tex. Feb. 20, 2015).

Each of the 12184 rules contains limiting language allowing providers to argue that accommodation would "fundamentally alter the nature of the services," is not "readily achievable," or that such discrimination is "necessary" to provide the accommodations. Therefore the most solid avenue of ADA liability for near-future AV transportation is likely 37.29. However, 37.29 does not actually require any particular modifications or aids to increase accessibility to disabled individuals. It simply prohibits discrimination against those who can already use the service.

Public Collaboration Needed to Expand Access

Because private AV transportation providers are not required to expand accessibility under the ADA, public collaboration is likely necessary to ensure accessibility. This could be accomplished pursuant to 49 CFR 37.23 - Service under contract, which requires private contractors of a public entity to meet the same standards the public entity is held to under the ADA.[16] If Washington contracts for an AV demand responsive[17], new vehicles purchased for use in that program must be accessible to the extent necessary to provide equivalent service to individuals with disabilities in respect to response time, fares, area of service, hours and days of service, restrictions or priorities based on trip purpose, availability of information and reservations capability, and constraints on capacity or service availability. Vehicles purchased for fixed-route services must all be accessible to and usable by individuals with disabilities, including those who use wheelchairs.[18] By contracting with AV companies, especially for fixed-route services, Washington can drive demand for the development of accessible AV services.

ADA Compliance in Public Transportation

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[16] 49 CFR 37.23(a).
[17] 49 CFR 37.77(a).
[18] 49 CFR 37.71(a)

In order to better predict how the Americans with Disabilities Act (ADA) will apply to connected and autonomous vehicles, it is imperative to understand what ADA compliance in public transportation currently looks like.

Among the multiple ADA requirements applicable to public transportation are (1) equipment and facilities in "good condition," including but not limited to lifts, ramps, straps for securing wheelchairs, (2) operators of said vehicles expected to provide adequate time for people with disabilities to enter and exit each vehicle, (3) in order to assist people with visual impairments, the vehicle's operators are responsible for announcing stops, "transfer points, major intersections, destination points," (4) vehicles must provide "destination and route information" located on the front of the vehicle as well as on the boarding side of the vehicle, (5) vehicles must comply with various letter and size- requirements on route-information signs, (6) lift platforms must be able to accommodate wheelchairs that are 30 inches by 48 inches in size, (7) lifts must be capable of supporting 600 pounds of weight, (8) doors and steps must be of slip-resistant surfaces, and (9) allowing for "sufficient turning and maneuvering space for wheelchairs." among multiple other requirements.

It is important to note that the ADA not only applies to public transportation, but also to private institutions offering transportation services to the public, rendering the ADA pertinent to connected and autonomous vehicles.[19]

While fully autonomous technology may still be far ahead, a number of companies working on deploying autonomous vehicles are already implementing features for the benefit of passengers

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[19] *The Ada & Accessible Ground Transportation*. ADA National Network. (2022, May 9). Retrieved May 8, 2022, from https://adata.org/factsheet/ADA-accessible-transportation

with disabilities. One example of this is Waymo in Arizona, which has been including Braille writing features throughout its automobiles.[20]

In 2018, Waymo launched a pilot program in Phoenix Metro aimed at implementing and testing vehicle features aimed at addressing the needs of "ADA paratransit certified people with disabilities and seniors aged 65 and above." Waymo's pilot program consisted of participants making use of such vehicles with an assistant present in the vehicle at all times in order to assist passengers as needed, per each passenger's impairments. According to Waymo's data—disclosed on their company's webpage—a majority of program participants felt safe while riding with Waymo's vehicles as well as safe with "autonomous driving technology" in general. Furthermore, participants also seemed to express satisfaction with the efficiency of Waymo's autonomous ridesharing services. A majority of participants expressed making more use of autonomous services than non-autonomous ridesharing services. Moreover, and more pertinent to the issue at hand, participants seemed to convey the belief that Waymo's autonomous technology "enhance[s] mobility for people with varying needs." Lastly, participants expressed an interest and a willingness to ride autonomous vehicles without an operator on sight. Having said that, participants did not actually have the opportunity to try out these vehicles without an assistant on board throughout the length of the program.[21]

II. CURRENT ADA IMPLEMENTATION IN AUTONOMOUS VEHICLE PROJECTS

A. Public

<u>Utah Autonomous Shuttle Pilot</u>

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[20] Andrade, Jane. Crafting inclusive autonomous vehicle policies. Retrieved May   8, 2022, from https://www.ncsl.org/research/transportation/crafting-inclusive-autonomous-vehicle-policies.aspx

[21] *Waypoint - The official Waymo blog: Addressing transit mobility gaps: What Waymo, Valley Metro and ASU learned from serving paratransit riders and seniors.* Waymo Blog. (2021, August 31). Retrieved May 8, 2022, from https://blog.waymo.com/2021/08/addressing-transit-mobility-gaps-what.html

One of the programs Washington policymakers could refer to as they consider the potential for Washington's own shuttle pilot program is the Utah Autonomous Shuttle Pilot, completed in September 2020.[22] The Utah Department of Transportation (UDOT) collaborated with the Utah Transit Authority (UTA) to deploy EasyMile shuttles with Level 4 automation as classified by the Society of Automotive Engineers, meaning the shuttles could operate without a human driver in certain environments.[23] The particular model used, the EZ-10, is an electric shuttle with a capacity of 12 passengers and a speed range of up to 12.5 miles per hour.[24] It features no steering wheel or pedals, but a wireless handheld control unit can be used if necessary.[25] The EZ-10 model is often favored for such pilots due to its customizability; the shuttle used in this program featured automatic wheelchair ramps and Q'Straint wheelchair securement straps.[26] With a program such as this, compliance with the ADA is at the forefront of considerations, not only because it is required to achieve federal regulatory compliance, but because these types of shuttle services broadly seek to improve accessibility to major transit lines by filling first mile/last mile gaps.[27] The project team here also reached out to stakeholders in various disabled communities for their feedback and conducted surveys related to the role of operators on public transportation.[28] As part of the outreach for this pilot, the project team demonstrated the benefits of automated vehicles specifically to those with certain disabilities, providing interaction opportunities for the Utah School for the Deaf and Blind.[29]

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[22] Utah Dept. of Transportation & Utah Transit Authority, *Utah Autonomous Shuttle Pilot: Final Report* (2021), *available at* http://www.avshuttleutah.com/pdfs/UtahAutomatedShuttle_FinalReport_1-3-2022.pdf
[23] *Id*. at 4, 8, 10
[24] *Id*. at 12
[25] *Id*.
[26] *Id*. at 16, 25
[27] *Id*. at 16
[28] *Id*. at 16; Kaedyn W. Crabtree, Joel M. Cooper, and Blaine Leonard, *Trust Development in an Automated Shuttle with a Disguised Operator* (2021)

[29] *Utah Autonomous Shuttle Pilot: Final Report* at 28

The Utah Autonomous Shuttle Pilot provides several takeaways that other states should look to in developing their own pilot programs. In engaging with the blind/low vision community, the project team noted that they expect to hear a transit vehicle approach, which requires extra consideration with notoriously quiet electric vehicles.[30] Additionally, bus drivers often provide guidance such as wayfinding or by notifying of sidewalk hazards.[31] UDOT and UTA have recommended design improvements based on their pilot program, most notably: raised edges of 1.5 inches for ramps to comply with the ADA; external stop announcements; two-strap wheelchair securement system, automatic if possible; a less steep ramp slope; and stop-specific internal stop announcements.[32] Another takeaway is the necessity for a "shuttle host," i.e., an individual who takes the place of an operator and fulfills the non-driving duties a bus driver would usually perform.[33] Despite the ability for a Level 4 autonomous vehicle to run without an operator, it is difficult to completely replace the full utility provided by their role. Research was done on passenger trust and whether a shuttle host was visible or disguised, with data showing that a lack of a shuttle host can negatively impact passenger trust.[34] This result comes as no surprise, given the multitude of non-driving operator duties: they provide safety and comfort to passengers, from adjusting climate controls to calling emergency services when needed, and by acting as an authority figure which may impact passenger behavior for the better; they provide information to riders, such as schedule information and which transfers to take; additionally, and most critically from an accessibility perspective, they provide assistance to elderly and disabled passengers, from assistance with seat and floor latches to clearing seats and providing additional information as necessary.[35]

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[30] *Id*. at 44
[31] *Id*.
[32] *Id*. at 69
[33] *Id*. at 28
[34] Kaedyn W. Crabtree, Joel M. Cooper, and Blaine Leonard at 1
[35] *Id*.

If Washington plans to move forward with a pilot program, they should take into account the recommendations proposed by UDOT and the UTA. EasyMile is working on improving these features and would be a good shuttle manufacturer to consider. Finally, featuring a shuttle host would benefit all riders, while also providing an additional facet of accessibility.

University of Michigan: A2GO

The University of Michigan launched A2GO, a free, autonomous shuttle service, in October 2021 in partnership with autonomous vehicle company May Mobility.[36] Riders can hail a shuttle through the May Mobility App on weekdays from 8 am to 8 pm; the shuttle services three square miles of Ann Arbor. The shuttle's fleet includes four hybrid-electric Lexus RX 450h vehicles that each seat three passengers, as well as one fully-electric Polaris GEM, fitted for one wheelchair passenger.[37] As in Utah's pilot program, each shuttle will be staffed by an attendant equipped to "monitor the vehicle and intervene" for safety if necessary.[38] The attendant manages complex traffic situations in which, for example, the autonomous vehicle is double parked or needs to take a left turn across traffic.[39] While A2GO's current maximum capacity is only 13 passengers, over 50,000 students attend the University of Michigan. Depending on the success of this pilot program, perhaps A2GO will expand to serve more of the university population. Note that UW's enrollment numbers are comparable.[40]

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[36] *A2GO Autonomous Vehicle Initiative in Ann Arbor, MI,* Ann Arbor Spark, https://annarborusa.org/a2go/.
[37] *A2GO Autonomous Shuttle Service Launches in Ann Arbor on October 11*, May Mobility, https://maymobility.com/a2go-autonomous-shuttle-service-launches-in-ann-arbor-on-october-11/ (Sept. 21, 2021).
[38] Ann Arbor Spark, *supra*.

[39] Elissa Welle, *Autonomous vehicle start-up May Mobility launches free passenger shuttle service at Ann Arbor Farmers Market*, The Michigan Daily, https://www.michigandaily.com/research/autonomous-vehicle-start-up-may-mobility-launches-free-passenger-shuttle-service-at-ann-arbor-farmers-market/ (Oct. 12, 2021).

[40] Jackson Holtz, *UW welcomes robust and diverse 2021 entering class*, UW News, https://www.washington.edu/news/2021/10/21/uw-welcomes-robust-and-diverse-2021-entering-class/ (Oct. 21, 2021).

B. Private

Although specific compliance with the ADA has been rebuffed by many private ridesharing services[41] and certain design may be presently invisible to the public due to trade secret laws, affirmative work on the development of accessibility features in autonomous vehicles nevertheless continues to be adopted among industry leaders.[42] For this reason, future policy surrounding the implementation of ADA-compliant accessibility features for autonomous vehicles may be guided by the array of accessibility work that continues to be done in the private autonomous vehicles sector.

The American Association of People with Disabilities (AAPD) monitors accessibility implementation in the automotive industry, and publishes an annual scorecard on accessibility work in the autonomous vehicles space.[43] The 2021 scorecard on autonomous vehicles reports a general trend toward the expansion of accessibility work among the top automakers, with diverse outreach to disability communities and a higher budget allocation for accessibility research and development being indicated as noteworthy improvements across most manufacturers.[44] While a large proportion of accessibility implementation among AV systems presently manifests as policy commitments toward inclusivity or engagements with diversity community stakeholders,[45] some manufacturers have been open about the specific accessibility features they are implementing in their vehicles.

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[41] *See* Nat'l Fed'n of the Blind v. Uber Techs., Inc., 103 F. Supp. 3d 1073, 1077 (N.D. Cal. 2015); *see also* SETTLEMENT AGREEMENT UNDER THE AMERICANS WITH DISABILITIES ACT BETWEEN THE UNITED STATES OF AMERICA AND LYFT, INC. (2020)

[42] *See,* for example, Lyft's Commitment to Accessibility, https://help.lyft.com/hc/e/articles/360045782413-Accessibility-in-the-Lyft-app-and-website ; Zoox Safety Report, 24 (2018) https://zoox.com/wp-content/uploads/zoox_safety_report_volume1_2018.pdf

[43] 2021 AAPD Auto Accessibility Scorecard - Progress Report (2021) is the most recent report from this series, with its newest edition expected to be published by summer of 2022. https://www.aapd.com/wp-content/uploads/2021/07/2021-AAPD-Auto-Accessibility-Scorecard-Progress-Report-1.pdf

[44] *Id.* at 3

[45] *Inter alia,* the scorecard suggests that Ford, Cruise/General Motors, Fiat-Chrysler, and Zoox have all taken similar steps toward implementing accessibility features in their AV products.

Volkswagen's Inclusive Mobility Team is dedicated to research and implementation of accessibility features in their autonomous vehicles,[46] and is perhaps the biggest standout among top automakers at this time. Presently, Volkswagen's heavy research in AV user experience has yielded design features that serve to accommodate across a broad variety of disabilities including mobility, vision, hearing, and cognition.[47] External audio equipment and microphones for location assistance, along with tactile feedback serve as effective first-steps toward accommodating the blind and visually impaired, a previously underserved community in the automotive industry.[48] Accessible screen-readers, simplified user interfaces, visual text assistance, and more in-cabin features are also prominent features of Volkswagen AVs to ensure its user base is as broad as possible. Moreover, Volkswagen's accessibility-awareness is integrated in the design of their vehicles. The integration of face-to-face seating arrangements in their autonomous vehicle prototypes have been designed with specific consideration for assisting hearing impaired and motion sickness-prone users.[49] Although an industry standard does not yet exist for the effective implementation of wheelchair accessibility in autonomous vehicles, Volkswagen has committed to future research on the subject.[50] With regard to future implementation of state-run ADA compliant features, Volkswagen may be one of the leading examples to follow for relevant accessibility implementation.

Waymo–a subsidiary of Google parent Alphabet–is also taking positive steps toward development and implementation of replicable accessibility features. Specific work accommodating visual impairment has been at the forefront of disability accommodation at

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[46] *See* What Inclusive Mobility means to Volkswagen, and the future of transportation. (2021) https://media.vw.com/en-us/releases/1606
[47] *Id.*
[48] *Id.*
See also Reardon, C., *DISABLED PASSENGERS WERE PROMISED AUTONOMOUS VEHICLES — THEY'RE STILL WAITING*, The Verge (2021)
[49] Supra Note 6
[50] *Id.*

Waymo, with audible beacons to signal the autonomous vehicle's arrival and braille lettering on the vehicle's buttons.[51] Another hallmark of Waymo's accessibility work is their ride hailing app, which closely follows the Web Content Accessibility Guidelines by implementing screen readers, haptic feedback, and location guidance.[52] Large interface displays on the dashboards, along with buttons to easily pull over or ask for assistance[53] are all features currently implemented in Waymo vehicles that may later be adopted in ADA-compliant vehicles.

Much like Waymo, the use of disability-assistance apps have been a prominent feature in Ford's strides toward AV accessibility.[54] Tappy Guide is oriented toward assisting the visually impaired, hearing impaired, mobility impaired, and elderly, by providing users with real-time location guidance for autonomous vehicle users.[55] In-line with these features, the close relation between autonomous vehicles and ride-hailing through smartphones means it is likely that future implementation of ADA-compliant autonomous vehicles will have to be mindful of app accessibility as well.

Cruise Origin, an SUV-sized autonomous vehicle developed by the AV company Cruise, has also taken steps toward meaningful and inclusive accessibility design.[56] Touted by Cruise as ''among the most innovative vehicles in history,"[57] the Origin includes a spacious cabin design and is in the process of prototype testing for wheelchair, low-vision, and service animal accessibility as well.[58]

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[51] Halsey III, A., *Driverless Cars Promise Far Greater Mobility for the Elderly*, Washington Post (2017).
[52] Reardon, C., *DISABLED PASSENGERS WERE PROMISED AUTONOMOUS VEHICLES — THEY'RE STILL WAITING*, The Verge (2021)
[53] *Supra* note 11
[54] Supra note 3 at 4
[55] *Id.*
[56] *See generally* Grant, R. *Seeking NHTSA review of the Origin.* (2022).
[57] *Id.*
[58] LaReau, J., *GM's self-driving subsidiary fires back at accusations it is violating laws,* Detroit Free Press. (2021)

III.   RECOMMENDATIONS

A. ADA Compliant Policy Proposal

Taken from the Utah Autonomous Shuttle Pilot: Final Report, these were the recommendations that came from their use of a slightly modified EasyMile AV which needed further adjustment to meet ADA requirements:

- "Ramps should have a raised edge at least 1.5 inches high for riders with visual impairments and canes, per United States Department of Transportation ADA Specification 49 CFR §38.23(b)(5)";

- "External stop announcements are needed for riders with visual impairments";

- "A two-strap wheelchair securement system would be preferred. It would be even better if it were automatic;" ramp slope steepness should be considered, "especially because infrastructure constraints can preclude the ability of the shuttle to be able to 'kneel' at some stops, which made it challenging for some riders to step into and out of the shuttle and was uncomfortable for those in a wheelchair to use the steep ramp. The slope of a ramp... [is] especially problematic in locations where there is not a raised curb alongside the travel path for the ramp to land on;" "[i]nternal stop announcements should be stop-specific, rather than the generic announcements;" "[r]amp deployments should be automatically logged;" "[v]erification of internal and external Braille for redundancy and accuracy should be implemented in future vehicle designs;" the vehicle can be too quiet, "given that it is an electric vehicle and riders with visual impairments are used to being able to hear" the approach of vehicles. "Suggest a distinct, consistent artificial engine sound, particularly for station approaches."[59]

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[59] *Utah Autonomous Shuttle Pilot: Final Report* at 69–70

B. Other Accessibility Considerations

An August 2021 study from the Mineta Transportation Institute identified several gaps and opportunities in accessibility policy for autonomous vehicles.[60] An overarching theme of the study is that accessible design decisions should be considered now, as it is the more cost-effective solution in the long run, and the more inclusive approach.[61] The study mentions several different pilot programs that are being run across the world, with a focus on the vehicle design choice.[62] But the study also mentions the importance of data privacy. First, the report recommends that any apps or other technologies that provide information to passengers be certified as 508 compliant.[63] Section 508 of the Rehabilitation Act requires that Information and Communication Technology (ICT) be accessible.[64] In addition, the study suggests communications between riders and operators be compliant with the Health Insurance Portability and Accountability Act (HIPAA).[65] While it is questionable if HIPAA would apply to operators since they are not healthcare providers, the spirit of the recommendation makes sense. Operators should be restricted in what they can do with the data they derive from passengers. It makes sense to limit operators to using the data for operations purposes, but not for marketing or selling to third parties.

The State University of New Jersey and Princeton University conducted a study aimed at testing the effectiveness of Olli vehicles (autonomous vehicles) on people with disabilities. The study divided participants (with either developmental disabilities or visual impairments) into different groups as they proceeded to ride and evaluate Olli vehicles. Each group provided feedback on their experience, with most participants expressing a willingness to ride automated

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[60] William Riggs & Anurag Pande, *Gaps and Opportunities in Accessibility Policy for Autonomous Vehicles*, Mineta Transportation Institute, San Jose State University (August 2021). https://transweb.sjsu.edu/sites/default/files/2106-Riggs-Pande-Accessibility-Policy-Autonomous-Vehicles.pdf
[61] *Id.*at 6.
[62] *Id.* at 14–17.
[63] *Id.* at 18.
[64] https://www.section508.gov/about-us/
[65] Riggs & Pande, at 18.

vehicles in the future. Furthermore, most also expressed "not anticipating the need for any personal assistance" when riding automated vehicles. As for general concerns, participants expressed safety concerns as a result of "a lack of familiarity with AV technology." However, many indicated that "an on-board attendant would be able to help address many of those concerns."[66]

A recent state-surveyed whitepaper on accessibility accommodation for autonomous vehicles in Michigan[67] generated valuable relevant policy recommendations that should be similarly considered for implementation in Washington. Synthesizing its recommendations through several focus groups, a total of forty-three individuals that either identified as disabled, had family members who were disabled, or were caregivers or workers in the disability field served as respondents.[68] Participants were asked to complete a questionnaire touching upon a variety of accessibility-for-transport issues, including *inter alia* questions regarding their current transportation-related challenges, frequency and types of travel, adequacy of options presently available to them, knowledge and feelings about autonomous vehicles, predicted future usage of autonomous vehicles, and design factors they deemed most important for accessibility.[69] Broadly, the ten policy recommendations[70] introduced by this study focus on accessibility issues surrounding reliability, equity, and collaboration.

Reliability refers to the call for policy and advocacy surrounding the logistical issues that often inhibit disability access to transportation and are required to be considered before AV

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[66] *Autonomous Vehicles: Capturing In-Vehicle Experience & Focus Group Follow-up with Persons with Autism and Other Disabilities at the 2019 Princeton University SmartDrivingCar Summit*; Rutgers CAIT. (July 15, 2021); Retrieved May 8, 2022, from https://cait.rutgers.edu/research/autonomous-vehicles-capturing-in-vehicle-experience-focus-group-follow-up-with-persons-with-autism-and-other-disabilities-at-the-2019-princeton-university-smartdrivingcar-summit/

[67] Bray, M. *Addressing the Impact of Autonomous Transportation on Individuals with Disabilities in Michigan*; Wayne State University (2021)

[68] *Id.* at 12.

[69] *Id.* See for a comprehensive list of all thirteen subgroups of questions featured in the survey.

[70] *Id.* 23-29

systems are formally implemented.[71] These issues include appropriate scheduling for the reliable arrival and departure of vehicles, ensuring transportation can deliver passengers to appointments on-time, and assurance that vehicles will not leave passengers stranded when needed.[72] Moreover, users report a higher reliance on friends and family for transportation to essential needs as the lack of transportation options diminish in more rural areas.[73] For these reasons, policy that accommodates not only a broad spectrum of abilities but across a diverse range of living conditions is highly sought after.

Second, equity refers to policy recommendations focusing on being proactive toward facilitating easy-to-use systems accommodating the needs of accessibility-reliant users in current and near-future AV systems.[74] These recommendations include addressing education and AV training for Direct Support Professionals, specialist assistants who are generally responsible for coordinating the transportation needs of their clients.[75] Further, requests for financial equity advocacy are required to bring to light the historic and logistical barriers some have faced in the area of vehicles. As certain disabilities have traditionally deprived some individuals from the ability to drive--and by extension, the access employment and other social opportunities--a need for conversation surrounding the changes AV systems may introduce is meaningful work towards equity for the disabled.[76] In a much similar regard, further advocacy championing the positive elements that AVs can bring to the disability community is required to ensure AV systems remain on an accommodation-forward path. While AVs have the opportunity to herald quality of life improvements for the disabled by way of facilitating better personal independence, employment opportunities, and social connectivity, proper implementation of policy is required to ensure these

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[71] *Id. See* Recommendations 1 and 2.
[72] Recommendation #1
[73] Recommendation #2
[74] *See* Recommendations 3, 7, and 10. *Supra* note 67.
[75] Recommendation #3
[76] Recommendation #7

communities may continue to benefit from these opportunities.[77] Mindfulness toward equity is, accordingly, a vital artery of disability accommodating state policy.

Finally, collaboration denotes the continued involvement required between disability communities and decision makers in the AV space.[78] Encapsulated within the notion of collaboration is the request to maintain ongoing and transparent dialogue connecting disability advocates with AV manufacturers, mobility experts, and state legislators to ensure their accessibility concerns are addressed.[79] Further measures to communicate with AV manufacturers and automotive leaders by way of feedback and customer support platforms are requested to provide open channels to keep developers up to date on the diverse regions, users, and destinations participants are relying upon.[80] Likewise, opportunities to collaborate with manufacturers and transportation authorities to establish public-access AV bus systems are identified as a point of interest.[81]

Overall, the Michigan whitepaper provides a rich resource for policy recommendations that may serve as an invaluable template for local policy. While further in-state surveying and research is recommended to provide Washington with bespoke insight into the specific needs of its residents, the findings from the Michigan survey may in the meantime provide local policymakers with an excellent head start perspective on these issues.

IV.   CONCLUSION

While the development and deployment of autonomous vehicles is an ongoing process, increased adoption of autonomous vehicles could offer those will disabilities an opportunity to become more independent. In order to achieve this independence, however, autonomous vehicles

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[77] Recommendation #10
[78] *See* Recommendations 4, 5, 6, and 9.
[79] Recommendations 4 and 6.
[80] Recommendation #5
[81] Recommendation #9

need to be developed and regulated in a way that puts an emphasis on accessibility. Putting an emphasis on accessibility now, during development of autonomous vehicles, will help ensure that accessibility is designed from the ground up, instead of being an afterthought. As this whitepaper has noted, there are several pilot projects being completed across the country, which puts Washington in a position to learn from and implement best practices from these pilots.