REPORT SUMMARY

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FTA RESEARCH
FEDERAL TRANSIT ADMINISTRATION

TRANSIT BUS AUTOMATION MARKET ASSESSMENT

Background

To support the development and deployment of driving automation systems in transit buses, the U.S. Department of Transportation Federal Transit Administration has developed a five-year Strategic Transit Automation Research (STAR) Plan that outlines the agency's research agenda on automation technologies. As part of the STAR Plan research, the *Transit Bus Automation Market Assessment* report provides context on the state of the market for transit bus applications of Advanced Driver Assistance Systems (ADAS) and Automated Driving Systems (ADAS).

Objectives

Stakeholders may not always have objective information or clearly understand the difference between conceptual ideas, prototype systems, and available products. To help align expectations with reality and assist in transit agency planning, FTA published a *Transit Bus Automation Market Assessment Report* in 2019 (with updates in 2020 and 2021). The current edition is a standalone report updated to include content from 2022 and early 2023.

The report conveys the state of automated transit bus technology in terms of its availability, capabilities, and limitations. It aims to inform FTA, transit agencies, and other transit industry stakeholders interested in understanding the market. This market assessment considers automation at all levels and a broad definition of transit bus, including a range of passenger capacities, sizes, and formats.

Findings and Conclusions

The ADAS and ADS markets for transit buses are still in their infancy, though many investments are being made and there are many pilots and demonstrations occurring that aim to further the development and capability of these systems.

Those activities use a variety of products and address a range of use cases and transit bus platforms. USDOT has provided grants to support pilots and demonstrations, but there are also many activities that use state, local, or other funding sources.

Although many concept vehicles and systems exist, and some have been developed into prototypes, few systems with automated actuation have been commercialized. Media coverage and marketing materials may not communicate realistic timelines for implementation or clearly differentiate conceptual ideas and prototypes from available products.

Key findings from the report include the following:

- The **development and commercialization** of driving automation systems for transit bus applications is still at an early stage and less advanced than it is sometimes portrayed in media reporting or marketing materials. To the extent that they exist, cost estimates and commercialization timelines are tentative.
- The **small size of the transit bus market** compared to other vehicle formats and the difficulty in adapting driving automation systems from one platform to another has slowed the introduction of driving automation systems to transit buses.

- **Bus architectures** are evolving to integrate more readily with driving automation systems and prototype vehicle models are increasingly chosen for their compatibility with transit service needs. Private sector firms are partnering to expand the availability of ADAS and ADS in different bus formats and to enable factory installation of those systems.
- **Component technologies** that enable automation are maturing and there are more commercially available options for many systems on the market. Systems that augment vehicle sensor suites, such as connectivity technologies, are also being developed and tested.
- Many pilot and demonstration activities are focusing on **near-term applications in simplified operational design domains** (ODDs). Bus yard automaton and automated BRT applications have received increased interest in recent years and may present a simplified ODD that addresses transit agency needs and capabilities. ADAS features with automated actuation are appearing in transit bus applications. The draw of freight applications may lead some firms to focus on goods movement instead of passenger service applications.
- **Transit agency staff** will continue to play an important part in enabling transit service. New roles will emerge as driving automation systems for transit buses continue to mature, resulting in new workforce needs. Unstaffed operation has been limited in transit bus pilots (and non-existent in U.S. pilots) and demonstrations, but it has the potential to enable new types of transit service and create new types of transit jobs.
- While transit agencies may be able to link implementing driving automation systems in transit buses with current challenges or broader goals, it will be a **big investment and funding may be a challenge**. This is especially true as fare collection is rare for pilots and transit agencies face resource constraints while trying to meet their core missions. Public funding of pilot and demonstration projects may enable industry and transit agency partners to conduct testing and evaluation of driving automation systems for transit buses.

Benefits

The *Transit Bus Automation Market Assessment* report is intended to help appropriately manage expectations and communicate a realistic depiction of the current state of transit bus automation technologies, including recent progress in pilot and demonstration projects, as well as the challenges faced by those efforts. It may be used as a resource for identifying commercially available automation technologies and to provide context for automated transit bus prototype research. The report findings will benefit FTA staff, transit agencies, state and local transportation departments, academic and research institutions, and other organizations interested in transit bus automation technologies.

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Project Information

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All FTA research reports can be found at https://www.transit.dot.gov/about/research-innovation.