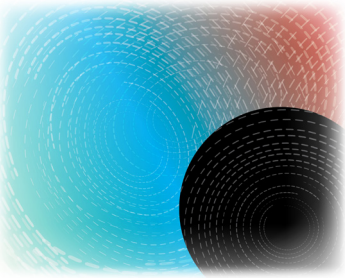
FTA RESEARCH
FEDERAL TRANSIT ADMINISTRATION

REPORT SUMMARY

U.S. Department of Transportation
Federal Transit Administration



Determining Requirements for Automated Transit Bus Test Facilities: Considerations for Practitioners

Background

Automation capabilities for motor vehicles have advanced rapidly in recent years and have changed the dialogue around all aspects of surface transportation. Automation of transit buses and related vehicles could deliver numerous benefits, but transit agencies and other stakeholders need additional research, demonstrations, and policy guidance to make informed deployment decisions. A full understanding of the implementation issues and appropriate data from testing and deployment will be necessary for transit agencies to invest in new technologies and undertake new operational models.

To support the development and deployment of automated bus transit services, the Federal Transit Administration (FTA) has developed a five-year Strategic Transit Automation Research (STAR) Plan that outlines FTA's research agenda on automation technologies. The plan proposes research, development, and demonstration projects conducted by FTA and transit industry research and development teams consisting of diverse stakeholders. This report supports these activities.

Objectives

The 91 requirements listed in the full report provide a resource and reference for selecting facilities with the appropriate and necessary characteristics for the testing of automated transit buses for all levels of automation. Testing may take place at closed test facilities, local restricted areas (e.g., maintenance yard, parking lot, or closed campus), and on public roads. The requirements are divided into the categories of Test Facility Features, Functionality and Performance, Safety, Environmental Resilience, Human Factors, and Data Collection and Management. The requirements may be used by a variety of organizations, including, but not limited to, technology developers and providers, bus manufacturers, integrators, academicians, and transit agencies and operators. The requirements are defined for the 14 use cases organized into 5 technology packages identified in the STAR Plan:

Technology Package	Use Cases
Transit Bus Advanced Driver Assistance Systems	• Smooth Acceleration and Deceleration • Automatic Emergency Braking and Pedestrian Collision Avoidance • Curb Avoidance • Precision Docking • Narrow Lane/Shoulder Operations • Platooning
Automated Shuttles	• Circulator Bus Service • Feeder Bus Service
Maintenance, Yard, Parking Operations	• Precision Movement for Fueling, Service Bays, and Bus Wash • Automated Parking and Recall
Mobility-on-Demand Service	• Automated First/Last Mile • Automated Americans with Disabilities Act (ADA) Paratransit • On-Demand Shared Ride
Automated Bus Rapid Transit	• Automated BRT

Findings and Conclusions

A variety of organizations (e.g., original equipment/bus manufacturers, integrators, test facility operators, academicians, transit agencies, and representatives from local, state, and federal governments) may be interested in performing or otherwise participating in automated transit bus research and development tests and pilot demonstrations to assess the ability of these vehicles to meet performance, safety, and economic goals. To conduct testing and evaluation, such projects will need test facilities that meet various requirements in terms of infrastructure, equipment, and personnel.

The requirements listed in the report are intentionally left as broad categories to provide flexibility in defining the operating domain of the automated vehicle and thus the testing program. Requirements for testing automated transit buses for actual research and development activities and demonstration pilots should contain specific and measurable statements that are precise and quantifiable. Depending on the organization conducting the testing, product being considered or use case being tested, users may identify additional requirements beyond those included in the report. Users may opt to take requirements directly from the document, adapt them, or add additional requirements as needed.

Benefits

The report and requirements listed are voluntary and may be used as a guide or resource for identifying requirements and considerations for testing the capabilities of automated transit buses. Multiple audiences may benefit, including transit agencies, state and local transportation departments, academic and research institutions, industry representatives, and other organizations interested in testing automated transit vehicles. Uses could include informing product development, test facility designs, pilot demonstrations, and other planning activities.

Project Information

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This research project was conducted by the John A. Volpe National Transportation Systems Center. For more information, contact FTA Project Manager Steven Mortensen at (202) 493-0459 or Steven.Mortensen@dot.gov. All research reports can be found at **https://www.transit.dot.gov/about/research-innovation**.