Modal

Testing Vehicle-Assist and Automation Technology in Public Transit Buses

VAA helps bus drivers maintain lateral and longitudinal control, facilitating the expansion of bus rapid transit systems

WHAT WAS THE NEED?

Bus rapid transit (BRT) offers a cost-effective alternative to fixed-rail systems, which are expensive to construct and operate. To run at a high level of reliability, a BRT system requires dedicated bus lanes. Adding lanes is costly, and many metropolitan areas have limited land to expand roadways. Narrowing bus lanes by two feet reduces the right-of-way cost, but causes the buses to go slower for safety concerns. A vehicle assist and automation (VAA) system with guidance and docking functions could enable buses to operate accurately and safely along narrow paths and precisely stop at bus stations, enhancing BRT's efficiency and quality of service.

The VAA technologies developed in the past years show promise in providing transit agencies more efficient operations and cost savings. However, their full technical feasibility and merits have not been quantified. The U.S. Department of Transportation initiated a pilot program to demonstrate the benefits of VAA applications for full-size public transit buses in revenue service and awarded conducting the program to Caltrans.

WHAT WAS OUR GOAL?

The goal was to demonstrate the technical merits and feasibility of VAA technologies in a real-world BRT application and to assess the benefits and costs.

Lane Transit District's Emerald Express BRT dedicated bus-only lane in Eugene, Oregon

WHAT DID WE DO?

Caltrans, in partnership with the University of California, Berkeley Partners for Advanced Transportation Technology program and the Eugene, Oregon, Lane Transit District (LTD), designed, developed, integrated, and field-tested the magnetic-sensing VAA technology. The pilot used a portion of LTD's Emerald Express BRT system, a four-mile route connecting Eugene and Springfield, Oregon with eight intermediate stations and two terminal stations, to test bus lane guidance and precision docking at stations. The researchers equipped an articulated bus with the VAA system and installed a magnetized section along 1.5 miles and three stations. LTD drivers were trained to use the VAA system and operated it during regular revenue service hours, carrying passengers for a total of six months. Working closely with the transit agency and drivers, the research team gathered feedback for system improvements.

WHAT WAS THE OUTCOME?

The pilot, the first real-world deployment of a VAA system in BRT revenue service in the United States, was successful and has the potential of leading to a commercially viable product. Hardware and software that better integrate with different transit buses was developed. The project produced off-the-shelf-like components and subsystem prototypes designed for easy maintenance, improved the detection and handling of VAA system faults to help ensure operational consistency and public safety, and laid the groundwork for designing and installing systems for future wide-spread national deployment.

WHAT IS THE BENEFIT?

VAA technologies enable buses to operate accurately along narrowly defined paths and precisely dock at bus stops, providing rail-like features at a fraction of the cost. VAA-equipped BRT systems streamline travel time, reduce traffic incidents, allow quicker and easier boarding for passengers, provide a smoother ride, and put less strain on bus drivers. The reduced right-of-way requirements of a BRT system offers a cost-effective public transportation solution to improve mobility and decrease congestion.

LEARN MORE

For more information about this research:
www.dot.ca.gov/research/modal/bus_transit/vaa/index.htm
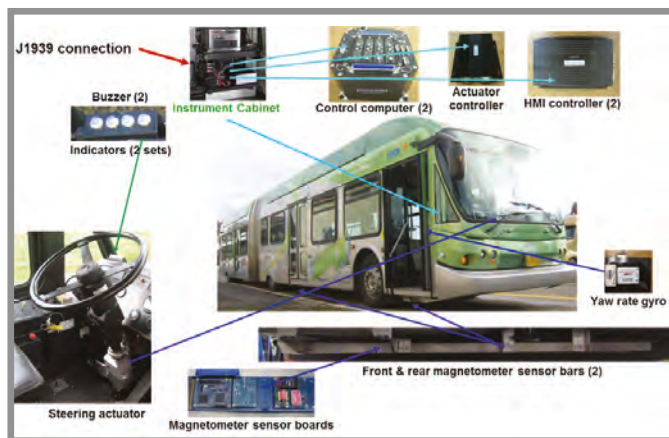
Precision-docking performance

VAA system on the LTD bus