

Maryland Accomplishments

in Connected and Automated Vehicle (CAV) Technology

2023

[Maryland CAV Strategic Framework](#) sets out five (5) key focus areas to inform, guide, and empower stakeholders to build their own plans for CAV across the State. These updates demonstrate continuing intention to realize the many benefits for safety, efficiency, and equity through collaboration and with partners interested in researching, testing, and implementing CAVs in Maryland.

Public Education & Outreach

- Maryland CAV was showcased at **many events**, including [ITS-MD Legislative Day](#), National Judicial College, Louisiana DOT, Transportation Research Board, and ADAS & Autonomous Vehicle Tech Expo.
- The Army Research Laboratory's (ARL) [Robotics Research Collaboration Campus \(R2C2\)](#) hosted a tour for MD CAV government partners, conducted two Autonomy Technology Demonstration Assessment events and enrolled additional Maryland-based collaborators.
- Maryland Department of Planning continued to collaborate with outreach and education by publishing CAV related articles in their Maryland Planning Blog.

Click the number for more information

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- After more than 18 months of [Kiwibot Personal Delivery Devices \(PDDs\)](#) operating at Morgan State University, a survey was completed by students, faculty, and staff on best use of the robots.
- MDOT helped guide a study by the Eastern Transportation Coalition with J.D. Power on [consumer use and knowledge of Advanced Driver Assistance Systems \(ADAS\)](#) confirming lack of critical knowledge creates risk and showing positive benefits with brief training.
- [STEER Tech](#) and [Morgan State University](#) engaged with MDOT to educate regional businesses on readiness and efficiencies which can be obtained by leveraging CAV technology at the [Chesapeake Region Safety Council Annual Meeting](#).

Early Deployment & Testing

- Five more companies submitted [expressions of interest \(EOI\)](#) in 2023 to formally state they are interested in CAV technology testing, research, and implementation in Maryland. This makes a total of 53 submittals since inception of the EOI process in mid-2017.
- MDOT completed the installation of connected vehicle (CV) technology on the [US 1 Innovative Technology Deployment Corridor](#) for Traffic Incident Management (TIM) and traveler information dissemination. Testing of CV devices/equipment is ongoing.
- [University of Maryland's Center for Advanced Transportation Technology \(CATT\)](#) marked progress on CV tech, including collaboration with MDOT on storage and analytics of CV data; research on object detection, tracking and broadcasting messages to improve safety of vulnerable road users; and use of a cellular vehicle-to-everything (C-V2X) evaluation kit, which includes equipment for development and testing of messages broadcast by infrastructure-based roadside units (RSUs) to passing CVs.
- Morgan State University began a [pilot of autonomous wheelchair operations](#) at BWI Thurgood Marshall Airport.
- USDOT [awarded Maryland \\$11.9 million](#) under the Advanced Transportation Technology and Innovation (ATTAIN) grant program to improve safety and mobility along the Eastern Shore. Deployment elements include CAV technology, such as RSUs to receive and emit signal phase and timing (SPaT) broadcasts and curve warnings.
- Prince George's County expanded use of CV with a [Vulnerable Road User \(VRU\) detection system](#). The system uses advanced technologies to detect and track pedestrians and bicyclists and help identify targeted interventions to improve safety.
- Morgan State University has developed a [mixed traffic CAV testbed](#) adjacent to the campus; working with the University's National Transportation Center and Baltimore City on vulnerable road user safety using roadside units to receive safety messages from vehicles, including campus shuttles.
- The University of Maryland College Park has acquired a [Level 4 connected automated vehicle](#) for testing and CAV research. The automated driving system software is identical to [Federal Highway Administration's CARMA](#) for enhancing capabilities and ensuring compatibility.



Planning & Policy

- The Maryland CAV Working Group hosted three virtual workshops on **Workforce Development** (February 2023), **Vulnerable Road Users** (June 2023), and **Freight** (September 2023). These deeper dive discussions produced ideas for outreach, collaboration, and potential action items to moving Maryland forward on CAV. Workshop summaries are found under each [CAV Working Group meeting](#).
- The [Baltimore Metropolitan Council](#) developed guidance for local jurisdictions and the region to prepare for CAVs, including a CAV Overview White Paper, Recommended Actions for Local Agencies, a User Guide, and an Executive Summary.
- MDOT has been developing a new 2050 [Maryland Transportation Plan](#) to guide the state's vision, policy, and investment priorities for the transportation network for the next 20 years. The draft Plan, called the "Playbook", incorporates CAV considerations and strategies and will be finalized in January 2024.
- Maryland Department of Planning remains engaged in CAV by encouraging local governments to prepare their built environment to include CAVs through planning policies in local comprehensive plans. At least 10 local jurisdictions now include CAV-related policies.
- MDOT partnered with the University of Washington on a [Transportation Data Equity Initiative](#) with testing spanning Washington, Oregon, and Maryland. The project aims to create the foundational data tools necessary for both public and private entities to collect, share, manage, and use transportation data. The project is part of USDOT's ITS4US program.

Infrastructure

- MDOT received a Federal Communications Commission (FCC) waiver to operate roadside units (RSUs) with **cellular-vehicle-to-everything (C-V2X)-based CV technology** in the state of Maryland. As a result, all RSUs previously deployed using Dedicated Short-Range Communication (DSRC) radios are being converted to operate on C-V2X.
- MDOT completed a [Freight AV Feasibility Assessment \(FAVFA\)](#) to identify the challenges and opportunities for deployment of AVs involved in moving goods on Maryland roads.
- The [Johns Hopkins University Applied Physics Laboratory's Institute for Assured Autonomy \(IAA\)](#) acquired two Olli autonomous shuttles at the end of 2022 and began turning those vehicles into robust and flexible research platforms to be used to support V2V, V2X, human-machine interface (HMI), cybersecurity, and other projects as well as documenting the process of training safety operators. The IAA continues its work to make AVs safer, to smooth their integration into the transportation ecosystem, and to help develop policy that allows for innovation while maintaining public safety.

Workforce

- [Community College of Baltimore County \(CCBC\)](#) hosted a CAV Working Group meeting to discuss CAV & freight, with demonstrations from [CVSA](#) and [Workhorse](#) and to showcase CCBC's existing extensive workforce programs related to CAV skills in transportation, distribution, logistics, engineering, etc. With this strong base, collaborative discussions have begun on customized training for CAV oriented apprenticeships.
- Mid-Atlantic Gigabit Innovation Collaboratory (MAGIC) continues AV progress by creating the [Autonomous Robotics Innovation Center \(ARIC\)](#)—a grassroots autonomous robotics training, workforce development, and educational facility featuring CAV projects, hands-on educational opportunities and small-scale demonstrations for the public.
- The University of Maryland broke ground on [Zupnik Hall](#)—a new Interdisciplinary Engineering Building at the University of Maryland, which will house a state-of-the-art Connected Autonomous Vehicle Laboratory with a capacity for 4 passenger-size vehicles and a Terp shuttle bus.
- Johns Hopkins University founded the **Safe, Secure, Smart, Scalable (S4) Vehicular Communications Laboratory (S4 LAB)** in 2023 to make transportation safer for drivers and pedestrians by focusing on communications security and integrity in vehicle-to-everything (V2X) networks. The laboratory is developing intelligent V2X applications using data aggregation and analytics, including machine learning. Teams of faculty and students in the S4 LAB have multiple projects underway in the areas of cyber-attack mitigation, data fusion, intelligent device handoffs, software-defined vehicles, advanced error recovery techniques, computer vision, V2X trust certification, real-world testbed experimentation, and much more.
- MDOT hosted **internal training webinars to improve awareness of CAV and gain insights from existing workforce.**

Maryland CAV Subgroups

Get involved with focused discussion and activities on CAV with the **Freight, Policy, Technical, and Emergency Responder Subgroups**. Details can be found in the Charter on the [MD CAV Working Group webpage](#).



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