DriveOhio

2024 ANNUAL REPORT

DriveOhio

LETTER FROM THE DIRECTOR

Dear Friends,

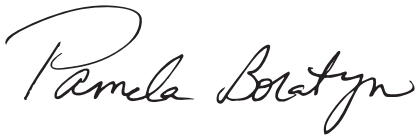
DriveOhio is at the forefront of leveraging advanced mobility technologies to improve Ohio's transportation safety and efficiency, attract industry investment, and increase economic opportunity for its residents and visitors.

In 2024, DriveOhio continued to demonstrate remarkable leadership and innovation. The integration of the Ohio Uncrewed Aircraft System Center into the National Advanced Air Mobility Center of Excellence (NAAMCE) significantly enhanced visibility and outreach efforts, positioning Ohio as a national hub for advanced air mobility technologies. Our Robotic Assistance Research project, in collaboration with the University of Cincinnati, showcased cutting-edge technology with the deployment of the robodog "Brutus," which played a crucial role in inspecting the I-471 Daniel Carter Beard Bridge after a fire caused extensive damage. Furthermore, the Toolkit Tuesday webinars provided essential professional development for K-12 educators, fostering awareness and interest in smart mobility careers.

Looking ahead to 2025, we will build on our past successes by continuously demonstrating, validating, and scaling solutions that enhance safety and accessibility for Ohioans and support workforce and economic development. By focusing on fostering a statewide culture of innovation, we will further develop interagency and cross-sector collaboration, public-private partnerships, and innovative operational and funding models to strengthen our "One Ohio" vision.

This Annual Report provides an overview of DriveOhio's 2024 project portfolio and details the priorities for 2025 and how we intend to achieve them. DriveOhio is committed to future-focused initiatives that help ensure Ohio remains a leader in transportation and advanced mobility.

Respectfully yours,



Pamela Boratyn, Esq., Director
Ohio Department of Transportation


DriveOhio
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INTRODUCTION

INTRODUCTION

DriveOhio, an initiative of the Ohio Department of Transportation (ODOT), was created in 2018 through an executive order and re-authorized by Ohio Governor Mike DeWine in 2019 as the statewide center for the advancement of smart mobility. In a rapidly evolving landscape, DriveOhio is charged with developing and implementing adaptable frameworks for planning, implementing, and scaling advanced mobility technologies throughout the state to address the needs and priorities of Ohio's communities and businesses to ensure the transportation system is safe, accessible, well-maintained, and positioned for the future. DriveOhio also leverages its cutting-edge technical expertise and robust cross-sector network to serve as a catalyst for third-party partnerships in support of a unified "One Ohio" approach to transportation innovation.

ADVANCED AVIATION

WHAT IT IS

- Advanced air mobility (AAM) and uncrewed aircraft systems (UAS)
- Innovative propulsion systems and varied energy sources
- Remote and autonomous operations

WHY IT MATTERS

- Enables faster emergency response and medical transport, including to rural and difficult or dangerous to access places
- Increases efficiency of the transport of goods and people
- Allows for safe and quick infrastructure inspection

CONNECTED VEHICLES

WHAT IT IS

- Communication between vehicles and other vehicles and infrastructure

WHY IT MATTERS

- Warns drivers of traffic conditions, presence of pedestrians or other obstacles
- Enables safer travel of emergency vehicles through intersections

AUTOMATED VEHICLES

WHAT IT IS

- Technologies that perform some or all tasks currently performed by a driver

WHY IT MATTERS

- Improves safety by reducing human error and reaction time
- Provides operational efficiencies

TRANSPORTATION ENERGY SECURITY & RESILIENCE

WHAT IT IS

- Alternative fuel technologies

WHY IT MATTERS

- Enables consumer choice
- Reduces dependency on any single power source
- Improves air quality

DATA, MACHINE LEARNING & AI

WHAT IT IS

- Data collection, processing, analytics, and usability

WHY IT MATTERS

- Efficiently integrates various data sources to enable advanced analytics
- Supports data-driven decision making and process enhancement

WORKFORCE

WHAT IT IS

- Training, upskilling, and STEM education initiatives that prepare current and future workforce for smart mobility careers

WHY IT MATTERS

- Increases awareness of and confidence in pursuing emerging technology and career paths through outreach and engagement
- Supports educators by providing free curriculum, resources, hands-on demonstrations and projects

2024 THOUGHT LEADERSHIP & SPEAKING ENGAGEMENTS

Aerospace and Aviation

- American Association of State Highway and Transportation Officials (AASHTO) Geospatial Information Systems for Transportation
- Beyond-Visual-Line-of-Sight (BVLOS) Podcast
- Collaborative Effort of States Moves Toward Consensus on Key Issues for Safe and Sustainable AAM - National Association of State Aviation Officials (NASAO)
- Emergency Management for Tornado
- FAA Drone/AAM Symposium
- Federal Highway Administration (FHWA) DC and Alaska Peer Exchanges
- National AAM Industry Forum
- Skydio Ascend '24 - Event | Skydio Live
- Symposium on the Application of Geophysics to Engineering and Environmental Problems (SAGEEP) | Annual Meeting
- Transportation Research Board (TRB) Annual Meeting

Workforce

PODCAST

- Central Ohio Workforce Readiness Collaborative Live! / Educational Service Center of Central Ohio (ESCCO)

PRESENTATION

- 2024 Ohio Educational Technology Conference
- Center of Science and Industry (COSI) Education Team at the Transportation Research Center (TRC)
- Central Ohio Careers2Classrooms Teacher Bootcamp at TRC
- ESCCO Business Advisory Council
- Columbus Artificial Intelligence (AI) Week
- Columbus City Schools / Career Tech Education Advisory Board
- Columbus City Schools / I Know I Can at COSI events (3)
- Columbus State Transportation Maintenance Technology Department Meeting
- Delaware Area Career Center (DACC) Career Connect
- ESCCO Grant Cohort Workshop
- Fort Hayes Career Center - Engineering Advisory Board
- Mid-Ohio ESC Business Advisory Council
- OSU guest lectures (2)
- Ohio 2024 Out-of-School Time Conference
- Ohio Afterschool Network / Quarterly Meeting
- Ohio Department of Education and Workforce (ODEW) Science, Technology, Engineering, and Mathematics (STEM) Committee
- Ohio Northern University (visit to ODOT Central office)
- Ohio STEM Innovation Summit
- Ohio Teacher Leadership Summit
- TRC - Central Ohio Educators
- Unmanned Safety Institute (USI) Teacher Training Event

SCHOOL VISIT

- School visits across the State of Ohio (17)

WEBINAR

- DriveOhio Toolkit Tuesday: Afterschool and Library
- DriveOhio Toolkit Tuesday: Airports
- DriveOhio Toolkit Tuesday: Back to School
- DriveOhio Toolkit Tuesday: LEGO Education
- DriveOhio Toolkit Tuesday: Ohio Manufacturers' Association
- DriveOhio Toolkit Tuesday: Partnering Anthropology with Science and Technology (PAST) Foundation
- ESCCO Live at Avalon Elementary School / Ohio Tech Day
- USI Webinar: Drone Industry Workforce Development

WORKSHOP

- Air Mobility in Springfield
- Amazon Web Services (AWS) Girls Tech Day at COSI (Day 1 and 2)
- DriveOhio K-12 Professional Development
- Girls in STEM event at the University of Cincinnati (UC)
- Grandview Heights / Summer Kids Club
- PAST Foundation / Columbus City Schools

Ground Transportation

- 2024 Intelligent Transportation Systems (ITS) Midwest Conference and Expo (ITSMW24)
- 2024 Women's Transportation Seminar (WTS) Annual Conference
- Electric Vehicle (EV) Landscape of Ohio – State Agency Coordination Meeting
- The Heritage Group (HG) Ventures Future of Roads Event
- ITS America Conference and Expo
- Mid America Association of State Transportation Officials (MAASTO) Annual Meeting
- MAASTO Connected and Automated (CAV) and EV Summit
- MOVE America and the EV Charging Infrastructure National Conference
- National Electric Vehicle Infrastructure (NEVI) Public Meetings (8)
- Ohio Area Coordinating Agency (OARC) Conference on Freight
- Ohio Civil Rights Symposium
- Ohio Contractors Association 2024 Conaway Conference
- Ohio State Bar Association's Environmental, Energy, and Resources Law Institute
- Ohio State Fair
- Ohio Transportation Engineering Conference
- OmniAir Spring 2024 Plugfest Connected Mobility Workshop
- PAVE Virtual Panel "Now Hiring: Workforce Development in the Autonomous Vehicle Industry"
- Rho Motion Live: North America
- SAE International 2024 Energy and Propulsion Conference
- Safety21 Symposium
- TRB 2024 Automated Road Transportation Symposium
- The Ohio State University's Women in Sustainability 2024 Panel
- U.S. Department of Energy's Deploy24 Dialogues

2024 Highlights

FEB
ODOT received a BVLOS Waiver from the Federal Aviation Administration (FAA) to operate a large drone along U.S. 33 for traffic monitoring and incident management.

MAR
Airmen from the 178th Wing successfully landed the first MQ-9 Reaper at Springfield Air National Guard Base.

APR
Held first of eight webinars as part of DriveOhio's ongoing series that connects Ohio's cutting-edge employers with students and educators.

MAY
Announced selections for Round Two NEVI Program deployments.

JUN
Published comprehensive final report from the Ohio Rural Automated Driving Systems (ADS) project.

JUN
Held eight public outreach workshops and six EV showcases for the NEVI program.

JUL
Published research report on measures of effectiveness for connected smart work zone devices.

AUG
Published 2024-25 edition of the DriveOhio Educator Toolkit with updated curriculum and expanded webinars for K-12 educators.

SEP
Completed Orphaned Well drone magnetometry project with the Ohio Department of National Resources, locating more than 100 abandoned oil wells.

SEP
Advertised Request for Proposal (RFP) for third round of NEVI deployments.

OCT
DriveOhio recognized as ITS Midwest Agency of the Year.

OCT
DriveOhio participated in 2024 AWS Girls Tech Day.

NOV
Deployed a robodog to assist with the inspection and repairs of the I-471 Daniel Carter Beard Bridge.

DEC
Highest monthly EV adoption rate on-record in Ohio at 4.73%.

DriveOhio

OHIO UAS CENTER

OHIO UAS CENTER

The Ohio UAS Center, established in 2013 and now operating under DriveOhio, serves as a nationally recognized leader and the state's central hub for all things AAM and UAS, from research and testing to demonstrations and deployments, including game-changing infrastructure advancements. In addition to supporting ODOT's AAM and UAS operations, the Ohio UAS Center supports ODOT's sister agencies in developing AAM and UAS expertise and integrating these technologies into their operations to improve efficiency, effectiveness, and safety.


DriveOhio
N183V
AVIATION

ADVANCED AIR MOBILITY

AAM uses innovative aircraft and infrastructure technology to expand aviation capabilities and open doors to new levels of transportation system safety, efficiency, and resilience. This effort is accomplished through various short and vertical take-off and landing styles (STOL and VTOL), distributed electric propulsion (DEP) systems, emerging aviation fuels, and remote operated and autonomous aircraft.

The Ohio UAS Center is a nationally recognized advanced aviation leader and spearheads testing, demonstration, and deployment of AAM technologies in the state by convening experts, partnering in research, supporting industry investment, and fostering interagency and cross-sector collaboration.

STATISTICS

Nation's largest aerospace supplier

130K jobs *in aviation and aerospace private industry*

$18.6B Gross Domestic Product impact from aviation *in Ohio*

200 successful AAM flights

580+ aerospace and aviation companies *operating in Ohio*

54+ higher ed *institutions offering programs leading to aerospace occupations*

84 outreach and engagement efforts **hosted at the National Advanced Air Mobility Center of Excellence (NAAMCE)** *including STEM learning, 2024 AWS Girls' Tech Day, AASHTO, and state meetings.*

2nd in the nation approved for drone operations over people and traffic *without a parachute*

National Advanced Air Mobility Center Of Excellence *(NAAMCE)*

Located at Springfield-Beckley Municipal Airport, the NAAMCE is a state-of-the-art collaboration space designed to advance AAM technology toward scalability in support of Wright-Patterson Air Force Base (AFB), the Air Force Research Laboratory (AFRL), the National Aeronautics and Space Administration (NASA), the Ohio UAS Center, academia, research institutions, and private industry.

The NAAMCE provides participants with a collaborative environment in which companies can find support for aerospace research, design, validation, and testing as well as training related to aircraft development. NAAMCE also supports various demonstration projects showcasing technologies that will advance AAM integration, beyond the aircraft itself. Home to 24 independent tenants and research and development partnerships, including industry recognized names such as Joby Aviation and BETA Technologies, the complex provides state-of-the art advanced aviation infrastructure and assets focused on the progression of AAM technologies and aircraft.

Key features include:

- BVLOS operations up to 18,000 ft with no chase plane requirement
- Class E and Class G airspace with flexibility and ease of coordination for test flights
- GPS Area Navigation (RNAV) with Localizer Performance and Vertical Guidance (LPV) on all four runways
- No noise abatement requirements
- 45 takeoffs/landings per day on average

SkyVision 2.0 Planning

This ongoing air traffic control system project at the Springfield-Beckley Municipal Airport is a collaboration between the AFRL and the State of Ohio that safely, accurately, and effectively allows uncrewed aircraft to detect-and-avoid crewed aircraft while in flight. SkyVision has enabled a variety of research at the Ohio UAS Center, including both VTOL and conventional takeoff and landing (CTOL) testing by multiple aircraft original equipment manufacturers (OEMs), vertiport simulation testing with NASA, VTOL testing and cross-state operations by BETA Technologies, and Pivotal Blackfly eVTOL operations and eVTOL simulation.

Planned SkyVision upgrades include additional radar coverage, new camera array, facilities enhancements, and – most notably – a mobile RSU component including local ground radar systems that can be easily transported to any site for testing, without the need for fixed infrastructure. When testing of the enhanced SkyVision system is completed, AFRL and ODOT can apply to the FAA for a Certificate of Authorization that, if approved, would allow all BVLOS flights that utilize SkyVision for detect-and-avoid. These improvements will enhance the capability of the NAAMCE and increase the attractiveness of the site for continued testing.

NAAMCE Tenants & Partners

TENANTS

- Ohio UAS Cntr./ODOT
- Modern Technology Solutions (MTSI)
- Unmanned Experts
- TORAY Composites
- FEAM Aero
- Parallax Advanced Research
- Joby Aviation
- Sinclair Community College
- AFRL/AFWERX
- Flight Proflier
- Veth Research
- CAL Analytics Select Tech
- D'Angelo Technologies (D5T)
- Lectratek
- Resonant Sciences (Hush House/Hangar)

AAM R&D PARTNERSHIPS

- AURA Network Systems
- BETA Technologies
- Blue Halo
- CAL Analytics
- MZA Associates
- NASIC/NSIC
- Skyvision AFRL UAS Range

Ohio Air National Guard MQ-9 Deployment

Leveraging SkyVision, the Ohio Air National Guard successfully landed its MQ-9 Reaper drone at Springfield-Beckley Municipal Airport in March. As part of Exercise Advanced Wrath – an historic joint exercise for Ohio's 178th Wing, the 163rd Attack Wing (California), 248th Air Traffic Control Squadron (Mississippi), AFRL, Wright-Patterson AFB, and FAA – this marked the first time the 178th has housed the aircraft and a revival of local flight operations at Springfield Air National Guard Base. This 10-day exercise provided a "proof of concept" opportunity and was the first flight at the Springfield Air National Guard base since the departure of their last F-16 12 years earlier. Allowing for additional cooperation between the services, the Reaper was launched and recovered safely with the assistance of SkyVision, which also offered significant cost savings of $12,000 to $15,000 over the traditional method of using a chaser plane. The exercise was such a success, it will be offered annually for further training.

AAM Multistate Collaborative

The AAM Multistate Collaborative, consisting of members from 27 states and the NASAO, met for the third time in August. This team has been working to identify a shared approach in the role of state government, integration of physical and digital infrastructure, and the harmonization of state efforts, to complement FAA efforts in this area and support industry development.

NASA Campaign/Annexes

The Ohio UAS Center enjoys six active Space Act Agreements with NASA to advance technology research and the development of AAM activities, information sharing regarding community integration of AAM and system-wide safety, public good use cases, autonomous cargo operations, and public outreach.

Attracting Industry

In September 2023, Joby Aviation, a leading eVTOL manufacturer, announced plans to invest up to $477.5 million in a 140-acre cutting-edge electric air taxi manufacturing facility at the Dayton International Airport, creating 2,000 new jobs in the Miami Valley. In March 2024, Joby took a significant step toward initial manufacturing operations by acquiring an existing Dayton International Airport facility and began hiring for the facility.

DriveOhio

UAS

UNCREWED AIRCRAFT SYSTEMS

UAS, informally referred to as drones, are a rapidly evolving technology that can transform air transport by offering more efficient, safer options. Small UAS (sUAS) operate remotely and close to the ground, usually less than 400 feet above ground level, and perform a variety of missions. Supported by the Ohio UAS Center's experts and sUAS fleet, ODOT districts, other state agencies, emergency responders, and others are increasingly incorporating sUAS into their operations, from infrastructure and construction monitoring, inspection, mapping and surveying to traffic incident, emergency response, and public information flights.

As a leader amongst State DOTs, Ohio continues to push the boundaries by expanding use cases, using advanced sensors, and building upon collaborative partnerships with other State agencies and the UAS Center. During 2024, ODOT renewed its focus on expanding its domestic fleet of both fixed-wing and multi-rotor drones and increasing flight operations.

STATISTICS

Trained 10 new pilots, *bringing the Ohio UAS Center's total to 46 pilots*

Completed UAS-based magnetometer ***Orphan Well survey project*** *covering 13,000 acres*

Certified pilots in each ODOT district and Central Office

Conducted outreach at ***18 demonstrations & school visits***

44% increase of flights *in 2024 (3,175) compared to 2023 (2,197)*

30
UAS Center tours

*Procured **27** aircraft with various sensors in 2024, bringing the total to **90***

UAS aircraft inventory

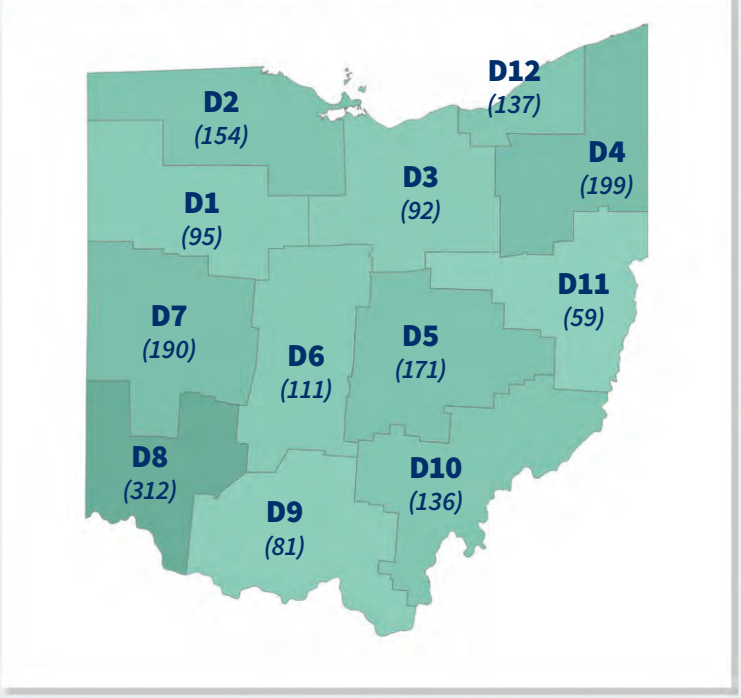
- ***Inspired Flight IF2100A:***
  Versatile heavy-lift aircraft, primarily used as replacements for DJI Matrice 600 to operate non-camera sensors.
- ***Skydio X10*:***
  Visible light and infrared camera capability, paired with LTE communications and on-board collision avoidance systems enable remote and BVLOS operations.
- ***Skydio S2*:***
  Equipped with onboard AI and nine deep networks for 360° obstacle avoidance, enabling monitoring, inspection, and drone as first responder, even in GPS-denied environments.
- ***Censys Sentaero 5:***
  Larger, fixed-wing eVTOL primarily used for mapping and survey missions. LTE communications enable BVLOS operation and fixed-wing flight mode allows for long operational time.
- ***Event38 E400*:***
  Another large, fixed-wing eVTOL, custom fit by the manufacturer to carry a magnetometer as a supplemental payload.
- ***Brinc Lemur S:***
  Robust multicopter designed for missions that would damage similar aircraft.
- ***Wingtra II*:***
  eVTOL used for mapping and survey missions. Sony camera integrated into the airframe and fixed-wing design make this aircraft well-suited for missions covering large areas.
- ***Fotokite*:***
  Ground-powered (tethered) aircraft designed for ease of operation and indefinite flight times. LTE connection enables live-streaming of visible and infrared spectra, making the Fotokite an effective temporary "pole camera" to monitor traffic conditions, emergencies, or construction sites.

** new drone in 2024*

STATISTICS

2024 Ohio UAS Center Flights

Number of Flights by ODOT District



2,604 mi
Total Distance

632.7 mi
Total Time

288	1,034	117
ODOT Central Office	*Ohio UAS Center*	*Sister Agencies*

Magnetometry Project Completed

In August 2024, the Ohio UAS Center completed a multi-year project with the Ohio Department of Natural Resources to survey orphaned oil and gas well locations using drones, locating 100+ abandoned oils wells at Grand Lake St. Mary's in 2024 alone. Without the use of drones, this project would have taken significantly more time.

These wells pose an environmental and health hazard as they may leak fumes and toxic materials. Knowing the locations of these wells helps improve safety and allows long term monitoring. This project highlights the UAS Center's ability to cooperate with other state agencies to accomplish their goals.

Robotic Assistance Research

The Robotic Assistance research project, conducted in partnership with the UC, explores the use of ground-based robotic assistants to support uncrewed aircraft operations for ODOT. In November, the Ohio UAS Center deployed the robodog named "Brutus" to assist with inspection and repairs of the I-471 Daniel Carter Beard (Big Mac) Bridge after a fire caused extensive damage to the southbound span. While not the original intent of the project, crews used the robodog to access areas that were unsafe for humans, capturing valuable information using Light Detection and Ranging (LiDAR) sensors. This data was then compiled with drone footage to help engineers assess the full extent of the damage.

2024 INITIATIVES

2024 INITIATIVES

Tethered Drone Operations

The Ohio UAS Center has completed pilot training for two Fotokite tethered drones and is deploying them to support traffic and emergency response monitoring, infrastructure inspections, overhead sign and signal installation inspection, and environmental monitoring.

Drone-In-A-Box Planning

In 2024, the Ohio UAS Center purchased its first "drone-in-a-box" system, which can independently launch, perform tasks, and return to a secure base for recharging and data offloading autonomously. In the future, this drone-in-a-box will be embedded in the Brent Spence Bridge Corridor project for construction monitoring and incident management.

Large Drone BVLOS Waiver From FAA

In February, ODOT received a four-year BVLOS Waiver from the FAA to operate a large drone along a four-mile section of U.S. 33 for traffic monitoring and incident management. The Censys Sentaero, a 20-lb drone with a 7.5 ft wingspan, is the first aircraft of its size to be approved for this type of operation, and the second in the U.S. approved for operations over people and traffic without a parachute.

UAS Use Case Library

DriveOhio is developing a Use Case Library that showcases drone capabilities and shares how they can be utilized to improve operational efficiency, safety, and resilience. Use cases include construction monitoring, bridge inspection, public information, survey projects, traffic management, radiation detection, and emergency response.

Drone Fleet And Pilot Certifications

The UAS Center trained 10 new pilots in drone operation and each ODOT district and Central Office have one or more certified drone pilots on staff. Additional pilots along with 27 new aircraft enabled a 44% increase in flight operations in 2024.

Expanded Testing By Outside Companies

ODOT has partnered with an outside company to support bridge maintenance, repair, and replacement projects throughout the state. The company will use sUAS for proactive projects to identify and mitigate areas of degradation prior to reaching a hazardous state. This bridge structure analysis will ensure Ohio's infrastructure is safely maintained and allow continued operations.

Drone Data Integration

To support more complex data analysis and streamline flight data entry and approval, the UAS Center transitioned to AirData, an online application for flight logging and support. AirData supports the drone data management and flight analysis of all ODOT flights. The data is compiled and used to inform the public of ODOT drone missions and usage on the ODOT UAS Dashboard.

Sonar-Equipped Boat Research

ODOT partnered with The Ohio State University and Seafloor Systems to research the use of a sonar-equipped boat for conducting underwater bridge inspections. The use of high-resolution multibeam sonar technology to monitor the structural integrity of bridge piers produces high-fidelity data, which is sufficient for accurate assessment and can minimize the need to deploy divers into high-risk, hazardous environments.


DriveOhio
CONNECTED VEHICLES

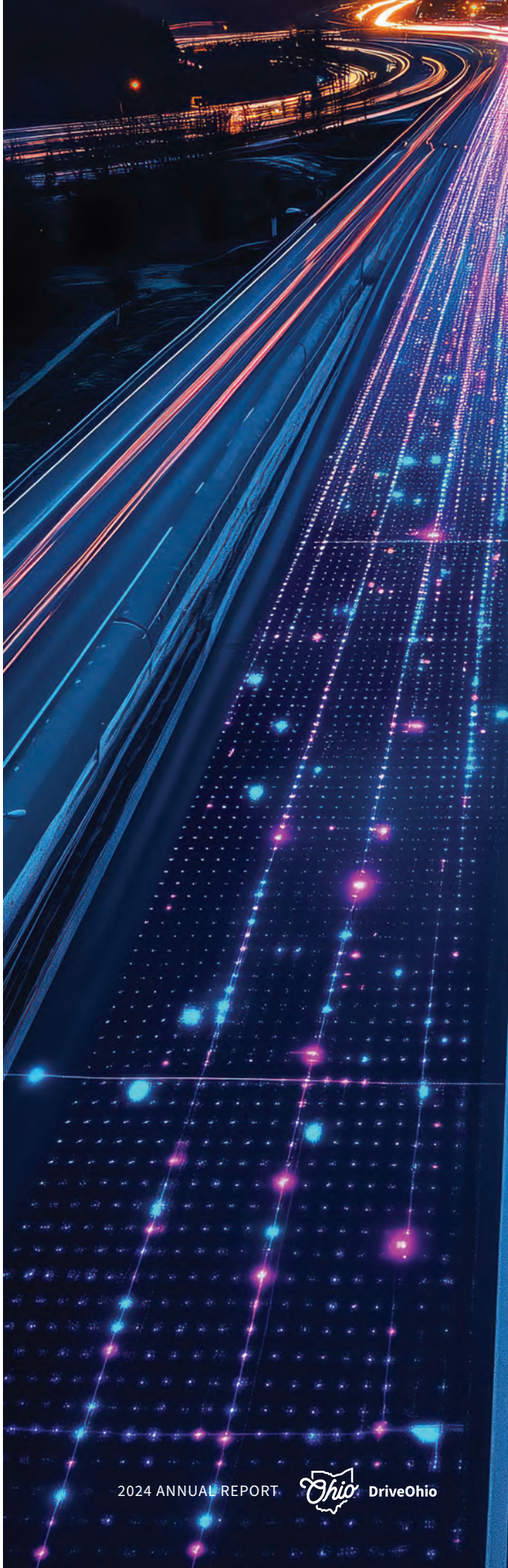
CONNECTED VEHICLES

Connected Vehicles (CVs) have the potential to save lives by warning drivers of stopped traffic ahead, reduced speed limits in school zones, emergency vehicles in intersections, upcoming work zones, and pedestrians and obstacles out of a driver's field of vision. DriveOhio plays a critical role in realizing safety and efficiency benefits by leading efforts in interoperability standards, collecting real-world data, and validating and measuring communications. This effort not only advances CV applications in Ohio, but it also serves as a model for the future.

STATISTICS

First of its kind research *project to measure safety benefits of CV2X devices in the real-world operations*

150 private vehicles equipped with CV technology *to collect data on driver behavior changes and potential for mitigating human error*



2024 INITIATIVES

Connected Marysville-Dublin Project

The Connected Marysville-Dublin Project is a prime example of DriveOhio leveraging prior investments for continued value. Leveraging the CV ecosystem that was built-out as part of the U.S. 33 Smart Mobility Corridor, DriveOhio funded additional research that culminated in equipping more than 150 private citizen vehicles with CV technology for data collection purposes. 2024 saw the continuation of that study, and the analysis of the data collected from these vehicles related to the efficacy of vehicle-to-everything (V2X) applications to vehicle operators. The data was focused on V2X applications, including curve speed warning, pedestrian conflict warning and redlight violation. The results of the study are in development and anticipated to be published in 2025.

V2X Standards and Interoperability

While long the unwritten expectation, U.S. Department of Transportation (USDOT) codified the goal of National Interoperability in their August 2024 publication Saving Lives with Connectivity: A Plan to Accelerate V2X Deployment. DriveOhio has been preparing for this moment for many years. The 2023 release of the V2X Standard Operating Principles is a prime example of this commitment to supporting USDOT's vision. Springboarding off the publication of the national guidance, DriveOhio is now developing Ohio-focused V2X Deployment Guidance, which will be published in 2025.

DriveOhio's continued support of the statewide Security Credential Management System (SCMS) portal further showcases a commitment to interoperability with different vendors and networks. Dublin, Marysville and ODOT have all used this system as part of the 33 Smart Mobility Corridor project, as has the City of Columbus, allowing drivers to traverse those different networks, hosted by different vendors, with seamless functionality.

OSU Intersection Safety Challenge

In 2024, the OSU Center for Automated Research (CAR) was awarded a USDOT Intersection Safety Challenge grant. DriveOhio has continued its support of OSU in this effort.

DriveOhio

AUTOMATED VEHICLES

AUTOMATED VEHICLES

Automated vehicles (AVs) are revolutionizing the transportation sector with technology that enables them to perceive their surroundings and make decisions independently. This technology includes advanced driver-assist systems (ADAS), such as adaptive cruise control, automatic parking, and collision avoidance, as well as fully autonomous vehicles that can perform all driving functions without human intervention. The primary goal of AV technology is to significantly improve roadway safety by minimizing human error. AVs also hold the potential to help address driver shortages, improve mobility for those who cannot drive for themselves, and enhance systemwide transportation efficiency for passengers and freight.

Ohio is one of the first states to allow controlled research and testing on its roads and is leading the exploration of the benefits, impacts, and challenges of AV technology. DriveOhio's initiatives cover a broad range of applications, including interstate freight operations, passenger transport in both rural and urban settings, and dedicated AVs for package delivery. These efforts continue to generate valuable insights and lessons, establishing Ohio as a leader in the integration and advancement of AV technology.

STATISTICS

*The Rural ADS Project generated **60 TB of data** on **331 trips** covering **3,000 miles** and completing **100+ deliveries***

***9 companies** registered to test AVs in Ohio*

Tractor-trailers connected via technology will operate on 166 miles of I-70 between Columbus, OH and Indianapolis, IN

Rural GPS Research

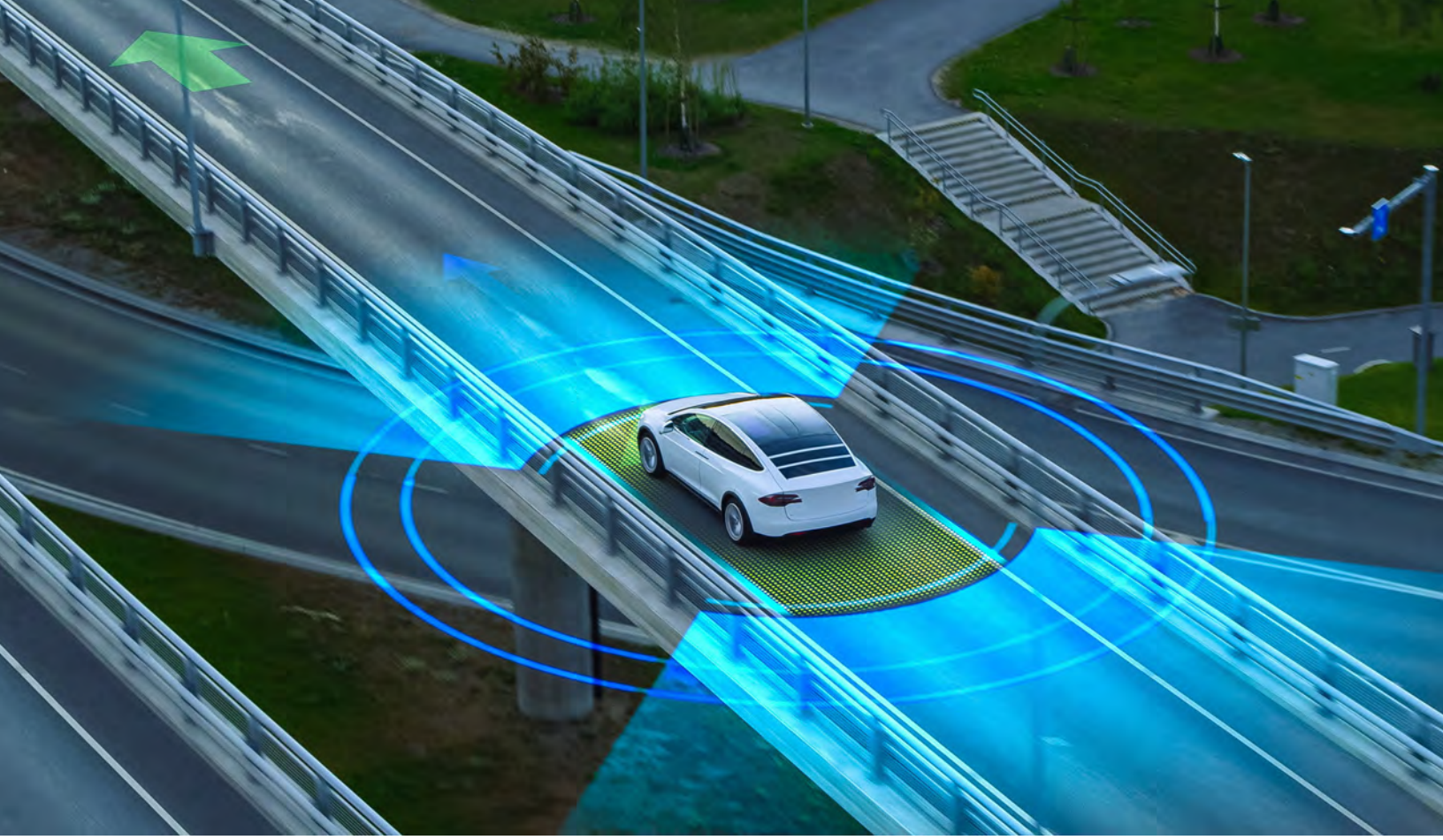
DriveOhio continues its research on enhancing GPS accuracy and reliability for both air and ground vehicles in rural areas. This ongoing effort aims to improve navigation and safety, ensuring that advanced mobility solutions are effective and dependable in less densely population regions.

Connected Community Hubs

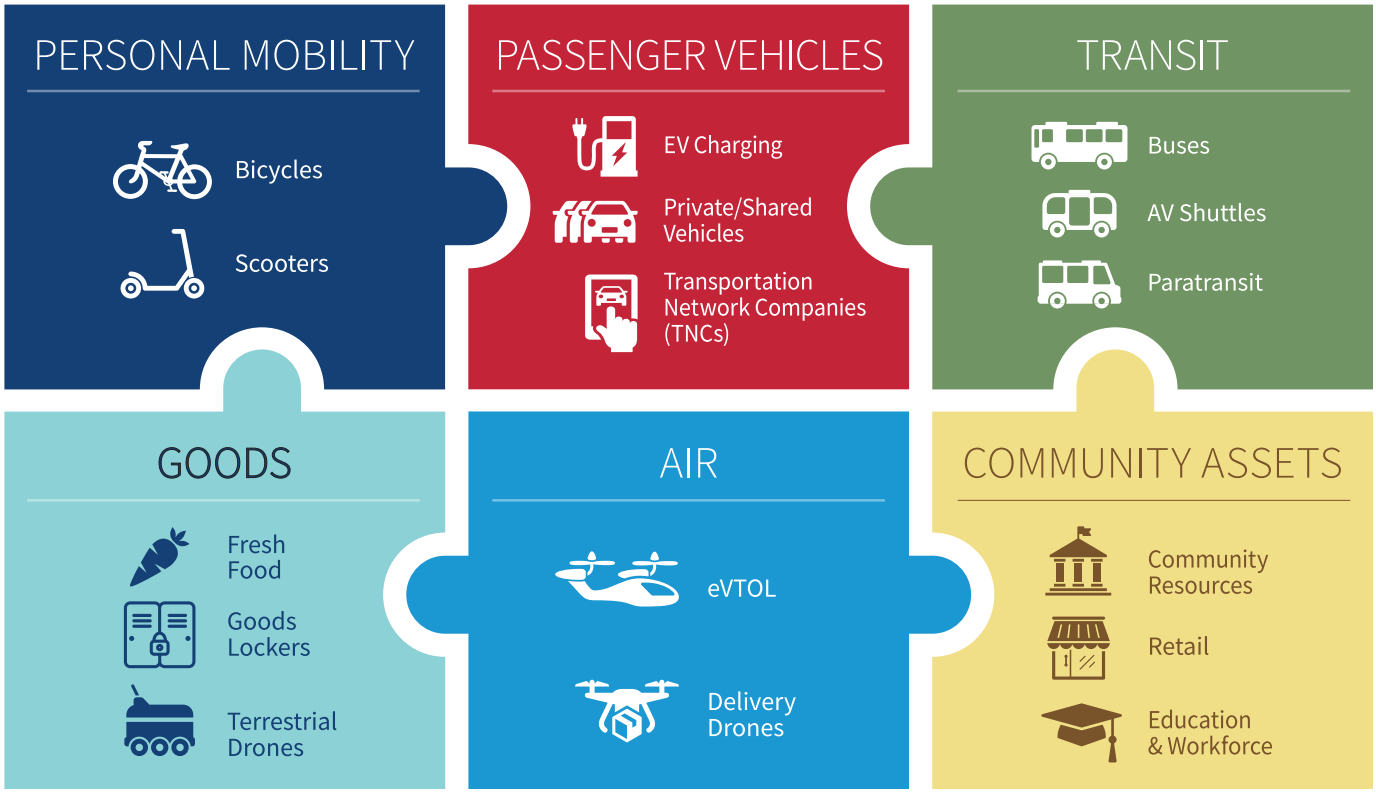
In partnership with student research teams at the UC, DriveOhio is developing and testing mobility hub concepts that integrate multiple modes of transportation. This initiative will produce concrete preliminary design examples of what a mobility hub could look like for a specific location in the Cincinnati area.

Mobility hubs are a promising solution to address transportation challenges, serving as community anchors that provide people of different backgrounds and abilities with easy and cohesive connections to multiple travel options, services, and technologies to increase mobility and access to employment, education, healthcare, and other opportunities.

Mobility hubs facilitate transportation access and location-specific needs, such as delivery lockers, pharmacy pick-up, and food/retail, with any combination of modular community-focused spaces to fill existing gaps. Within urban areas, mobility hubs can shift traffic patterns to reduce congestion, shorten travel times, and expand connection points to move people and goods more efficiently. Suburban and rural areas can build hub and spoke models that strategically and efficiently bring people and goods to and from less densely populated areas to more central locations and between regional hubs, connecting communities and improving traveler experience and goods transport efficiency.



Connected Community Hub Components



2024 INITIATIVES

I-70 Truck Automation Corridor Project

This project, funded in part by FHWA and in partnership with the Indiana Department of Transportation (INDOT), features real-world demonstration of automation technologies with robust data collection to understand performance in a variety of operating conditions. The first deployment with truck platooning technology is planned for 2025 and procurement for additional technology demonstrations is underway.

AV READINESS ROADWAY AUDIT TOOL (ARRAT)

Development of an AV Readiness Roadway Audit Tool and guidebook to aid infrastructure owner-operator decision making is also underway. Expected to launch in 2025, the tool automates and streamlines analysis of roadway conditions and characteristics that impact AV performance.

DRIVEOHIO AV INCIDENT REPORTING

DriveOhio and INDOT are collaborating to track AV interactions with law enforcement across both states by updating the DriveOhio Automated Vehicle Incident Reporting Form to include Indiana counties.

Closing Out the Ohio Rural ADS Project

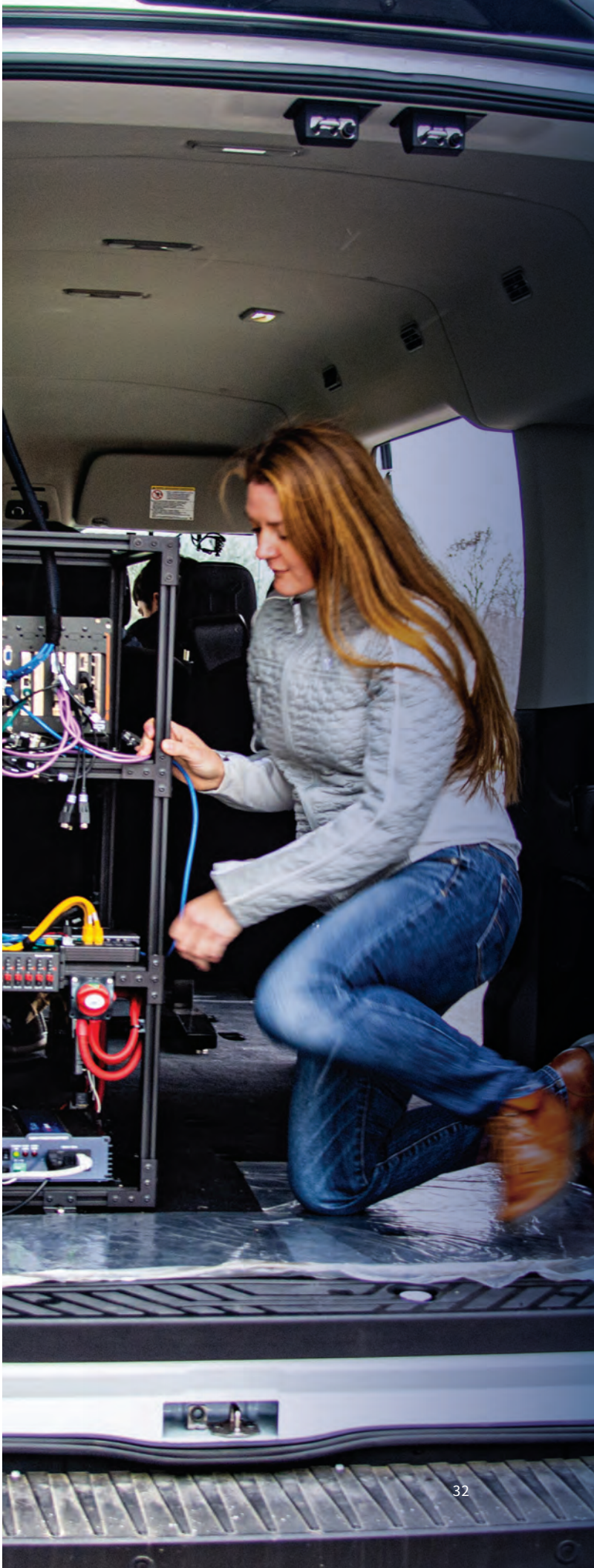
Funded in part by the USDOT, this project demonstrated how connected and automated semi-trucks and passenger vehicles can improve safety for drivers, passengers, and other travelers in rural settings. The project generated 60 TB that is being analyzed to identify characteristics that create challenges to AV operation in rural areas using AI and machine learning (ML). A comprehensive Final Report was published in June. Additional information on further utilizing data collected through this project is provided in Predictive Modeling for AV Data Analysis.

AV Pooled Fund Study Local Agency Support

DriveOhio leads collaborative efforts with other State agencies and infrastructure owners to advance adoption of AV technology. Using its AV Infrastructure Owner-Operator (IOO) Industry Forum launched in 2023, members continue to engage AV deployers on the sustainability techniques and challenges they experienced during deployment, with a goal of developing guidance for future deployers to consider when making transportation infrastructure and policy changes.

Automated Truck Mounted Attenuator

Advances in work zone safety include routine use of truck-mounted attenuators, or crash trucks, during mobile operations to absorb the impact of a crash and help protect roadside workers. This research project investigates technology to automate the crash truck, removing the driver from harm's way as well as automating the critical safety function of the crash truck driver. The research team will implement technology to alert workers on the ground to a work zone intrusion – typically performed by the crash truck driver who is responsible for sounding the horn to warn workers to get out of the way.



DriveOhio

ENERGY SECURITY & RESILIENCE

TRANSPORTATION ENERGY SECURITY & RESILIENCE

With the second largest workforce in the nation for motor vehicle and parts manufacturing, the automotive industry is a key pillar of the state's economy.[1] Building on this foundation, Ohio has taken a balanced and future-focused approach to energy security and resilience by proactively investing in a variety of technologies that create additional economic opportunity for its residents.

DriveOhio advanced these efforts by leading the nation in leveraging NEVI Formula Program funding to support the buildout of the state's charging infrastructure through public-private partnerships (P3). In addition to supporting passenger EV travel within and through Ohio, DriveOhio's charging infrastructure efforts consider medium- and heavy-duty vehicles, airports, and urban, suburban, and rural needs, positioning the state to take full advantage of future electrification opportunities and serving as a model for how to rapidly plan and execute on large-scale new programs successfully.

[1] https://www.jobsohio.com/industries/automotive

STATISTICS

#1 producer of engines** and **#3 in automotive manufacturing nationwide

***2nd largest workforce** in the nation for motor vehicle and parts manufacturing*

***#4** in the U.S. for **EV industry investment** [2]*

***19 operational NEVI charging sites** along interstates providing 78 ports each with a 150 kW capacity*

40% of charging stations built through the NEVI program at the end of 2024 are in Ohio

***82% of Ohioans are within 25-miles** from a NEVI-funded direct current fast charging station*

3.82% of all new vehicles** registered in 2024 were **EVs

[2] https://www.jobsohio.com/industries/automotive

NEVI Progress and Reporting

DriveOhio is leading the nation in EV infrastructure deployment under the NEVI Program, with 40% of NEVI stations deployed nationwide in Ohio, as of the end of 2024.

To date, Ohio has awarded 42 sites in two rounds of procurement, totaling $32.5 million in federal funds. Nineteen stations are operational and 23 are expected to become operational by the second quarter of 2025. Another round of procurement was advertised in September 2024 and proposals are currently
under review.

DriveOhio released a publicly accessible EV charger dashboard to check real-time port availability, current kWh price, and network uptime. This tool provides transparent information on program progress and station utilization trends. DriveOhio also submits charging infrastructure data to the Joint Office of Energy and Transportation's Electric Vehicle Charging Analytics and Reporting Tool (EV-ChART) on a quarterly, annual, and one-time basis for all operational NEVI-funded stations.

Alternative Fuel Vehicle Registration Dashboard

DriveOhio collaborated with the Ohio Bureau of Motor Vehicles (BMV) to create and maintain the Alternative Fuel Vehicle (AFV) Registration Dashboard. This dashboard monitors and analyzes the latest trends in AFVs across Ohio—helping users better understand the types of AFVs being sold, where the vehicles are registered, and the type of fueling infrastructure needed to support them. The AFV adoption rate has steadily increased from 0.55% in 2019 to 3.82% in 2024. During that period, December 2024 had the highest new AFV registrations with 3,475, which represents a 44.5% increase from AFV registrations in December 2023.

1st Procurement

23 SITES AWARDED

19 OPERATIONAL SITES

4th IN DESIGN DEVELOPMENT PHASE

2nd Procurement

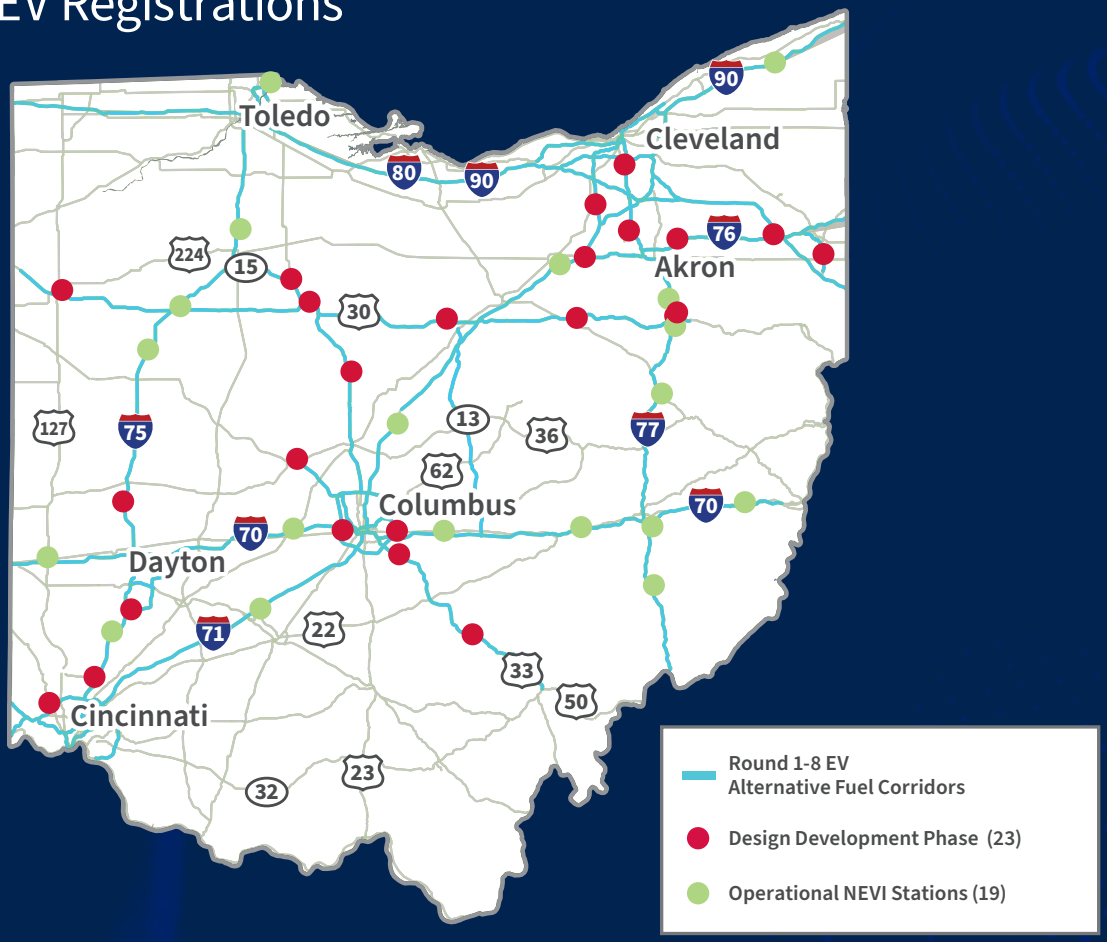
19 SITES AWARDED

19 IN DESIGN DEVELOPMENT PHASE

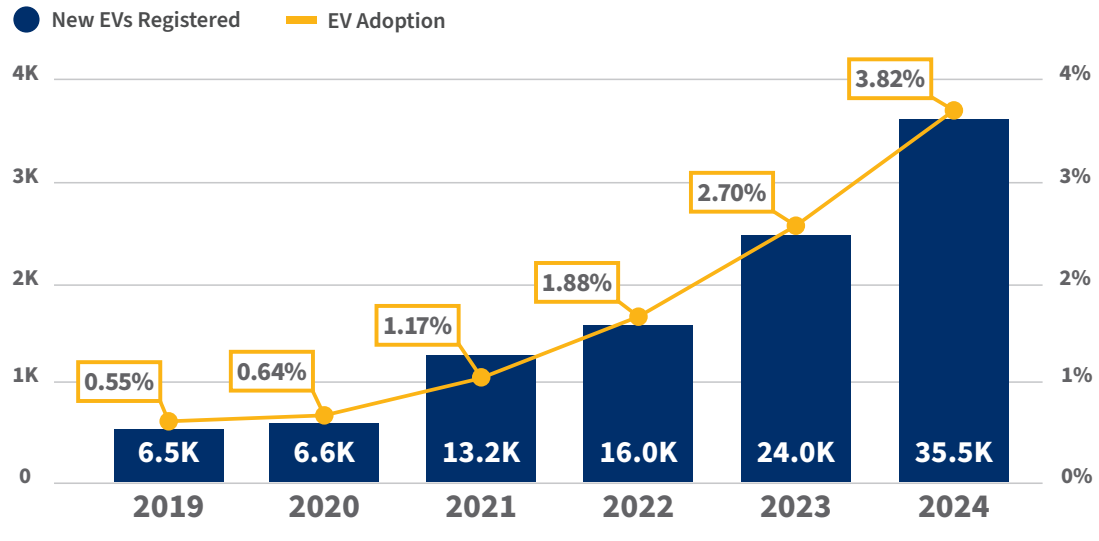
3rd Procurement

128 RESPONSES RECEIVED

Awarded NEVI Charging Station Locations & New EV Registrations



New EV Registrations in Ohio



2024 INITIATIVES

NEVI Outreach and Collaboration Efforts

DriveOhio, in collaboration with regional interested parties, continued to actively engage the public and industry through a series of webinars and outreach activities. These initiatives aim to keep the community informed about NEVI program progress and gather input on potential charging station locations. In 2024, DriveOhio conducted the following engagement activities:

- Eight public meetings (six in-person meetings held throughout the state and two virtual sessions)
- Metropolitan Planning Organization (MPO) and state agency workshops; local government webinar
- Webinars for interested NEVI vendors
- Numerous media engagements
- 10+ conferences showcasing EV initiatives and insights

To facilitate collaboration, DriveOhio created an **EV Infrastructure Partner Directory** of private individuals and organizations that are seeking partners or are open to partnering on EV infrastructure projects.

In November 2024, Ohio further broadened its reach for feedback through the release of an Request for Information (RFI) to solicit potential project and program ideas for future procurements following the Alternative Fuel Corridor (AFC) buildout. This effort includes innovative ideas for rural charging, cybersecurity, fleet electrification, airport charging, workforce development, energy storage systems, and other solutions.

Fleet Electrification

ODOT purchased four electric Ford F-150 Lightning pickup trucks to explore how EVs can meet the demands of fleet operations. This initiative is part of a broader effort to enhance Ohio's EV infrastructure and support the state's exploration of alternative fuel transportation options.

Alternative Fuel Research

DriveOhio is working with Ohio University, University of Toledo and Go Sustainable Energy to find optimal locations in Ohio to install EV chargers, specifically in communities and rural areas, focusing on utilizing off-grid alternative energy sources (e.g., solar, wind, or hydropower) where possible to reduce the impact on the electric grid.


DriveOhio
DATA, ML & AI

DATA, MACHINE LEARNING & ARTIFICIAL INTELLIGENCE

Vehicle technology is transforming transportation and that transformation has unleashed a significant amount of data that can be collected in the field. DriveOhio is harnessing this data to create meaningful insights that positively affect safe and reliable movement of people and goods within and through Ohio. DriveOhio has also been using ML and AI technology to break down the large datasets into usable and actionable data and outputs. In 2024, DriveOhio saw many initiatives launch using these technology solutions.

2024 INITIATIVES

Vehicle-Based Data Pilot Project

DriveOhio awarded $700,000 to Honda and partners to develop a road condition management system that leverages vehicle-generated data from ADAS-equipped test vehicles. This two-year initiative focuses on identifying and reporting hazardous road conditions, such as potholes, damaged guardrails, signage issues, and roadway striping deficiencies, to enhance safety and efficiency across Ohio's transportation system.

By integrating real-time roadway condition data into a web-based dashboard, ODOT crews can respond more quickly to emerging maintenance needs, preventing further deterioration, and reducing long-term costs. The project also seeks to refine machine learning algorithms for data analysis and evaluation, potentially informing future maintenance operations and paving the way for broader adoption of data-driven solutions in Ohio's transportation network.

Event Streaming Platform Smart Grant Programs

The Event Streaming Platform (ESP) is designed to process large volumes of real-time data from multiple sources and integrate it with existing datasets to deliver faster, more informed decision-making. DriveOhio successfully completed the ESP's ingestion module and will soon be in production with the discovery module. Consumption model completion is planned for 2025.

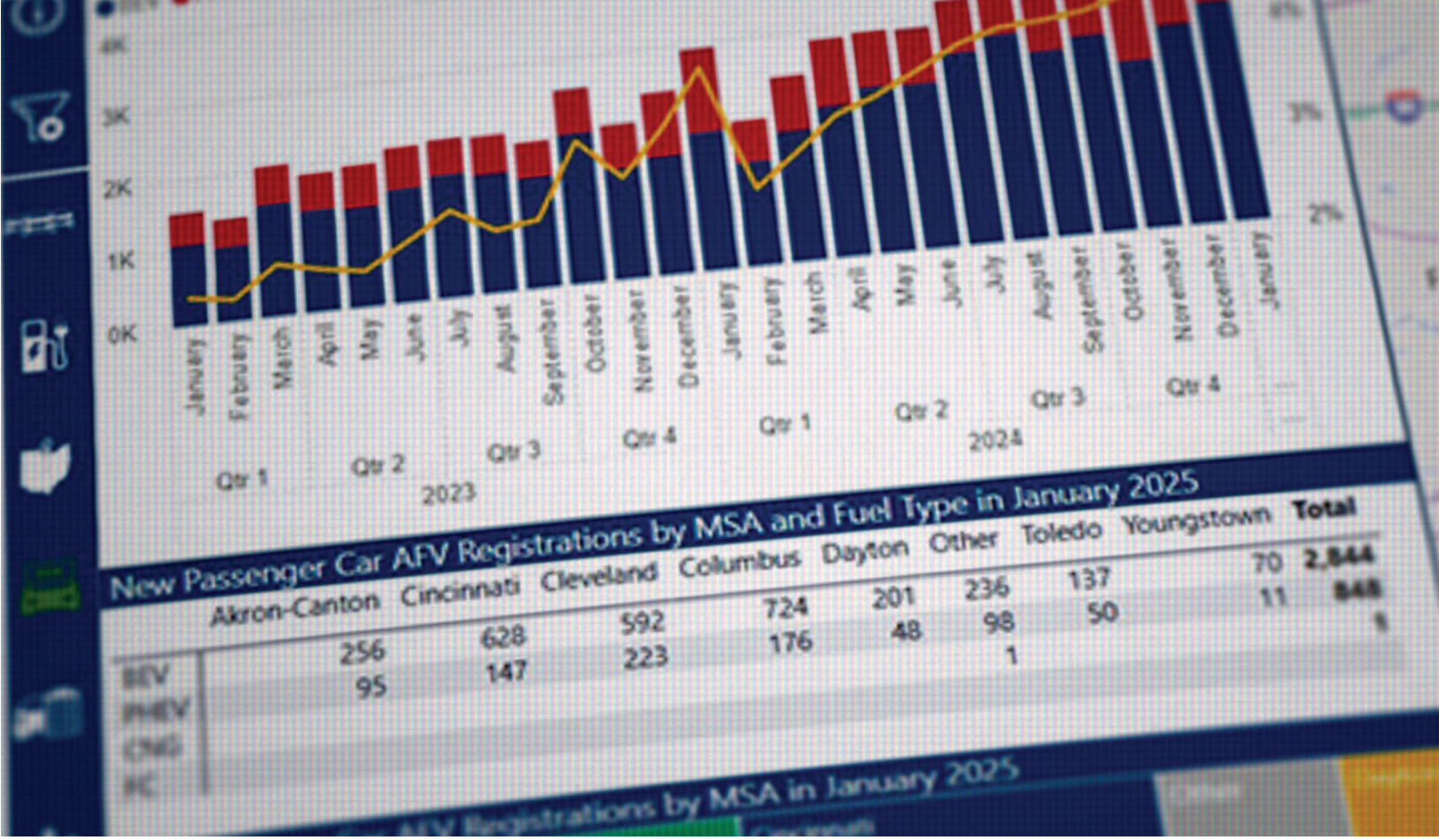
ODOT will use the ESP to develop two programs to improve roadway safety:

CRASH PREDICTION AND PROACTIVE MITIGATION

This program will identify situations that pose a high probability of crashes occurring. This identification will be accomplished by comparing real-time data streams, such as speed, traffic volume, weather, and pavement conditions, to historical data. The resulting product with deliver a data set defining roadway crash risk scores. Those risk scores can be monitored to allow ODOT's Traffic Management Center to be proactive with strategies to reduce accidents from occurring.

INCIDENT DETECTION AND RESPONSE INITIATIVE

This program will allow ODOT to receive alerts on air bag deployments including crash location and severity information in real time directly from vehicle manufacturers. This data would be sent to emergency responders to speed up response times to crash sites.



Predictive Modeling for AV Data Analysis

DriveOhio is working with Youngstown State University(YSU) Data Mine to build AI and Machine Learning models to analyze the 60 TB of data collected during the Rural ADS Project. The goal is to identify characteristics not intuitive to humans that are contributing to difficulties for AVs in rural areas (clustering, categorization, and probabilistic prediction, without generative AI).

Work Zone Technology Assessment

DriveOhio developed and published *"A Plan to Measure the Effectiveness of Connected Smart Work Zone Devices"* that discusses how using 'connected' devices can reduce crashes, increase safety, and maintain reasonable traffic flow in and near work zones. For the purposes of this plan, connected refers to the ability to inform either workers, drivers, or both of existing or impending conditions through some form of wireless connectivity, as well as to collect data related to the operations of these devices. Smart work zone (SWZ) devices have been piloted to notify drivers in advance of upcoming areas of concern with a goal to improve roadway safety.

Smart Belt Coalition Leadership

Since 2023, DriveOhio has served in the lead agency role of the Smart Belt Coalition (SBC). SBC was formed in 2016 and is a strategic transportation collaborative comprised of roadway owners, operators, and maintainers (both State DOTs and tolling authorities) and research and academic institutions.

In the lead agency role, DriveOhio spearheaded efforts to advance work zone safety through identification of and collaboration on technological solutions for scheduling, managing, and validating work zones, with seamless communication across jurisdictions. This effort involved mapping current agency processes, creating an ideal workflow, and detailing a road map of improvements for each participating agency. A key recommendation is to adopt a common data standard, which will allow for interoperability of future connected work zone deployments and for seamless communication with connected devices, with connected vehicles and between transportation agencies.


DriveOhio
WORKFORCE

WORKFORCE

DriveOhio is partnering with educators, industry, and others to proactively prepare Ohio's workforce to integrate technological advancements into the transportation system. DriveOhio's efforts are critical for understanding and communicating current and future industry and workforce needs, as well as efficiently getting relevant information and resources into the hands of our educators.

STATISTICS

*Federal grants totaling more than **$70k awarded** to educators implementing smart mobility activities into classes and after-school programs*

***780+ DriveOhio Educator Toolkit downloads**, by educators who work with **50K + students** including:*

- ***120+ after school programs***
- ***80+ summer programs***
- ***20% referrals***

30 educator and community partner events with 700 participants

***600 registrants** for **8 professional development webinars** about smart mobility workforce opportunities*

30 DriveOhio events,** student and school visits with an audience of **2,500 students

Advanced Mobility Career Paths

Architecture, Urban Planning, and Environmental Science

Law and Policy Studies

Computer Science and Data Analytics

Engineering (Mechanical, Electrical, Civil Software), Operations and Maintenance

Business and Economics

Sociology and Psychology

Skilled Trades

Manufacturing

DriveOhio Educator Toolkit

DriveOhio's K-12 Educator Toolkit provides free resources for educators, employers and other workforce stakeholders to support STEM education. 2024 updates include a new resource page for Drones and Air Mobility, a new collection of resources for Afterschool and Summer programs, recordings of eight episodes of the Toolkit Tuesday professional development webinar series, free Portable Innovation Labs, and links to more partner resources.

Toolkit Tuesday Webinars Series

Bite-Sized Learning for Busy Educators

This free webinar series supports K-12 educator professional development, focuses on implementation of the K-12 Educator Toolkit,and showcases smart mobility career paths. In 2024, DriveOhio hosted eight webinar episodes on smart mobility initiatives in Ohio and how to use toolkit resources. Guests included LEGO® Education, the Ohio Manufacturers' Association, the PAST Foundation, the National Air Transportation Association, and more.

Portable Innovation Labs (PILs)

DriveOhio collaborated with the PAST Foundation to develop two new PILs that complement the DriveOhio Educator Toolkit curriculum – Drones and Vertiports and the Smart City Adventure. These labs provide free STEM equipment and standards-aligned curriculum that can be borrowed anywhere in the state to support hands-on experiences in K-12 classrooms, after-school, and summer programs. Additional PIL content includes 3-D printers, autonomous delivery, virtual reality, and more.

2024 INITIATIVES

Drones & Air Mobility

This new DriveOhio Educator Toolkit collection supports K-12 drone education, including an updated version of the Cardboard Vertiport Challenge with a variety of extension activities; Ohio content to support the FAA Airport Design Challenge using Minecraft; videos to support career exploration with students; information about industry-recognized credentials including the FAA Part 107 drone pilot certification; presentation slides to support classroom discussions, and more.

After-school & Summer Programs

This new DriveOhio Educator Toolkit collection supports K-12 after-school and summer programs, including condensed versions of the Smart City Adventure curriculum, developed in collaboration with the Cuyahoga County Public Library; new curriculum developed by the UC specifically for summer programs; and links to resources from the Ohio Afterschool Network, LEGO® Education, NASA, and other partner organizations.

Ohio's Auto and Advanced Mobility Workforce Strategy

DriveOhio supported the Governor's Office of Workforce Transformation and the Ohio Manufacturers' Association with ongoing implementation of this statewide strategy to strengthen and build Ohio's advanced manufacturing workforce. DriveOhio provided technical expertise and insights from workforce initiatives, including direct alignment with the DriveOhio Educator Toolkit.

Student Transportation Advancement Research (STAR) Program

STAR is ODOT's open challenge, grant-style program meant to engage college students to address transportation topics in an innovative manner. STAR challenges students (and ODOT) to think outside-the-box to identify novel approaches to solve issues, create new value by applying new processes or techniques to established topics, or simply to test new ideas. DriveOhio STAR topics have included Connected and Automated Vehicle Education (CAVE) for K-12 audiences, and Next-Generation Smart Mobility Hubs for Ohio.

Ohio Vertiport Challenge

Student teams at the high school and higher education levels work with industry mentors and government mentors to develop proposals that solve an AAM transportation challenge through aviation infrastructure.

Campus Collection

DriveOhio continued to develop the new Campus Collection for higher education, which will launch during 2025. This free collection of resources will be tailored for college students and higher education faculty and staff. Content will include lecture slides, reading assignments, work-based learning, capstone project support, innovation challenges, and data sets from DriveOhio research projects.

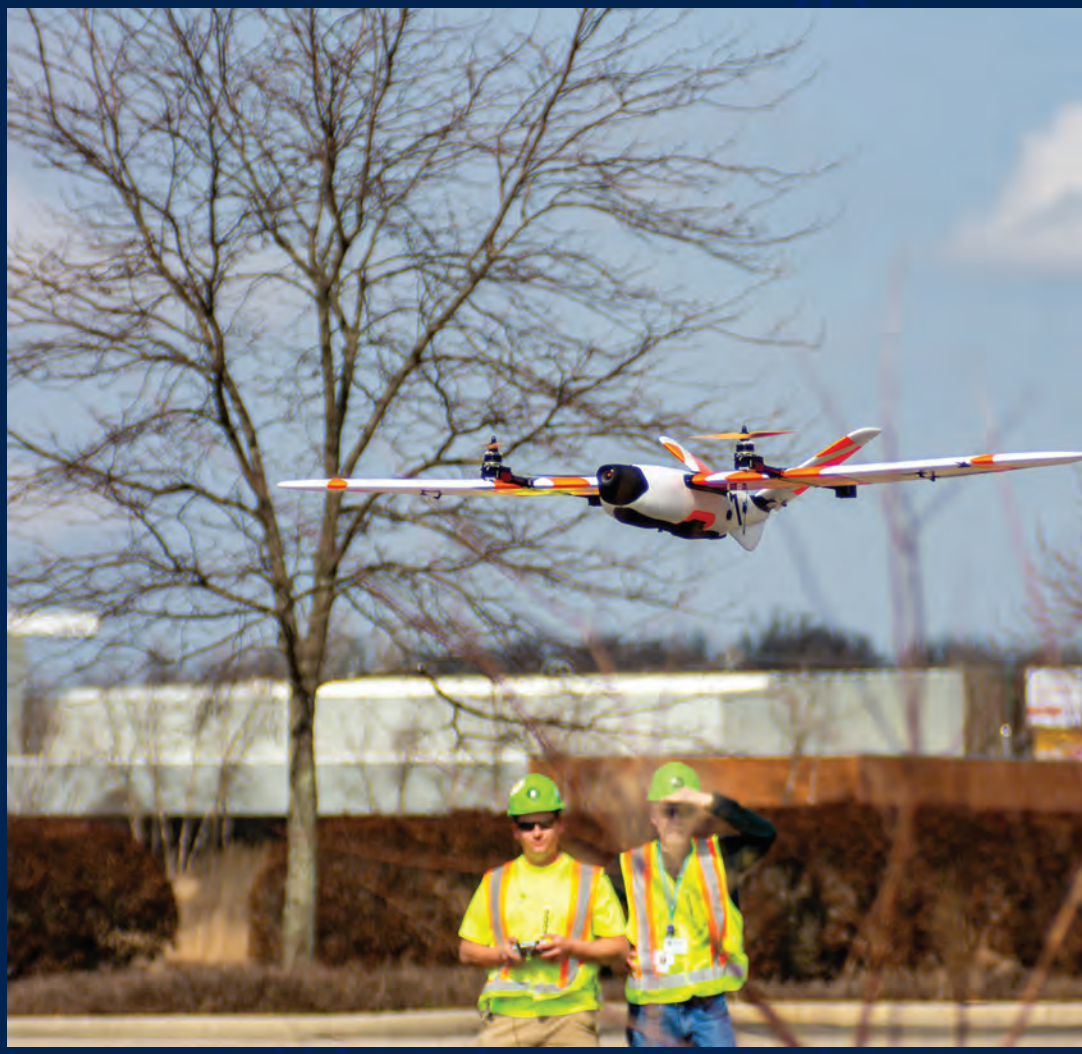
STEM and Higher Ed Classroom Visits and Projects

In 2024, DriveOhio held 30 student events for STEM and higher education classrooms throughout the state, engaging 2,500 students with smart mobility activities and spreading awareness of career opportunities.


Drive Ohio
Ohio
Delivery Robots

DriveOhio

LOOKING AHEAD



LOOKING AHEAD

Building on its achievements in 2024, DriveOhio is excited to continue advancing innovation across mobility technologies and use cases to increase safety, efficiency, and resilience in our transportation systems.

2025 STRATEGIC OBJECTIVES

What

Facilitate interoperability, integration,and scaleup of emerging technologies that benefit Ohioans.

Why

To maximize public good and improve transportation safety, efficiency, and reliability.

How

- Implement SkyVision 2.0 for statewide testing of AAM.
- Increase complexity of AAM and UAS operations for integration in the National Airspace System (NAS).
- Continue developing Ohio UAS Center pilot expertise and train additional pilots across ODOT and sister agencies.
- Continue development of modular mobility hub designs and proof of concepts.
- Implement Standard Operating Procedures for CV applications.
- Benchmark conventional vehicle and AV policies and regulations in Ohio and other states to identify where potential changes are needed, such as guidelines for using LiDAR.
- Complete buildout and testing of the AV Readiness Roadway Audit Tool and guidebook to facilitate road audits statewide and pursue funding for additional tool capabilities.

What

Advance interagency and cross-sector collaboration, public-private partnerships, and innovative funding models to support a unified ***'One Ohio'*** vision for transportation.

Why

To accelerate innovation, attract industry investment, and create high-quality jobs.

How

- Convene DriveOhio Alliance.
- Develop a program to spur public-private partnerships that harness emerging technology to address community challenges.
- Enhance capabilities of the ESP to enable more data-driven decision making.
- Identify ideas for public-private partnerships to address rural EV charging and alternative fueling infrastructure, cybersecurity, fleet electrification, workforce development, airport charging, and energy storage systems.
- Launch the Campus Collection for higher education and continue strengthening the K-12 Educator Toolkit.
- Continue engagement through panels, classroom visits, innovation challenges, and conferences.
- Continue to expand partnerships, including a new statewide collaboration with the Ohio STEM Learning Network and the Ohio Manufacturers' Association during the 2025-2026 school year.

DriveOhio

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drive.ohio.gov