

U-M offers open-access automated cars to advance driverless research

By Susan Carney
Mobility Transformation Center
and Nicole Casal Moore
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New University of Michigan research vehicles will be open testbeds for academic and industry researchers to rapidly test self-driving and connected vehicle technologies at a world-class proving ground.

These open connected and automated research vehicles, or open CAVs, are equipped with sensors including radar, lidar and cameras, among other features. They will be able to link to a robot operating system. An open development platform for connected vehicle communications will be added later.

The open CAVs are based at Mcity, U-M's simulated urban and suburban environment for testing automated and connected vehicles. While a handful of other institutions may offer similar research vehicles, U-M is the only one that also operates a high-tech, real-world testing facility.

The combination will be "transformational," said Carrie Morton, deputy director of U-M's Mobility Transformation Center, which operates Mcity and is a public-private partnership that involves more than 60 industry partners.

"By providing a platform for faculty, students, industry partners and startups to test connected and automated vehicle technologies, open CAVs will break down technology barriers and dramatically speed up innovation," Morton said. "We're democratizing access to automated vehicle technology for research and education."

A high entry barrier into this emerging field, in terms of cost and time, can make it difficult for new players to engage, and that's a problem if society is to get connected, automated and driverless vehicles out of the research lab and onto the road, Morton said.

Today, auto companies are leading the effort. While making key advances, they're doing so on proprietary systems.

The lack of open testbeds has the potential to bottleneck innovation. Researchers and technology developers outside the auto companies with ideas for improving components or system controls have no way to assess whether they'll work in the real world. Students have limited options for studying connected and automated systems.

Open CAVs change all that. "These research platforms will change the way we do our work," said Jessy Grizzle, director of robotics and the Elmer G. Gilbert Distinguished University Professor and the Jerry W. and Carol L. Levin Professor of Engineering. "The cars are far too expensive and hard to maintain for a control expert or a perception expert to own one of their own, just to test out their area of specialty. Now they can work on the car with others and realize their dreams."

MTC's first open CAV is a Lincoln MKZ sedan, powered by PolySync's



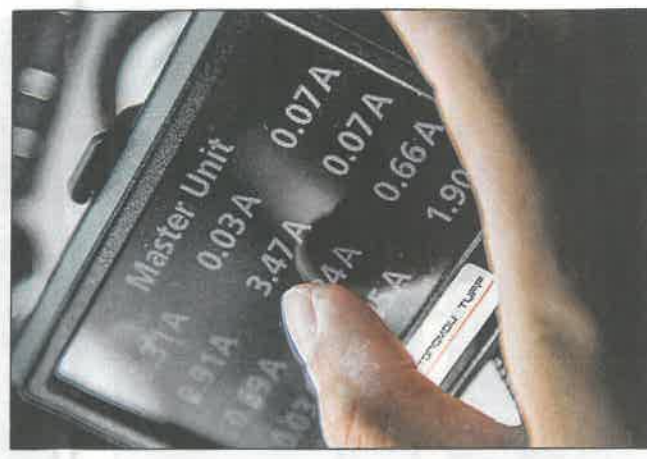
JOSEPH XU

This Lincoln MKZ is an open connected and automated vehicle research platform, or open CAV, at the University of Michigan. It is an open testbed for academic and industry researchers to rapidly test self-driving and connected vehicle technologies at Mcity.



JOSEPH XU

Ding Zhao, research fellow at the University of Michigan Transportation Research Institute, adjusts a LIDAR system, just one of the components of Open AV, a vehicle research platform, at Mcity.



JOSEPH XU

This Lincoln MKZ sedan is powered by PolySync's autonomy platform.

"This is a model of applied learning which will be a key driver for innovation."

— JAY ELLIS

autonomy platform that provides the foundation for rapid driverless vehicle development. Two Kia Soul compact crossovers will join the Lincoln. The new PolySync Open Source Car Control kit that enables complete "drive by-wire" control, which was introduced at Automobility LA in Los Angeles, will be installed on the Kias.

MTC will add dedicated short-range communications capabilities to the vehicles to support the intersection of connected and automated vehicle control and allow development of

connected vehicle applications. With such capabilities, vehicles can anonymously and securely "talk" to each other via wireless communications similar to Wi-Fi to improve safety.

From a research perspective, the open CAVs are completely adaptable, said MTC Director Hui Peng, the Roger L. McCarthy Professor of Mechanical Engineering.

"Researchers can bring in their own hardware — swap out any sensor they'd like. Or they can create advanced controls to take advantage of various sensor technologies already on the vehicles. And they have the ability to explore how it works in a real mobility system at Mcity," Peng said.

From an educational perspective, the vehicles will give undergraduate and graduate students an opportunity for hands-on exploration of advanced mobility systems, and a chance to refine them.

Faculty and students are already beginning work to build on these vehicles and allow them to operate without a driver. U-M plans to offer a course using open CAVs in about a year.

The open CAVs will be available to students participating in TechLab at Mcity, an experiential learning incubator that matches early-stage startups with students interested in applying classroom learning to practical technology development. TechLab is run jointly by the College of Engineering's Center for Entrepreneurship and MTC.

"The open CAVs lend our students a unique opportunity," said Jay Ellis, instructor for TechLab. "They will be able to rapidly develop technology, while also advancing proposed solutions for the companies participating in TechLab. This is a model of applied learning which will be a key driver for innovation."