CANADIAN AUTOMATED VEHICLE INITIATIVE

Automotive IQ's Simulation, Testing & Validation for Automated Driving 2024 Conference

September 12, 2024

Barrie Kirk, P.Eng., President, CAVI

Agenda

- Introduce CAVI
- Test sites: global view
- Dive into Canada, US, Europe, Asia
- Conclusions
- Questions

Canadian Automated Vehicle Initiative

CAVI

- Canadian Automated Vehicle Initiative
- Association for all stakeholders involved in any way with the CAV/CAM ecosystem
- Includes government, industry, academia
- A voice for the industry and a forum for discussion

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CAVI Members Include

ARCADIS

CNIB

AREA_55
ADVANCED COLD
RESEARCH FACILITY

Royal Canadian Mounted Police | Gendarmerie royale du Canada

BLG
Borden Ladner Gervais

RSG
INTERNATIONAL

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

uOttawa

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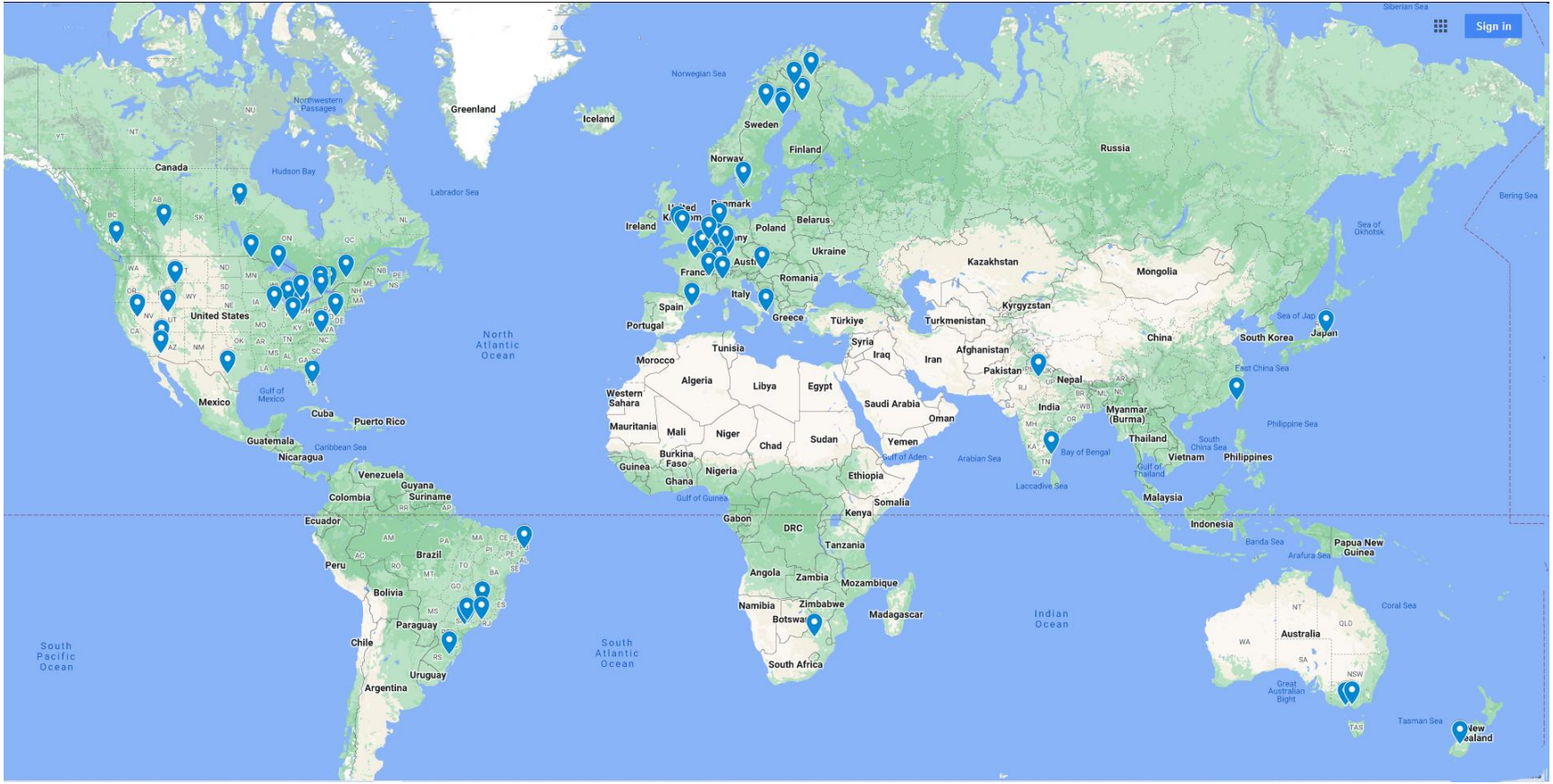
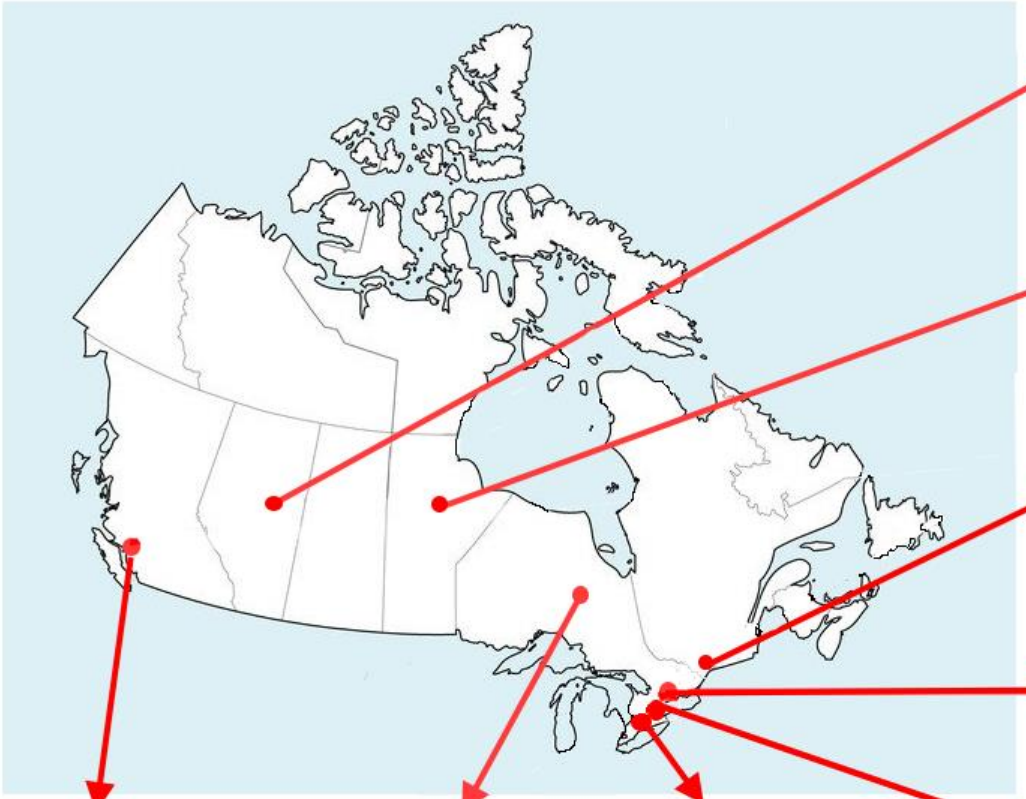
Test Sites: Global View



Test Sites in Canada



UofA - Edmonton
a research and development complex as part of the University campus

Thompson Manitoba
Cold weather testing facility

PMG Technology - Montreal
Test and research centre
(Owned and funded by TC)

Area X.O - Ottawa
A research and development complex for all weather testing of AV technologies

GM - Oshawa
General motor and AV test track

UofW - Waterloo
AVRIL Project
Autonomous Vehicle and Intelligence Lab

GM - Kapuskasing
Cold weather testing facility

UBC - Vancouver
a research and development complex as part of the University campus

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Thompson MB

- Average temperatures:
  - Below zero for 222 days
  - Below -20°C for 103 days
- Snow cover for up to 6 months
- 100s kms of winter roads over land, muskeg and lakes

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Winter Weather Testing in Thompson, Manitoba

- Rolls-Royce, Pratt & Whitney cooperated on building and operating a jet engine test facility in Canada:
  - National Research Council evaluated 12 potential sites; result:
  - “Thompson is the best place in Canada for winter weather testing”

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Jet Engine Testing in Thompson

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Winter Weather Testing in Thompson MB

- OEMs have conducted winter weather testing in Thompson, leveraging the low-cost, real-world ecosystem:
  - BMW
  - Bombardier Aerospace
  - Ford
  - Honda
  - Hyundai
  - Kia
  - Jaguar Land Rover
  - Porsche
  - Heavy equipment manufacturers
  - Snowmobile manufacturers

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Area X.O - Ottawa

- Secure, integrated test site for CAM/CAV technology: streets, intersections, buildings
- 1866-acre site
- 16 km of roads
- C-V2X, 4G / LTE, WiFi, LoRa, 5G, etc.
- Supported by:
  - Federal Government
  - Province of Ontario
  - City of Ottawa

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Area X.O - Ottawa

Smart, on-site, rail crossing

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Area X.O - Ottawa

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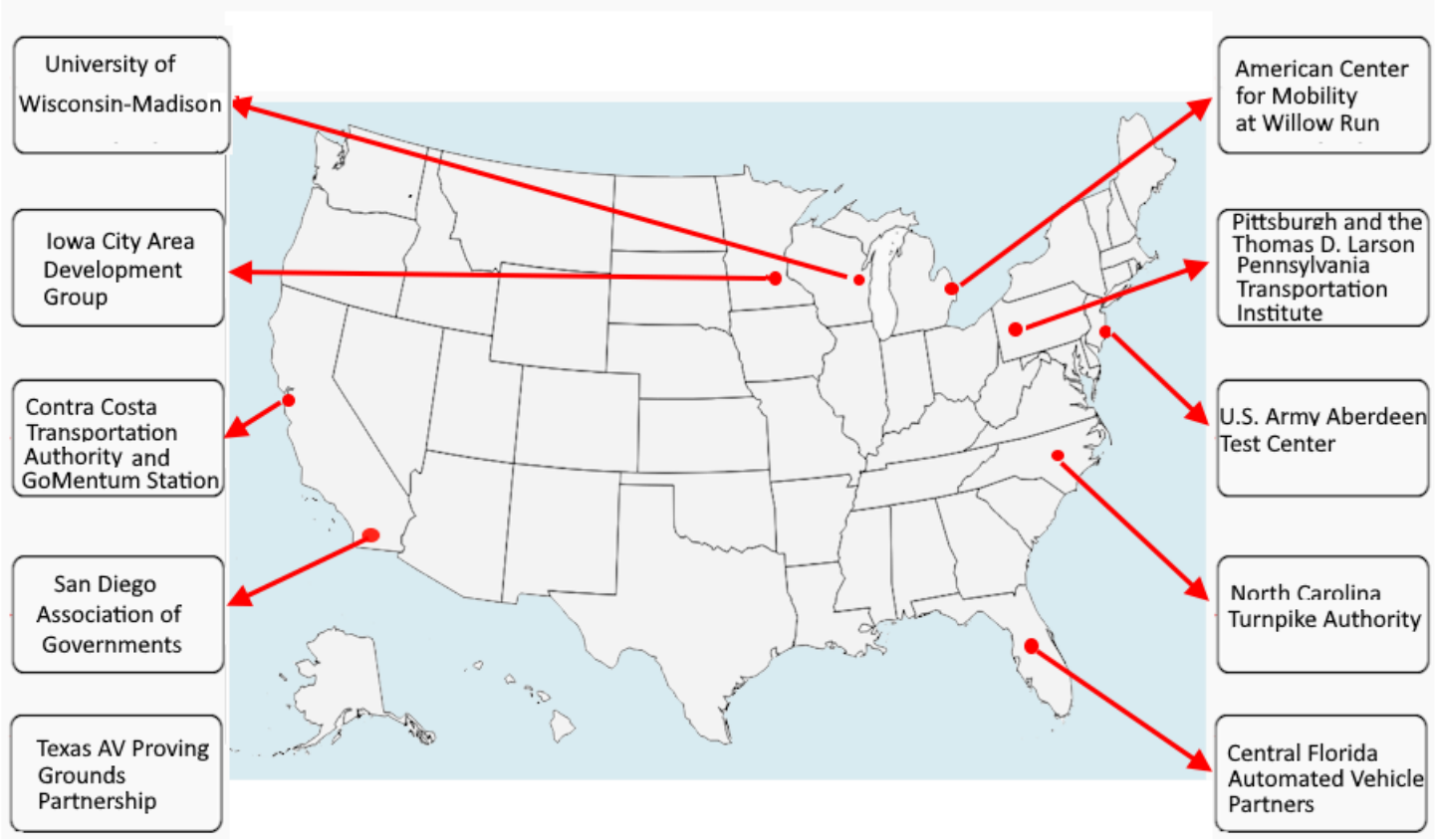
Test Sites in the U.S.



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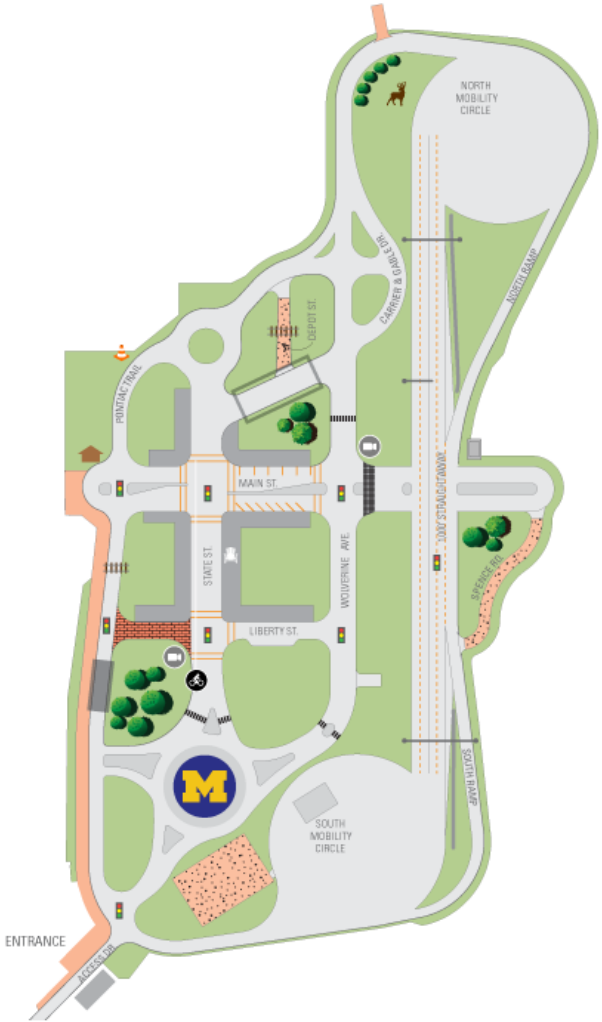
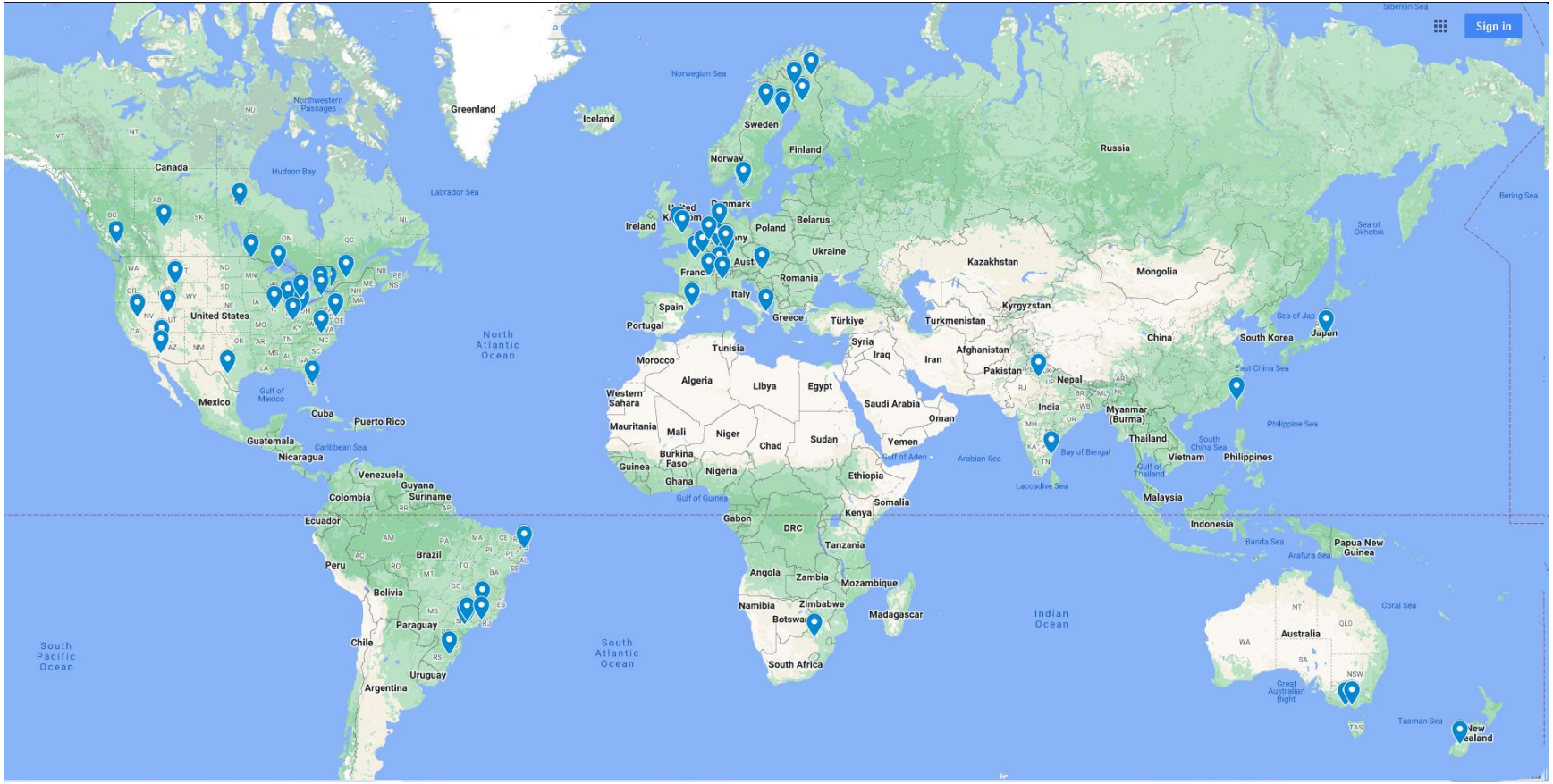
Mcity, U of Michigan

- State-of-the-art instrumentation and sensors
- Augmented reality testing technology
- Fully connected 5G network and vehicle-to-everything (V2X) communication
- Multiple road surfaces
- 1,000-foot straightaway
- Traffic signals and signs
- Bridge deck, underpass, guardrails, barriers, and crash attenuators



Test Sites: Global View



CAM TESTBED UK

Eight core testing facilities

Eight core testing facilities for the innovation and development of connected and self-driving vehicle technologies in the UK.

1. ASSURED CAV
2. MIDLANDS FUTURE MOBILITY
3. convex
4. UTAC Millbrook – Culham
5. Smart Mobility Living Lab London
6. CATESBY TUNNEL
7. TEES VALLEY
8. NORTH EAST AUTOMOTIVE ALLIANCE

Centre for Connected & Autonomous Vehicles

UKRI Innovate UK

ZENZIC

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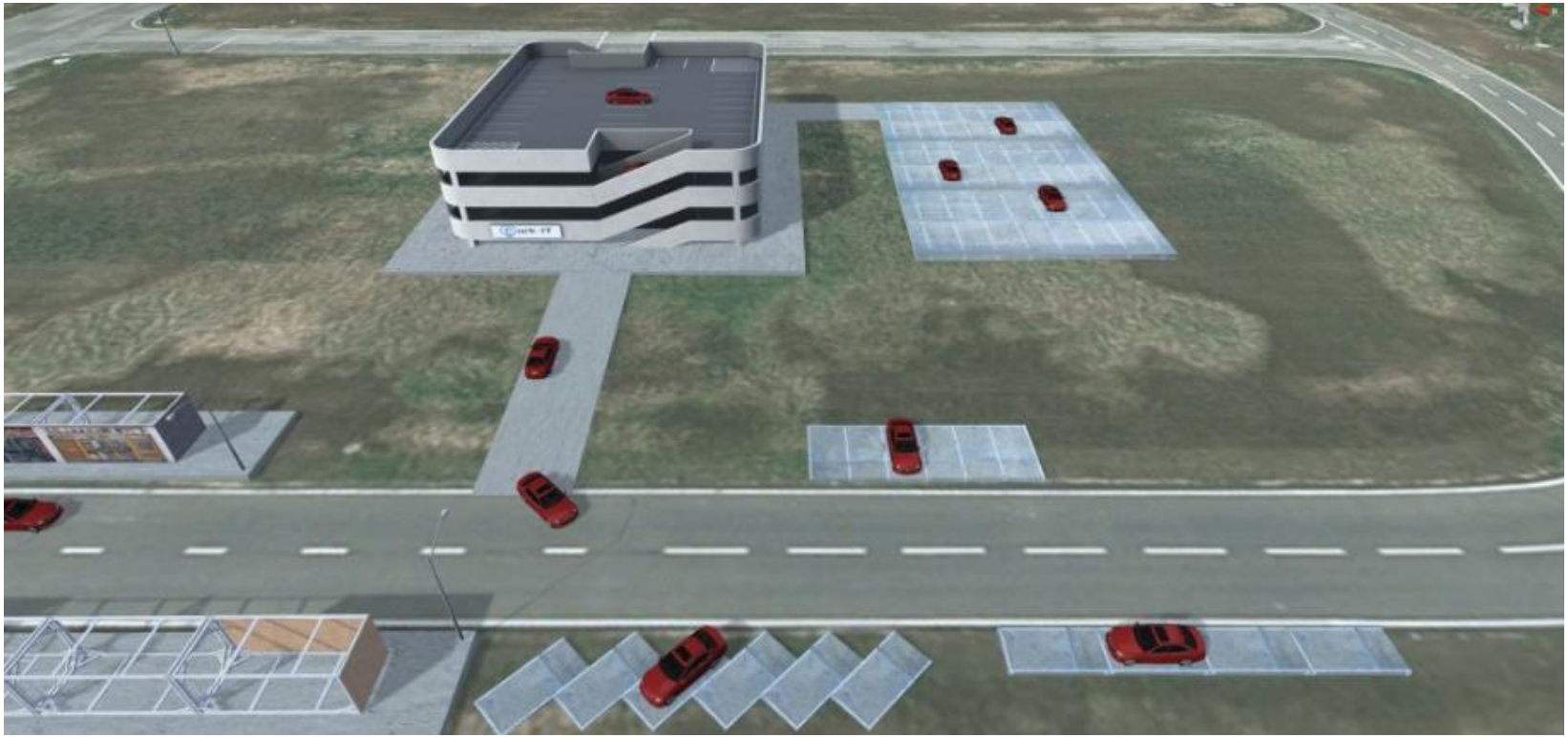
HORIBA MIRA, Coventry University, UK

- UK's first connected and autonomous vehicle (CAV) parking facility is now under construction in Nuneaton
- Partnership between global engineering firm, HORIBA MIRA and Coventry University will create 'Trusted Autonomous Parking' (Park-IT)
- Part of CAM Testbed UK – coordinated by Zenzic, funded by HORIBA MIRA and the Centre for Connected and Autonomous Vehicles (CCAV), via Innovate UK

HORIBA MIRA, Coventry University, UK



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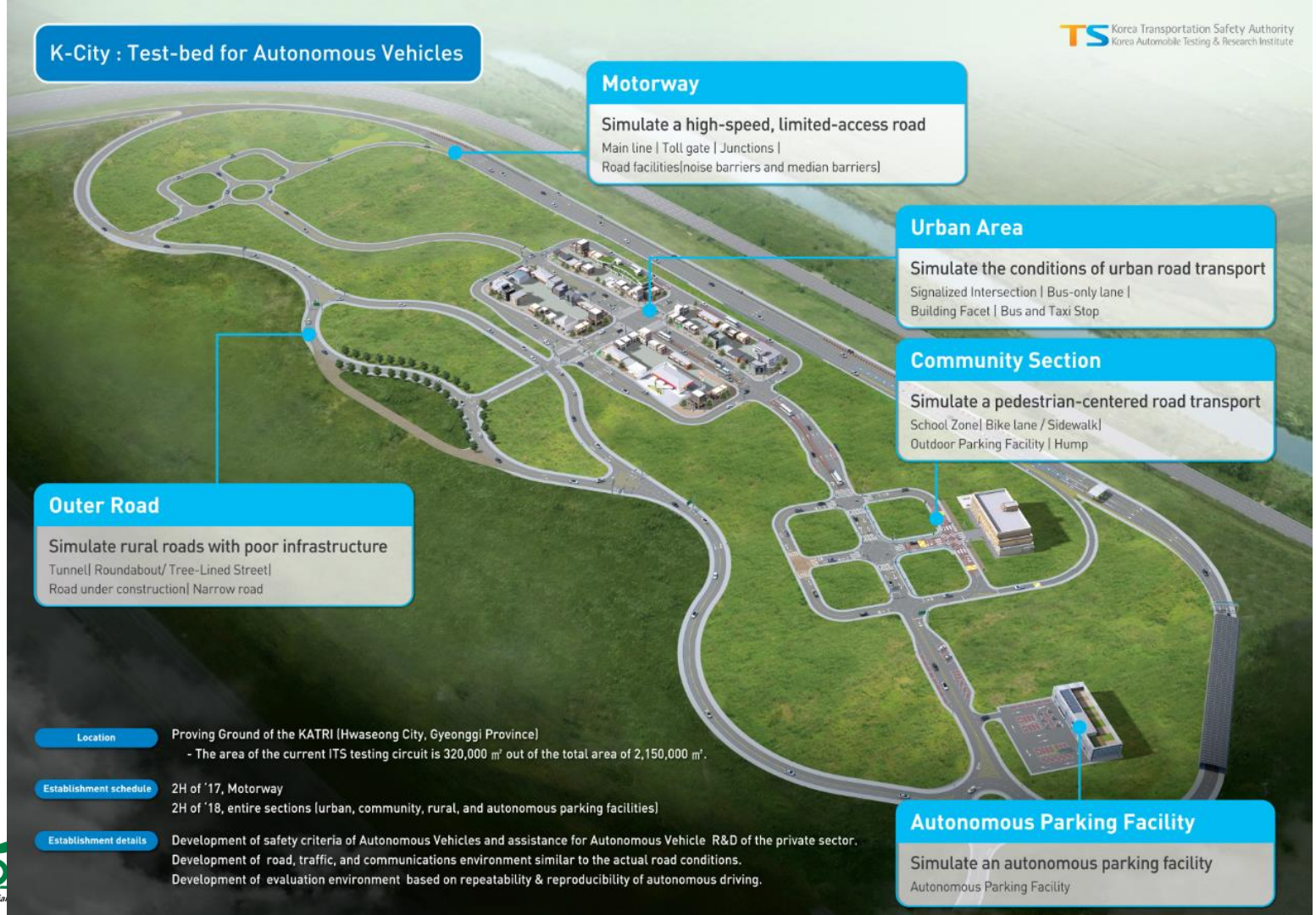
Japan Automobile Research Institute (JARI)


K-City : Test-bed for Autonomous Vehicles
Korea Transportation Safety Authority
Korea Automobile Testing & Research Institute
Motorway
Simulate a high-speed, limited-access road
Main line | Toll gate | Junctions |
Road facilities(noise barriers and median barriers)
Urban Area
Simulate the conditions of urban road transport
Signalized Intersection | Bus-only lane |
Building Facet | Bus and Taxi Stop
Community Section
Simulate a pedestrian-centered road transport
School Zone| Bike lane / Sidewalk|
Outdoor Parking Facility | Hump
Outer Road
Simulate rural roads with poor infrastructure
Tunnel| Roundabout/ Tree-Lined Street|
Road under construction| Narrow road
Location
Proving Ground of the KATRI (Hwaseong City, Gyeonggi Province)
- The area of the current ITS testing circuit is 320,000 ㎡ out of the total area of 2,150,000 ㎡.
Establishment schedule
2H of '17, Motorway
2H of '18, entire sections (urban, community, rural, and autonomous parking facilities)
Establishment details
Development of safety criteria of Autonomous Vehicles and assistance for Autonomous Vehicle R&D of the private sector.
Development of road, traffic, and communications environment similar to the actual road conditions.
Development of evaluation environment based on repeatability & reproducibility of autonomous driving.
Autonomous Parking Facility
Simulate an autonomous parking facility
Autonomous Parking Facility

Conclusions

- Very dynamic, global testing ecosystem
- Many variations on features and specialty capabilities
- OEMs, Tier 1, 2 suppliers have multiple choices available to them

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Follow-up

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- ***CAV Update***
  - Free monthly newsletter
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CAV Update **August 2024**

From the Editors

The *Canadian Automated Vehicle Initiative* (CAVI) has made significant progress since it was formed earlier this year:

- We have formed a Board of Directors, and we are pleased to achieve our objectives of diversity by geography (coast-to-coast), expertise, and gender.
- We continue to encourage people to reduce their excessive hype about CAVs. For example, PostMedia recently published my op-ed on CAV safety here.
- We have continued our liaison with all three levels of government. There is more activity at the government level and the momentum is building.
- We continue our international liaison, especially with Europe. In September, I will be speaking at a conference in Germany about the CAV testing ecosystem.
- The organizations and individuals that have joined CAVI are from the Federal and Provincial Governments, academia, other associations, and industry.
- We are developing and will soon publish a directory of the stakeholders in the Canadian CAV ecosystem.
- Our members continue to receive regular updates on all aspects of the Canadian and international CAV ecosystem via this newsletter.