

CAV Update

A monthly newsletter
on the CAV ecosystem

June 2023

From the Editors

Ottawa is the place to visit this Fall. There are four very interesting, separate events linked to the mobility, CAV, and drone ecosystems:

- The **Transportation Association of Canada** is holding its conference & exhibition on September 24-27. This is Canada's largest transportation conference with 70+ technical sessions and 300+ presenters. Barrie Kirk is speaking on *The Changing Future of Automated Vehicles*. He will describe what is trending upwards in the CAV ecosystem, what is slower than expected (and why), and the new trajectories for passenger, freight, and service CAVs.
<https://www.tac-atc.ca/en/conference>
- The same week, **Invest Ottawa** is presenting TCXpo, a national smart mobility, tech demonstration day at **Area X.O** on September 27, 2023. It will bring together stakeholders from industry, government, academia and the investment community, and feature announcements, exhibits, tours and other opportunities.
<https://www.eventbrite.ca/e/tcxpo-2023-tickets-645367590837>
- The day after, on September 28, 2023, Invest Ottawa and the **Kanata North Business Association** are presenting *CAV Canada*, which is also at Area X.O. It will feature a mix of local, national and global speakers, thought leaders and companies; keynotes and panel discussions on R&D, markets, investment, and policy; global foresight on key opportunities and challenges in the smart mobility sector; an exhibition; and many recruitment, talent spotting and networking opportunities.
<https://www.eventbrite.ca/e/cav-canada-2023-tickets-648165208587>
- A few weeks later, the **Aerial Evolution Association of Canada** is presenting its conference and exhibition in Ottawa on November 7-10. This will be a celebration of 20 years of Canada's premier drone association. (Aerial Evolution Association of Canada was formerly Unmanned Systems Canada, and before that, UVS Canada).
<https://evoque.swoogo.com/AEAC2023>

Finally, I want to say a big thank you to **Keith Fagan** who has contributed to *CAV Update* in many ways ever since the first issue back in 2013. It has been wonderful working with you all these years, and all your contributions are very much appreciated.

Canadian CAV News

Autonomous Haulage Systems (AHS) have been deployed in the Alberta oilsands for a few years now. AHS equipment by both **Caterpillar** and **Komatsu** have been deployed by the various energy companies working in the oilsands. In a recent development, Toyota has partnered with Komatsu to create a new class of automated vehicles known as *Autonomous Light Vehicle* (ALV). The basic idea is to incorporate ALVs in Komatsu's AHS to increase efficiency and reduce collisions between Komatsu's automated trucks and human-driven light vehicles. Komatsu launched the world's first commercial application of AHS in 2008. Since then, the company has deployed over 650 trucks at 22 sites in 5 countries. Edmonton-based heavy equipment dealer, **SMS Equipment**, deals in AHS and other systems and is a supplier to Alberta oilsands companies. More information is on Komatsu's site at [this link](#). A few videos on AHS in action can be viewed at SMS Equipment's site at [this link](#).



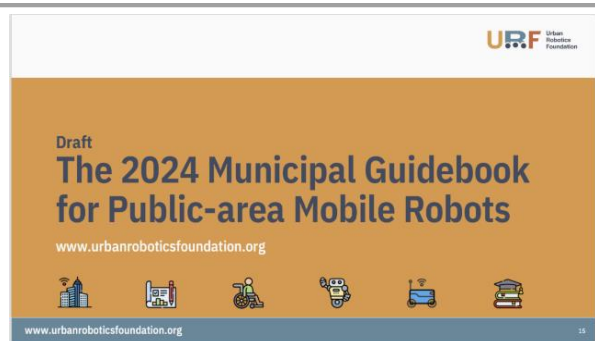
Toronto was the destination for a delegation from **Estonia** that comprised entrepreneurs, mentors, VCs, and staff from the **Embassy of Estonia** in Ottawa. Barrie Kirk met many of the delegation at a networking event.



Photo by Peeter Põldre

There is substantial interest in Estonia in building stronger connections to the start-up ecosystem in Canada, and connecting with potential collaboration partners such as EV fleet operators, resellers, manufacturing and chip design experts, clinical trial operators, forestry enterprises, companies working with digital contracts, etc. Barrie continues to be impressed with Estonia's achievements including its advanced digitalization of government, the entrepreneurial ecosystem, Tartu City's vision of becoming the European capital for self-driving vehicles, and much more.

The **Urban Robotics Foundation** is developing the Municipal Guidebook for Public-area Mobile Robots (PMRs). The background is that PMR devices are moving beyond food delivery and new solutions are able to perform tasks such as maintenance, logistics, and security. Municipalities and public facilities like zoos, airports and hospitals are exploring how to pilot test and deploy these technologies. The guidebook will address a wide range of questions to help move organizations across 5 stages of maturity with PMRs from discovery to preparation, initialization, deployment and expansion. For more information, please click [here](#). For information on member benefits, please click [here](#).



On June 21, 2023, **Invest Ottawa / Area X.O** together with **InDro Robotics** launched the *Drone and Advanced Robotic Testing and Training Facility* (DARTT). The test site comprises various zones for testing and demonstrating robots and drones, including water, sand, gravel, doors, stairs, confined spaces, rough ground, and a large cubic area with mesh on all sides for testing drones. Overall, it is a very impressive facility. DARTT will directly support researchers, innovators, companies, regulators, and their collaborators across many sectors to test, evaluate and demonstrate the performance, safety and impact of their drones and advanced robotic technologies.





International CAV News

As we reported in the February 2023 of *CAV Update*, the connected vehicle communication technology known as *Dedicated Short Range Communication* (DSRC) is pretty much dead and being phased out. The technology in ascendance is *Vehicle to Everything* (V2X) based on cellular technology known as C-V2X. Numerous automobile manufacturers, communication equipment makers and transportation organizations have backed C-V2X over DSRC. The **Federal Communications Commission** (FCC) is currently in the process of developing the framework for C-V2X. In the meantime, the FCC was petitioned by **Audi, Ford, Jaguar Land Rover**, Kapsch TrafficCom, Panasonic and others to issue waivers to allow operating C-V2X services in the upper 30 megahertz of the 5.9 GHz band until specific rules around C-V2X could be developed. The FCC has now granted the waivers to accelerate the deployment of C-V2X roadside units (RSUs) and on-board units (OBUs) ahead of the final rules. More information is at [this link](#).



A recent issue of **ITS International** magazine showcased three sidewalk delivery robot companies. The article titled *Watch your step: the sidewalk robots are here* featured **Kiwibot, Starship** and **Nuro**. While the article's author calls these autonomous robots *Personal delivery devices* (PDDs), they are better known in North America as *public-area mobile robots* (PMRs), or simply sidewalk robots. Some of the everyday challenges these small, automated robots face are detailed in the article. For example, the robots had difficulty contending with cracked sidewalks, sidewalk obstructions such as overgrown trees or bushes, inaccessible medians, short walk signals, or cars parked blocking the way. They also needed remote teleoperation to guide them across wide roads. The article can be viewed at [this link](#).




It is not a secret that to be in the AV business, you need very deep pockets. A case in point is **GM's** AV division – **Cruise**. In 2022, it was reported that Cruise was losing US\$5 million per day. Recent reports indicate that Cruise has lost US\$561 million in the first quarter of 2023. This works out at about US\$6.2 million per day for losses. Cruise's main operating base is in San Francisco where it offers commercial driverless *robotaxi* service to the public. These generate a small amount of revenue for Cruise; however, the revenues are dwarfed by the massive losses. In general, the investment in robotaxi and delivery operations has dropped 60 percent in 2022 compared to the previous year. Major AV operators (Waymo, Lyft and others) are slashing costs, laying off staff, and some have even closed altogether. Despite these, Cruise is bullish about its future and is predicting revenues of US\$1 billion by 2025 and US\$50 billion by 2030. More information is at [this link](#).



Stagecoach is one the largest public transportation companies in Britain. It has been in business for about 40 years, employs 24,000 people and operates 8,300 buses. In partnership with **Fusion Processing Ltd.**, **Alexander Dennis**, **Transport Scotland**, **Edinburgh Napier University** and **Bristol Robotics Lab**, Stagecoach has registered five full-size autonomous buses for its bus operations in eastern Scotland. Called the *CAVForth*, this new commercial service is expected to carry 10,000 passengers per week on a 22.5 Km route at speeds of up to 80Km/h. Some 18 sensors on the outside of the vehicle provide a 360-degree view of its surroundings, and send data to the computer many times a second. An AI model, trained on over 1 million miles (1.6 million kilometres) of similar data, drives the bus. The service started on May 15, 2023 and is expected to continue till 2025. At this time, the buses will have two members of staff on board: a *Safety Driver* in the driver's seat to monitor the technology, and another employee in the passenger compartment to take tickets and answer customers' questions. More information is at Stagecoach's site at [this link](#).





Oxford-based **Oxbotica** is one of the leading AV developers in the UK. Its roots are in **Oxford University's** Department of Engineering Science *Mobile Robotics Group*. Since its inception in 2015, the company has raised about US\$205 million in various funding rounds. In a recent announcement, the company shortened its name to **Oxa** and indicated partnerships with some leading companies such as **Google, Ocado, ZF, Goggo Network** and others. Oxa states that its autonomous technology can be used across multiple industries such as shared passenger transport, logistics, goods delivery, agriculture, energy and mining. More information is at [this link](#).



On May 23, 2023, the **City of San Francisco's Board of Supervisors** (its City Council) voted against a previously approved zoning change barring **Waymo** from converting a warehouse into a parking garage for its employees. The zoning change was strongly opposed by the **Teamsters Union** as well as the **Firefighters Union**. The Teamsters representative told the board that Waymo intends to get into the parcel delivery business using its driverless vehicles. If this was to happen, many of its union members who are parcel delivery drivers would lose their jobs. Waymo argued that it had no intention of getting into automated parcel delivery business. The union countered by showing a video of Waymo executives bragging about this issue and contradicting what Waymo representatives were saying at this tense meeting. For good measure, the Teamsters representative said *Nobody came to the microphone to support sending fleets of driverless vehicles onto city streets with the end goal of job elimination. The general public is not on the side of these AV companies – in San Francisco or anywhere else.* More information is at [this link](#).



UK-based **Imperium Drive Ltd.** is a developer of remote teleoperation systems for fleet operators. One of its offerings is the *Fetch* car rental system available in Milton Keynes. Once a customer rents a car through the *Fetch* app, the car is driven remotely from a control centre to the customer's location. Similarly, the vehicle can be driven back to another customer or back to the company's depot at the end of the rental. The company states that at present, its service is driverless and not autonomous. *Fetch* currently only has four cars in its fleet (all EVs), operating within a four-mile (6.4 Km) radius of central Milton Keynes. Other regional hubs are expected to follow, e.g., to nearby locations such as Luton (which hosts one the UK's busiest airports) and Northampton. The company claims *Fetch* is the first of its kind in the world. *Fetch* rental cars can be rented by the minute, by the hour or by the day on an unlimited basis. Fuel and insurance are included in the rental price. More information is at [this link](#). A short YouTube video





showing the remote operation in action can be viewed at [this link](#).

On May 21, 2023, a **Waymo** autonomous vehicle in San Francisco was involved in a collision with a small dog. The dog did not survive. At the time of collision, the Waymo vehicle was in autonomous mode and a safety driver was behind the wheel. The sensors on the AV detected the dog, however, neither the human driver nor the vehicle's autonomous systems had enough time to react. The incident was reported to the California *Department of Motor Vehicles* as required by the regulations. Waymo claims it has done extensive investigation and simulation and has determined that the fatal collision was unavoidable. Waymo's simulation was based on its in-house developed system known as *non-impaired, with eyes always on the conflict* (NIEON). Unlike a normal human driver who experiences fatigue and distraction, this system is designed to mimic a competent human driver who is always attentive, never gets tired or distracted, and is always ready to react. The NIEON system confirmed the unavoidability of this unfortunate incident. More information is at [this link](#). A copy of the actual collision report filed with the DMV can be viewed at [this link](#).



The **Port of Long Beach** in California is one of the major entry points into and out of United States. The port is home to the highly automated **Long Beach Container Terminal** (LBCT) where over 100 zero emissions *Automated Guided Vehicles* (AGVs) that are battery powered travel between the vessels and the stacking cranes moving the containers from ship to their destination on trucks and/or rail. Some of the cranes for moving the containers around are also automated. All this makes for a highly efficient movement of containers in and out of the terminal. LBCT claims a one-hour turn around for a truck arriving and leaving the port. A 3-minute YouTube clip provides a glimpse into the automation technologies at work at this port. The clip can be viewed at [this link](#).



**Long Beach
Container
Terminal**

The **Wall Street Journal's** technology group have produced a 7-minute YouTube video titled *Self-Driving Car Tech: What's Slowing It Down?* The video discusses issues such as *Where does self-driving technology currently stand?*, *Are changes needed on roads or highways for self-driving cars to be a reality?*, and other related issues. The video clip can be viewed at [this link](#).

THE WALL STREET JOURNAL.

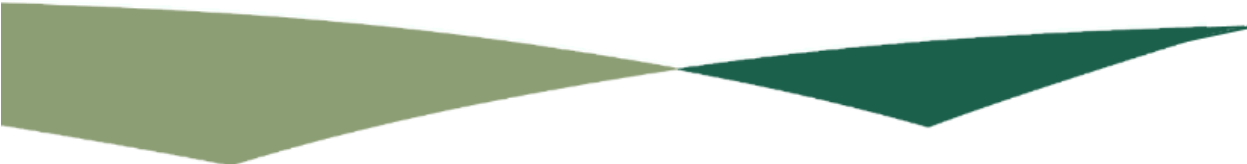
And finally, a novel research project at the UK's **University of Nottingham Human Factors Research Group** to assess the reaction of pedestrians to driverless cars had a driver disguised as a car seat to pretend the car was without a driver. The vehicle was equipped with external electronic signage to warn the pedestrians that the car was driverless. The signage known as *external human-machine interfaces* (eHMIs) - visual displays positioned on the front of the vehicle could display graphics and messages such as *expressive eyes and a face*, accompanied by short text-based language such as *"I have seen you"* or *"I am giving way"*. Actions of pedestrians were recorded on video for later analysis. It was found that the pedestrians reacted best to the explicit eyes eHMI. They not only captured the most visual attention, but it also received good ratings for trust and clarity as well as the highest preference by the 520 pedestrians that were part of this experiment. A short video of the vehicle with fake driver in action can be viewed at [this link](#). The academic paper titled *Ghost Busting: A Novel On-Road Exploration of External HMIs for Autonomous Vehicles* detailing this research can be viewed/downloaded at [this link](#).



CAVCOE Speakers' Bureau

CAVCOE provides speakers for many different types of events across Canada, the US and overseas. On the one hand, our keynotes and presentations have core messaging on the status of CAVs, their deployment scenarios, and the impact on business plans, government regulations, and almost all aspects of society. On the other hand, each presentation is customized for the audience and the time available.

To enquire about a speaker for your event, please write to speakers@cavcoe.com



Upcoming CAV-Related Events

July 4, 2023	Connected and Automated Mobility (CAM) Cohort engagement event ; hosted by the Centre for Connected and Autonomous Vehicles (CCAV), Innovate UK, and Innovate UK KTN, Cambridge, UK.
July 12-13, 2023	VTM Michigan Vehicle & Transportation Technology Innovation Meetings, Novi MI
September 20-21, 2023	ADAS & Autonomous Vehicle Technology Expo , Santa Clara CA
September 24-27, 2023	2023 Transportation Association of Canada (TAC) Conference & Exhibition , Ottawa, Ontario
September 27, 2023	TCXpo hosted by Invest Ottawa, at Area X.O, Ottawa, Canada
September 28, 2023	CAV Canada conference presented by Invest Ottawa and the Kanata North Business Association, at Area X.O, Ottawa, Canada
October 19-20, 2023	Last Mile Delivery Conference & Expo (LMD-2023), Las Vegas NV
November 7-10, 2023	Aerial Evolution Association of Canada Conference & Exhibition , Ottawa, Ontario



About CAV Update

CAV Update is a free, monthly summary of news and analysis in the world of connected and automated vehicles, and their impact on the private sector, government, and society.

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We welcome all comments; please send them [here](#)

CAVCOE (formerly the Canadian Automated Vehicles Centre of Excellence) advises the public and private sectors on planning for the arrival of self-driving vehicles.

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