

CAV Update

A monthly newsletter
on the CAV ecosystem

July 2021

From the Editors

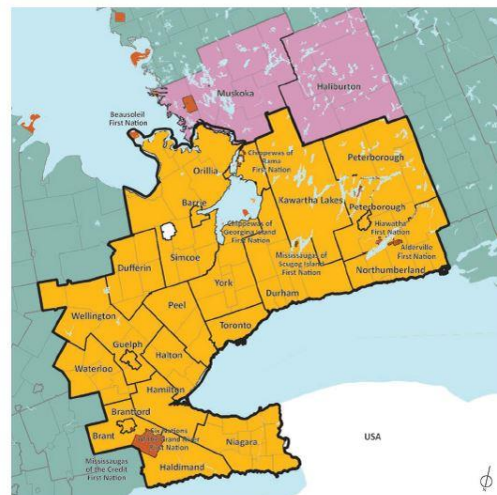
The trends in the overall CAV sector are positive and exciting. Further down in this newsletter, there are a couple of articles about the significant and ongoing flow of investment funds into many key companies. The non-passenger CAV sector is also looking very strong with key developments in categories from large transport trucks (also described later) to small robotic vehicles. As we have said before, there is a good possibility that the non-passenger CAV segment will deploy in greater numbers in this decade than the passenger CAV segment.

Regardless of the use case, they all require sensors of all kinds, reliable software, AI, and – in many cases – electric drive systems and the associated batteries. And for Canadian applications, they all need to be tested in our winter weather (more on that below).

Canadian CAV News

On June 29, 2021, the **Ministry of Transportation of Ontario (MTO)** released a 34-page discussion paper titled *Towards a Greater Golden Horseshoe Transportation Plan*. The Greater Golden Horseshoe (GHG) includes the Greater Toronto Area and adjacent municipalities (see map). GHG is the most densely populated and industrialized area in Canada with a population of nearly 8 million people.

Part of the discussion paper is devoted to newer transportation technologies such as electric cars as well as automated and connected vehicles. The public are invited to provide input for the draft plan. The deadline is August 28, 2021. More information about the plan is at [this link](#). The discussion paper can be viewed and/or downloaded at [this link](#).

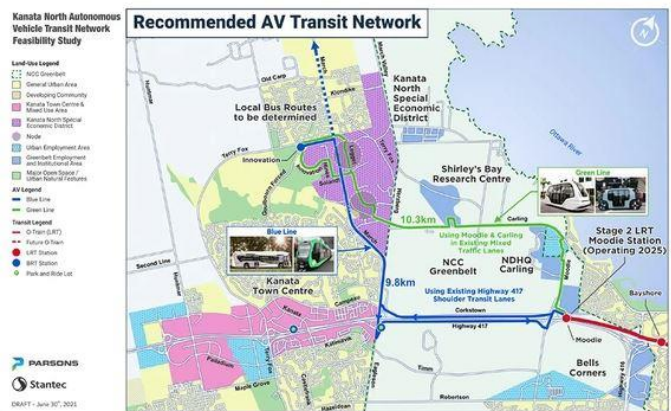


Greater Golden Horseshoe Study Area

On July 8, 2021, **Drone Delivery Canada (DDC)** announced that it had signed agreements with each of **Edmonton International Airport (EIA)**, **Apple Express Courier Ltd.** and **Ziing Final Mile Inc.** to deploy various DDC automated drones for cargo delivery in the vicinity of EIA. This will be DDC's first commercial contracts in Alberta and with courier companies, and the first one in Canada involving a major international airport. The contract duration is 12-months starting in Q3 2021. More information is at [this link](#).

A suburb of Ottawa – **Kanata North** – is home to Canada's largest technology park.

Approximately 24,000 people work at the technology park. Transportation to and from this important employment hub is on the mind of the City of Ottawa and the **Kanata North Business Association**. One solution being explored is the use of driverless electric shuttle buses to ferry the workers from a nearby planned LRT station to the park and back. KNBA has commissioned **Parsons** and **Stantec** to conduct a feasibility study into this concept along with cost estimates. It is envisioned that the AV transit shuttles will become part of the public transportation network in Ottawa. More information is at [this link](#).



From a humble beginning in Canada, **Embark Trucks** has emerged as a major player in the automated trucking sector in the U.S. It all started back in 2015 when *Varden Labs* was started by a couple of enterprising University of Waterloo students. Their first vehicle was a used electric golf cart that the students had turned into a self-driving machine. The students then moved to the U.S., went into stealth mode, and emerged as Embark Trucks garnering US\$117.1 million in venture funding (source: crunchbase.com). On June 23, 2021, it was announced that Embark Trucks will merge with a *Special-purpose Acquisition Company (SPAC)* called **Northern Genesis Acquisition Corp. II** in a deal worth US\$614 million. Canadian freight company, **Bison Transport**, has partnered with Embark to trial its technology in Canada. More information is at [this link](#).





Winter Weather Testing

As we mentioned in the June 2021 issue of *CAV Update*, we plan to include a regular section on winter weather testing of CAVs and other vehicles and systems. A key part of this ecosystem is the **Thompson, Manitoba** winter weather testing campus.

Several things are happening behind the scenes. Although it is premature to reveal the details, we can give you the following high-level preview of the three main areas.

First, there are ongoing discussions with organizations interested in conducting winter weather testing in Thompson. In the next issue of *CAV Update*, we expect to make a specific announcement about a new pilot project in Thompson to be conducted this winter.

Second, the Thompson winter weather testing ecosystem is being expanded and a range of stakeholders have indicated that they are very supportive. These stakeholders are from the local private and public sectors and academia. Everybody is on the same page, and they understand the importance of the synergies in winter weather testing. In the next issue of *CAV Update*, we will start to announce these partners.

Third, there is a strong testing ecosystem in Canada and Thompson plans to be an active participant. There will be partnerships with stakeholders across the country. The conversations have started, and -- as above -- we will start to publish the details in the next issue of *CAV Update*.

Car manufactures and other companies have conducted winter weather testing in Thompson, including BMW, Bombardier Aerospace, Ford, Honda, Hyundai, Jaguar Land Rover, Kia, Porsche, as well as heavy equipment makers and snowmobile manufacturers.

For additional information, a 2-page backgrounder on winter weather testing in Thompson is [here](#).

CAVCOE continues to take a key role in helping Thompson move this initiative forward. If you have any questions or would like more information, please write to winterweather@cavcoe.com

Most readers of *CAV Update* are probably not familiar with the fact that winter weather testing in Thompson MB got a big boost from the establishment of a jet engine test facility. The **GLACIER** test facility is operated by **MDS AeroTest** with a permanent staff in Thompson of 15 people. A very good backgrounder on the project is [here](#).



Photo: MDS AeroTest

Again, for more information, please write to winterweather@cavcoe.com

International CAV News

Some AV companies take existing vehicles and modify them heavily to make them self-driving. Some others design a self-driving vehicle from the ground up. One such company is Amazon-owned **Zoox** which is developing an advanced vehicle resembling a toaster on wheels and incorporating many safety features into it. Building a vehicle this way allows placement of safety-critical sensors where it matters most. It also pays more attention to those features that are specifically tailored to passengers, rather than drivers. The vehicle is designed to be bi-directional dispensing with U-turns and 3-point turns. It sports four-wheel steering allowing Zoox to control each wheel's speed, power, and direction independently. Zoox claims that its vehicle has numerous safety features which are detailed in a 26-page document. More information about the Zoox AV can be viewed at [this link](#). The safety features of the vehicle can be viewed/downloaded at the Zoox web site at [this link](#).



Staying with **Amazon**, media reports indicate that Amazon intends to place an order for 1,000 driverless trucks with the automated truck developer **Plus**. Furthermore, Amazon is reported to be interested in taking a 20% stake in the company. Since logistics is such a large part of Amazon's business, the company pays attention to developments in automated vehicles as well as electric vehicles. This has manifested itself in Amazon making a US\$500 million investment in AV developer **Aurora** and a US\$700 million in the electric vehicle maker **Rivian**. More details at [this link](#).



On June 29, 2021, The **National Highway Traffic Safety Administration (NHTSA)** issued a 37-page *Standing General Order* to all manufacturers and operators of vehicles equipped with SAE Level 2 advanced driver assistance systems (ADAS) or SAE Levels 3-5 automated driving systems (ADS) to report crashes to NHTSA. The purpose of this order is to collect information necessary for the agency to play its role in keeping roadways safe as the technology deployed on these roads continues to evolve. Under the new rules, if a vehicle was operating in an automated mode within 30 seconds of an incident happening, NHTSA must be notified if anyone is sent to a hospital, if a vehicle is towed away, if an air bag is deployed or if a pedestrian, bicyclist or other road user is involved. A detailed report must be provided to the agency within 10-days after the incident. More information at [this link](#). A copy of NHTSA's order can be downloaded/viewed at [this link](#).




Despite the cooling of expectations about AVs hitting the mass market anytime soon, substantial funds are still flowing into some of the more major players. In June 2021, **Waymo** and **Cruise** announced new funding rounds. Waymo got a cash injection of US\$2.5 billion while Cruise was granted a financial credit line of US\$5 billion by **GM Finance**. Companies and organizations investing in Waymo are Waymo's parent company **Alphabet** as well as **Andreessen Horowitz**, **AutoNation**, **Canada Pension Plan Investment Board**, **Fidelity Management & Research Company**, **Magna International**, **Mubadala Investment Company**, **Perry Creek Capital** and **Silver Lake**. Advisors for the Waymo funding were T. Rowe Price Associates, Temasek, and Tiger Global . More information about Waymo funding is at [this link](#) and about Cruise at [this link](#).

Staying with the venture fund flow into AV companies, 2021 has proven to be very good for AV companies working in the autonomous truck space. In the first half of 2021, investors pumped a record US\$5.6 billion into autonomous trucking companies such as **TuSimple, Plus, Embark** and **Locomotion**. A pair of reports by **Forbes** magazine and **axios.com** flesh out the funding for these companies. The Covid-19 pandemic has been helpful to these companies by highlighting the increased need for trucks to move goods around by customers ordering online. The long-standing driver shortage is another reason for the spurt in funding for autonomous truck companies. One company (**Locomotion**) is also engaged in developing truck platooning. The company expects the combined autonomy and platooning features to extend the hours a two-truck autonomous/platooned configuration can operate from 11 hours/day for a single truck/single driver to 20 hours/day for the two-truck operation. The Forbes article can be viewed at [this link](#) and the axios.com article at [this link](#).



Actuaries use mathematics, statistics, and financial theory to study uncertain future events, especially those of concern to the insurance industry. Like many other professions, the actuaries have automated vehicles on their radar from a risk assessment viewpoint. In June 2021, **The Society of Actuaries** published a 24-page report titled *Automated Vehicle Systems Outlook*. The report looks at the evolution of the auto industry over the past 100-years, its consolidation, how the automakers managed to push the liability issue from themselves to the driver, and how the advent of automated vehicles might push the liability issues back to manufacturers. The report can be viewed/downloaded at the society's site [this link](#).



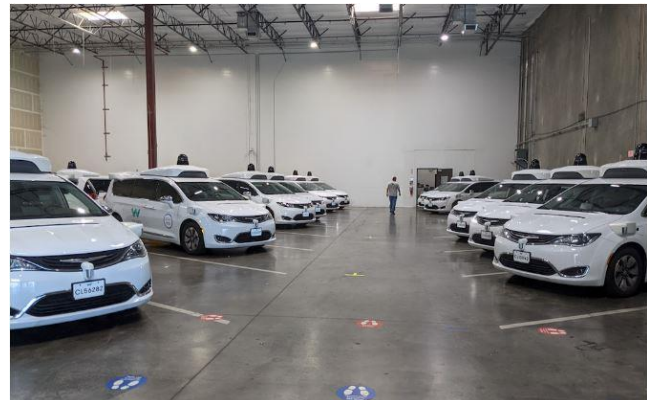


High accuracy simulation has always been a key component of CAV development. For every mile driven by an AV in the real-world, many more miles can be driven in a simulated world. Leading AV developer – **Waymo**, uses a sophisticated simulation system known as *Simulation City* to supplement data gathered by its fleet of over 600 AVs. This advanced system allows Waymo’s engineers to simulate something as small as raindrops or as complex as late afternoon solar glare. In the past, these situations have been known to confuse an autonomous vehicle’s perception hardware, which can make it difficult to read critical signage and traffic lights. The simulation software can also model common driving scenarios and safety-critical edge cases. All these features combined will enable Waymo to determine if its *Waymo Driver* automated driving system will work in the cities that it hasn’t driven -- testing that will be conducted before Waymo actually deploys its vehicles on the ground in that city. More information is at [this link](#).



Since October 2020, **Waymo One** driverless taxi service has been available to the public in a limited *Service Area* in **Chandler, Tempe and Mesa** in Arizona. The *Service Area* for the driverless operation is about 50 square miles.

Service Area for Waymo One with *Safety Drivers* is about twice that. Waymo has mapped the *Service Area* with very high accuracy to include major corridors, neighborhood drives, and shopping malls. This even extends to spots and rows in parking lots where passengers can specify where they would like to be



picked up and dropped off. The location precision prevents the Waymo robotaxi from picking up or dropping off passengers where it is illegal (as determined by the government) or unsafe (as decided by Waymo). Many reporters have taken rides in these driverless taxis. One of the latest is by a reporter working for **morningbrew.com**. He flew to Phoenix and over 2.5 days took 10 trips in a Waymo driverless taxi. A full account of his report can be viewed at [this link](#).

Low-speed Automated Driving (LSAD) systems have been around for a while. They usually operate on predefined routes for applications such as last-mile transportation, transport in commercial areas, business or university campus areas and other low-speed environments. Recognizing the global deployment and interest in LSADs, the

International Standards Organization (ISO) have developed a new standard (ISO 22737) titled *Intelligent transport systems – low-speed automated driving (LSAD) systems for predefined routes – performance requirements, system requirements and performance test procedure* which defines the

minimum safety and performance requirements for this class of automated driving systems. The development of this standard was led by the **Warwick Manufacturing Group (WGMG)**, part of the **University of Warwick** in the UK; and with expert input from Japan, USA, Canada, Australia, South Korea, China, Germany, France, the Netherlands, Hungary and the UK. More information is at [this link](#).



And finally, **visualcapitalist.com** has put together an informative infographic titled *Anticipating the Driverless Future of Vehicles* which with numbers and charts, sheds light on the current state of electric vehicle and autonomous vehicle development and investment. The infographic can be viewed at [this link](#).





Upcoming CAV-Related Events

- Sept 1-2, 2021 [Autonomous Vehicles 2021](#), Long Beach, California
- Sept 13-15, 2021 [MINExpo](#), Las Vegas, Nevada
- Sept 27-30, 2021 [IEEE VTC2021-Fall](#).
- Oct 4-5, 2021 [UK CAV Infrastructure Symposium](#), London, UK
- Oct 5-7, 2021 [Target 2035](#), Electric Mobility Canada's virtual conference
- Oct 11-12, 2021 [Auto Sensors 2021](#), Detroit MI
- Oct 11-15, 2021 [ITS World Congress](#), Hamburg, Germany
- Oct 18-19, 2021 [Australia and New Zealand Driverless Vehicle Initiative \(ADVI\) Summit](#), Sydney, Australia
- Nov 23-24, 2021 [Monetizing the Digital Car](#), live virtual event, UK
- Dec 1-2, 2021 [Autonomous Vehicles Europe 2021](#), Berlin, Germany
- Dec 14-17, 2021 [UITP Global Public Transport Summit](#); Melbourne, Australia
- Feb 27–Mar 2, 2022 Ontario Good Roads Association's conference; Fairmont Royal York, Toronto
- June 20-23, 2022 [HxGN LIVE Global](#), Las Vegas, Nevada
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About CAV Update

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

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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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