CAVCOE

CAV Update

A monthly newsletter on the CAV ecosystem

February 2023

From the Editors

There are two emerging technologies that can help Canada's supply chain be more efficient and competitive. One is automated freight vehicles, which we have mentioned multiple times in *CAV Update*. The other is blockchain, which is less well-known.

Blockchain is an approach to data management for goods at all stages in the supply chain. It allows stakeholders who are suppliers, manufacturers, transportation service providers, and recipients of these goods to cooperatively add to a dynamic record that is secure and decentralized.

The concept behind blockchain is not new. **IBM**, **FedEx** and others have investigated it and conducted pilots. From a technical perspective, blockchain uses an architecture that is very different to modern, centralized, server-based systems.

Because blockchain is so different, it can be challenging for people to get their heads around the many different aspects of blockchain. The good news is that IBM's *Blockchain for Dummies* is now in its 3rd edition; it has introduced blockchain to more than 68,000 readers. You can read it here.

If you want to learn more, especially about the use of blockchain in the supply chain, CAVCOE and its partners are developing a lunchtime webinar, and we will announce details in March. If you are on the mailing list for *CAV Update*, you will receive the announcement. If someone forwarded this copy to you, there is a subscribe link at the end of *CAV Update*.

Canadian CAV News

Aurora, Ontario based **Magna International** has acquired Stockholm-based **Veoneer** for a reported US$1.525 billion in cash. This is Magna's latest acquisition of an automotive tech company to bolster the technology arm of its operations. Veoneer's products include radars, lidars, thermal night vision cameras, vision systems, advanced driver assistance systems (ADAS) and autonomous driving software. Veoneer counts all major global automakers as its customers. Magna has approximately 170,000 employees worldwide, operates 345 manufacturing operations (in 28 countries) and makes 90 different products. The company has a market cap of $21 billion as of this writing. More information is on Magna's site at this link.

Swap Robotics of Kitchener ON has announced a $7 million USD seed round. The investment will help support Swap's position as clear industry leader in utility-scale solar robotics, such as automated vegetation clearing around large solar panel deployments.

The main investors are SOLV Energy, the USA's largest utility-scale solar builder, which is leading the round, as well as SOSV, Green Ventures, and other investors. The 20-year vision is to become an outdoor work robotics platform that enables dozens of use-cases in utility-scale solar use-cases and beyond. Together, this represents a $1 trillion+ total addressable market.

More information is here.

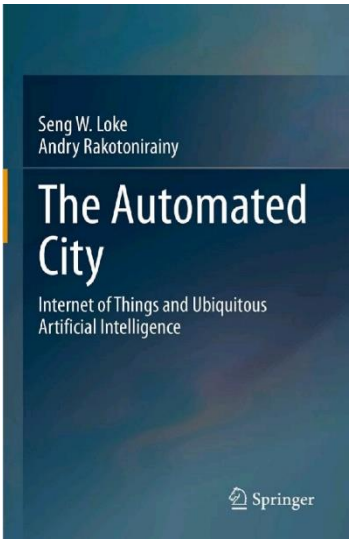
As we reported in the January 2023 edition of *CAV Update*, Toronto-based **Waabi** has annouced a partnership and funding from a major truck manufacturer. At the time, Waabi declined to disclose who the new partner/funder was. It has now been revealed that it is the **Volvo Group Venture Capital**. The size of the investment is reported to be in the single-digit millions of dollars. The **Volvo Group** has its own AV development arm called the *Volvo Autonomous Solutions* (VAS). In addition to Waabi, VAS has entered into several agreements with other AV startups to leverage their technology and know-how into its current and future commercial trucks. More information is at this link.

Innovative research at the **University of Alberta**'s Engineering Faculty is exploring the concept of *shared perception*; where an automated vehicle's onboard sensors are supplemented by other sensors mounted on nearby structures on the side of the roadway such as streetlights, signs, buildings or other structures. The idea is to give the AV a better understanding of its surroundings and to identify people or objects that it cannot sense with its own onboard sensors. This scheme prepares the AV to better plan and react to what is happening on the road ahead. For example, If a child chases a ball across a residential street, a remote sensor could detect that movement before the car enters the scene from as far away as 100 metres. The U of A team is also working with **Telus** to explore how its 5G high-speed and low latency networks can be leveraged for this research and autonomous driving. More information is on U of A's site at this link.

Ottawa-based **Sensor Cortek** has developed advanced radar and lidar technologies to give automated vehicles a clearer view of what is ahead. Many AV developers rely heavily on cameras to capture and analyze what is visible in the AV's field of view. While this works fine under good weather conditions, it is a different story when the visibility is poor due to weather, lighting, dirt on the cameras and other reasons. Under these conditions, the technologies developed by Sensor Cortek come into play to supplement or replace the degraded vision systems. More information about the company's products and technologies is at this link. A short YouTube video of the technology in action can be viewed at this link.

International CAV News

A book titled *The Automated City: Internet of Things and Ubiquitous Artificial Intelligence* delves into the impact of automated vehicles, urban robots (12 use-cases and more) and urban drones in many aspects of city life and operation. This is all in the context of *Smart and Data-Centric* cities. The book considers broader perspectives for future cities including aspirational visions of cities, transportation, new business models, socio-technological challenges and large scale cooperating autonomous systems in the city. The book is available on Amazon (Canada) for $86.76. More information about the book on Amazon's site is at this link.



Data Centres are often in the news for being big consumers of electric power and contributing to global warming and climate change. A recent study titled *Data Centers on Wheels, Emissions from Computing Onboard Autonomous Vehicles* by the **Massachusetts Institute of Technology** (MIT) focuses on greenhouse gas emissions caused by the powerful onboard computers of autonomous vehicles of the future. The study assumes that by 2050; there could be one billion AVs on the road network. It then makes some assumptions on the pace of advancement in computer technology to determine how much emissions will be produced by these one billion AVs. The researchers built their model around four variables: the number of vehicles in the global fleet, the power of each computer on each vehicle, the hours driven by each vehicle, and the amount of greenhouse gases emitted per unit of electricity produced. The study suggests that to keep emissions in check, the computer technology's efficiency must double about every 1.1 years. More information is at this link. The 13-page MIT paper can be viewed/downloaded at this link.

Massachusetts Institute of Technology

Nature is a British weekly scientific journal. A recent article titled *The politics of autonomous vehicles* in this magazine delves deep into the entire concept of autonomous vehicles from a *Social Sciences and Humanities* (SSH) point of view. Admittedly, most media articles on AVs focus on technical aspects and the potential changes to the transportation system. Looking at the development of AVs and how they may impact the society through an SSH lens; brings fresh perspectives on the subject. It is stated

nature

that so far, the discussions on AVs has been dominated by science, engineering and narrow questions of ethics such as the oft cited *trolley problem*. It suggests that there is a need to draw attention to the old questions of politics: Who wins? Who loses? Who decides? Who pays? The article is fairly long and cites numerous references. The Nature article can be viewed at this link.

Cruise is the automated driving arm of **General Motors** (GM). Cruise has been very active in San Francisco for both testing its AVs as well as carrying fare paying passengers in its electric *Chevrolet Bolt* automated vehicles. The Bolts were initially manned by a *Safety Driver* but are increasingly driverless. At present Cruise has over 100 AVs active in San Francisco. The Chevy Bolts have the conventional controls such as a steering wheel, brake and accelators pedals. By contrast, the purpose-built *Origin* robotaxi vehicle designed and built by Cruise has no conventional controls. On February 3, 2023, Cruise announced that it has received approval from California's *Department of Motor Vehicles* to test the *Origin* robotaxis on San Francisco public roads without anyone present in the *Origin* vehicle. Cruise needs to obtain other approvals before it can carry fare paying passengers in these robotaxis. More information is at this link.

Staying with **Cruise** and San Francisco, Cruise's automated vehicles have caused some traffic tie ups by all converging at a certain location or blocking lanes for long periods. San Francisco officials are not happy about this and have documented 92 such cases between May and December 2022. One of the latest occurred on January 21, 2023, when a Cruise driverless vehicle entered an active fire scene attended to by the **San Francisco Fire Department** (SFFD). The Cruise vehicle appeared to be intent on driving over the fire hose on the road. This is a violation of San Francisco regulations. To stop the Cruise vehicle from driving over the hose, the fire crew resorted to first stopping in front of the vehicle and then breaking its front window. This made the car stop. Cruise personnel then attended to the scene and drove the errant vehicle away. This is the second occurrence of this type of incident between SFFD and a Cruise driverless vehicle. **Forbes** magazine detailed this incident and made some suggestions for mitigating similar emergency situations in the future. The Forbes article can be viewed at this link.

Leading AV developer **Mobileye** has proposed alternative levels of automation as opposed to the well-known **SAE J3016** known as *Recommended Practice: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles*. These are more commonly known as SAE automation levels 0 to 5. These levels were first published by SAE in 2014 and have gone through some updates since. Mobileye believes the SAE definitions are ambiguous and not in tune with the current state-of-the-art. Mobileye proposes new levels of autonomy based on four criteria: (i) Eyes-on/Eyes-off, (ii) Hands-on/Hands-off, (iii) Driver versus No-driver, and (iv) Minimum Risk Maneuver (MRM) requirement, i.e. when an AV makes a decision to pull over and stop. These four criteria approximate SAE levels 0 to 5 and have the advantage of more clarity according to Mobileye. Furthermore, Mobileye includes some of the more common ADAS features such as *Autonomous Emergency Braking* (AEB) and *Lane Keep Assist* (LKA) in its definitions. Details of Mobileye's proposal are at this link.

An intriguing concept from Europe presents an alternative to the old idea of delivering goods to customers by autonomous drones. The new idea is to use pilotless aircraft to carry cargo from airfield to airfield as opposed to dropping parcels from a drone at a customer's residence – which is what Amazon has been trying to perfect over the past 10-years without much success. The Bulgaria-based company called **Dronamics** hopes to establish Europe's first *drone cargo airline*. A large German logistics company (**Hellmann**) has backed the concept and is hoping to start using the cargo drones in 2023. Dronamics and Hellmann state that they never believed in Amazon's concept of drone delivery to homes. They believe using smaller airfields for cargo drone operation makes more sense. They indicate that Europe has 3,000 such airfields and with an operating range of 2,500 Km, the full-size Dronamics aircraft can put the whole of Western Europe within range of any EU-based cargo hub. More details are at this link.

And finally, and after a very long time, reality seems to have set in regarding the practicality of large-scale deployment of *Dedicated Short Range Communication* (DSRC) for connected vehicle applications such as *Vehicle to Everything* (V2X). V2X allows communication between vehicles, infrastructure, and other road users such as pedestrians and bicyclists. Furthermore, it provides drivers with crucial warnings necessary to improve safety. In a recent development, **ITS America** and nine other U.S. transportation organisations

have jointly backed the *Cellular Vehicle to Everything* (C-V2X) technology over DSRC. In another development, the **U.S. Department of Transportation** (USDoT) recently held a *V2X Summit* in which it committed to the development of a nationwide V2X Deployment Plan. More information is 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

Mar 15, 2023	CAM Innovators Event 2023, hosted by Zenzic and held at IET Place, London, UK.
Mar 22-23, 2023	Autonomy Mobility World Expo 2023, Paris, France
Mar 28, 2023	Globe Drive Urban Mobility Summit. A free, virtual summit by the Globe & Mail.
June 4-7, 2023	UITP Global Public Transport Summit, Barcelona, Spain
June 7-8, 2023	AutoTech: Detroit, Suburban Collection Showplace, Novi MI, USA
June 12-15, 2023	Hexagon | AutonomouStuff News, Autonomy & Positioning Reality Summit, HxGN LIVE Global 2023, Las Vegas NV
June 20-22, 2023	Autonomous Ship Expo and Conference, Amsterdam, The Netherlands
June 21-23, 2023	ADAS & Autonomous Vehicle Technology Expo, Stuttgart, Germany
July 12-13, 2023	VTM Michigan Vehicle & Transportation Technology Innovation Meetings, Novi MI

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.

Chief Editor: Ahmad Radmanesh
Contributors to this issue: Barrie Kirk, Keith Fagan, and Donna Elliott

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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.*

300 Earl Grey Drive, Suite 222, Ottawa ON K2T 1C1, Canada.
info@cavcoe.com *www.cavcoe.com*