Autonomy on the roads: Intelligent Transportation Systems

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Intelligent Transportation Systems (ITS) have been used extensively across Canada for decades. ITS make use of various technological devices – such as computers and electronic sensors – to reduce traffic congestion, fuel consumption and improve safety on our highways. Despite the pervasiveness of ITS on our roads, the consequences of their development and increased presence in future transportation systems remain worthy of examination. A recent update to the ITS architecture used in Canada and the U.S. is summarized below.

ITS today

Overview

ITS have already revolutionized the way Canadians travel on a daily basis. There are countless examples, including:

- Automated toll collection;
- In-road sensors;
- Real-time parking management;
- Red light cameras; and
- Automated braking and steering.[1]

Ultimately, the goal of ITS is simply to assist transportation network users with navigation in a cost effective and convenient way, while optimizing safety.

Potential problems

With continued advancements in ITS, there are persisting liability issues, which are almost unavoidable. These include – but are not limited to – the following:

- Failing to operate as designed;
- Faulty manufacturing and system design; and
- Failing to monitor and update these systems, as needed.[2]

In addition, there are risks that will result if ITS do not communicate properly with each other within the transportation network. ITS may also pose threats to privacy, particularly because of their ability to track movements, identify patterns and monitor communications without the knowledge of those being tracked.[3] ITS can also be used to collect and store personal information, which can then be used to create individual travel profiles.[4]

ITS Architecture for Canada

In Canada, there is a tool that has been implemented nation-wide for over two decades: ITS Architecture for Canada (ITS Architecture Canada). Its purpose is to provide "a common framework for planning, defining, and integrating intelligent transportation systems."[5] In 2000, ITS Architecture Canada was developed by Transport Canada, based upon the Architecture Reference for Cooperative and Intelligent Transportation from the U.S., or "U.S. ARC-IT". ITS Architecture Canada is designed, therefore, to provide the transportation industry with a framework that does not conflict with the U.S. ARC-IT.

The U.S. is a global leader in ITS, having valued this market at US $26.58 billion in 2019, with its Compound Annual Growth Rate projected to increase by 5.8 per cent from 2020 to 2027.[6] In late 2020, ITS Architecture Canada underwent amendments to remain fully aligned with the latest update of U.S. ARC-IT in the U.S., Version 9.0. Version 9.0 of U.S. ARC-IT includes some significant enhancements, inspired by research results and stakeholder input. These include:

- Solutions to information exchanges that are more detailed than in prior versions;
- New support for mapping between physical and functional objects; and
- Understanding the relationships between the environment and enterprises that own, operate and maintain the roadway and vehicles.[7]

Version 3.1 is the most recent update for ITS Architecture Canada. We expect to see further updates in Canada, particularly as the U.S. model continues to evolve.

What's to come

The future of transportation

The future of transportation will undoubtedly include Smart Transportation, which involves a combination of ITS with 5G networks and Internet-of-things (IoT) technologies, allowing for even more efficient and effective intelligent transportation networks. For example, the U.S. Department of Transportation has been closely monitoring the implementation of connected vehicle technology through a variety of pilot projects in Florida, Wyoming and New York State, in an effort to make automobile transportation safer, more efficient and cost effective. Similar Canadian pilot projects include ones in the four most populous provinces: Ontario, Quebec, British Columbia, and Alberta. On March 23, 2021, the National Research Council of Canada released this report on the first electric low-speed automated shuttle trial of its kind in Ontario, involving multiple stakeholders. The goal of this project was to test and evaluate the Low-Speed Automated Shuttle (LSAS) as a potential sustainable transit solution, to help with integrating this into future transportation systems across Canada.

ITS have been deployed in commercial trucking as well, with the number of pilot projects growing each year. For example, Loblaw and Canadian Tire have recently invested in projects that will automate a small portion of their truck fleet.[8] With the growing shortage of commercial truck drivers in North America, more projects are likely to be announced in the coming months.

In the ocean shipping world – which does not depend on the ITS Architecture for road applications – consideration must nevertheless be given to factors such as compatibility and ability to communicate with the ITS used in other modes of transport. The other aspects of the transportation network, including terminals, ports and warehouses, are experiencing their own evolution into the broader application of intelligent systems, and they stand between the ships and the commercial trucks and rail. If all parts of the system do not fit together seamlessly, the growth of intelligent transportation systems throughout the network will no doubt experience more bumps in the road than may be necessary.

All of the above requires ITS to be effective, compatible and adopted into common usage across borders in order to be most beneficial, and it is essential to the smart growth of intelligent transportation networks.

[1] Jamie Lederman et. al, "Fault-y_Reasoning: Navigating the Liability Terrain in Intelligent Transportation Systems" (2016) Public Works Management & Policy at 21(1) 5-27; Alndra Labs, "What is Intelligent transportation system (ITS): Applications and Examples", accessed April 23, 2021.

[2] Lederman, *Ibid.*

[3] Barry B Sookman, *Computer, Internet and Electronic Commerce Law*, (Toronto: Thomson Reuters Canada, 1988, loose-leaf), Preface. Online: WestlawNext Canada.

[4] *Ibid.*

[5] ITS Architecture for Canada, accessed April 23, 2021.

[6] Intelligent Transportation System Market Size Report, 2020-2027(grandviewresearch.com).

[7] What's New in ARC-IT, accessed April 23, 2021.

[8] Betakit, Nuport Robotics Receives $1 Million from Ontario for Autonomous Trucking Project with Canadian Tire.

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