



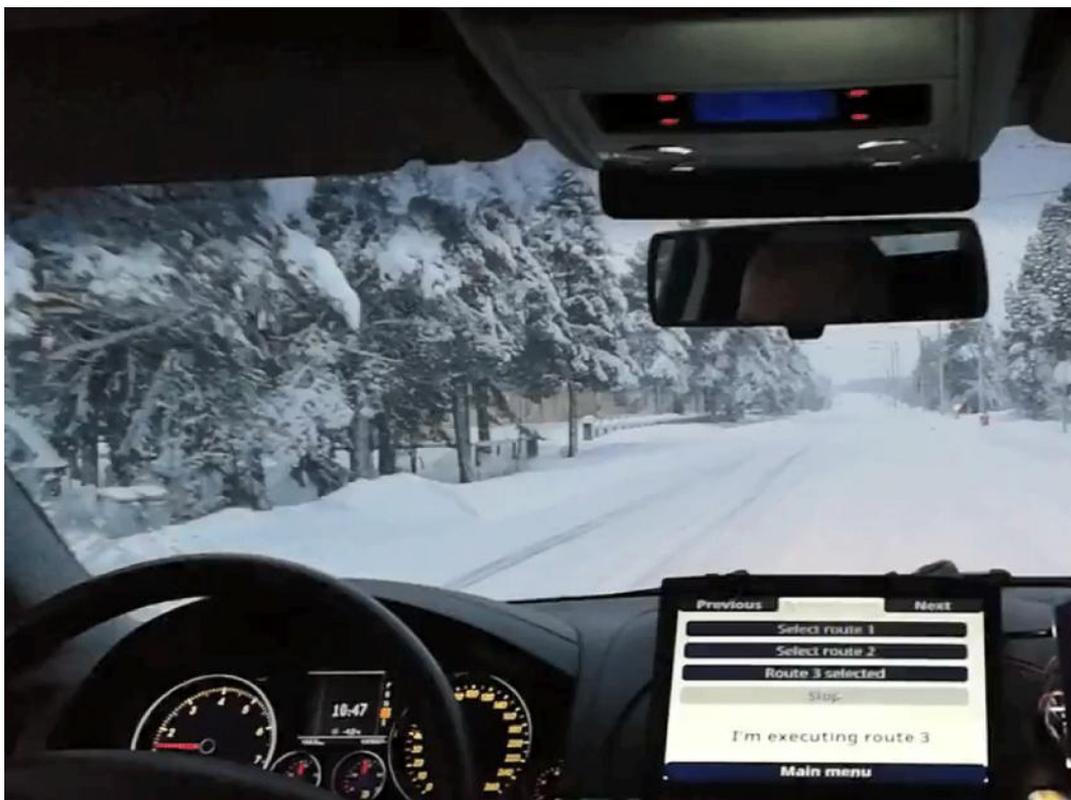
## Way north of 60: How autonomous car testing above the Arctic Circle could help Canada

Finland is figuring out the limitations of current driverless technology on the icy, snow-covered E8 highway, something Canada has been keen to do



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**Martti, an autonomous vehicle developed by the VTT Technical Research Centre of Finland, completed what is believed to be the first fully autonomous drive on a snow-covered public road in December. CREDIT: SUPPLIED BY VTT TECHNICAL RESEARCH CENTRE OF FINLAND.**

HELSINKI — At first glance, the online video posted by the VTT Technical Research Centre of Finland late last year merely shows an all-too-familiar for Canadians: a car driving slowly down a slightly bumpy, snow-covered road in the middle of winter.

It's only when the car makes a right-hand turn do you realize there are no hands on the steering wheel. This autonomous vehicle is turning on its own, completing what is believed to have been the first fully autonomous drive on a snowy road.

The road is actually a 10-kilometre stretch of a remote-but-public highway located in the Arctic Circle — and one that is often dark, and covered in ice and snow for at least six months a year — that the Finnish government in 2016 opened to autonomous vehicle testing.

Called the Aurora Project, the government allows anyone to test autonomous vehicle technology on the challenging E8 highway that stretches across the border into Norway (testing on the Norwegian side is done through the Borealis Project, managed by the Norwegian Public Road Administration.) The Finnish government spent nearly \$8 million (five million euros) on developing the project.

Even though the safety of autonomous vehicle testing has been called into question after a recent fatal crash involving a self-driving Uber Technologies Inc. vehicle that left one woman dead in Tempe, Ariz., the Aurora Project continues at full speed.



Cars go by the scene near where a pedestrian was stuck by an Uber vehicle in autonomous mode on March 18 in Tempe, Ariz. The vehicle was in autonomous mode with an operator behind the wheel when a woman walking outside of a crosswalk was hit. Uber suspended all of its self-driving testing Monday after what is believed to be the first fatal pedestrian crash involving the vehicles. CHRIS CARLSON/THE ASSOCIATED PRESS  
Alina Koskela, the Transport Ministry manager in charge of the Finnish project, said she was slightly bothered by the rapid autonomous vehicle development happening in the United States.

“The testing in Silicon Valley and Arizona, it’s interesting, but something very different from the environment we have here,” Koskela said in early March, pointing out the temperature outside her office had plummeted to -20 C (somewhat abnormal, even by Helsinki’s cold standards) due to a Siberian cold front.

“And we thought, if we don’t do this kind of development now — looking at how automated vehicles could work in our harsh environments — then we’re going to miss out on the benefits of automated driving, things like traffic safety improvement, improved efficiencies and bringing down emissions.”

Of course, safety, or lack thereof, is what often grabs the public’s attention.

Tempe Police last week released video footage of the moments leading up to when the self-driving car struck the woman.



**This image made from video, March 18, of a mounted camera provided by the Tempe Police Department shows an exterior view moments before an Uber SUV in autonomous mode hit a woman in Tempe, Ariz. Video of the deadly self-driving vehicle crash in suburban Phoenix shows the pedestrian walking from a darkened area onto a street just moments before the crash. TEMP POLICE DEPARTMENT**

University of South Carolina professor Bryant Walker Smith, who studies the legal aspects of autonomous driving, said the video evidence “strongly suggests a failure by Uber’s automated driving system and a lack of due care by Uber’s driver (and by the victim).”

He added the vehicle’s sensors should “absolutely should have detected her and classified her as something other than a stationary object.”

Among the questions raised by the video while the investigation continues: Why didn’t the vehicle’s Lidar and radar sensors pick up the woman crossing the road? And, if the technology can seemingly fail on a clear, paved road on a warm evening in Arizona, what will happen when an autonomous vehicle is steering through icy roads and blustery, whiteout conditions?

Answering those questions is the main reason why the Aurora Project was launched in the first place.



This image made from video, March 18, of a mounted camera provided by the Tempe Police Department shows an the human backup driver of an Uber SUV in autonomous mode moments before the vehicle hit and killed a woman in Tempe, Ariz. TEMPE POLICE DEPARTMENT

“Current technology is known to have limitations in challenging and varying conditions, which includes heavy rain, fog, dark enclosed spaces, slippery surfaces, and snowfall,” Koskela said. “Regardless of the (Uber) incident, we know that winter testing remains a very important development to make automated driving possible for people living in more wintry regions throughout the world.”

The Aurora Project is certainly not the only winter autonomous vehicle testing being done in the world, though many experts say Canada is lagging behind in both developing AV tests and adopting related policies.

A report released in January by the Information and Communications Technology Council (ICTC) said more work is needed to bring Canada near the level of the world’s key AV developers.

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A Senate report released in January said much the same thing, pointing out that federal leadership is required to prepare for the change that the technology will bring. It also said investment in road infrastructure that incorporates connectivity will be needed to maximize AV potential.

An autonomous vehicle testing zone in Stratford, Ont., was put in place in November as automakers have been keen to test their self-driving cars in harsher conditions. Similar testing is also being done in Michigan.

But what makes the Aurora Project unique, Koskela said, is that the E8 highway, which is heavily used by transport trucks bringing fresh Norwegian salmon to Helsinki, has been developed into a so-called “intelligent road.”



To optimize testing — and provide more information about driving on the highway — the Finnish government has installed various sensors in the road that measure a wide range of things, including vibration, weight, pressure, acceleration and surface slipperiness.

The extra data may not necessarily make the road safer, but it provides researchers with much more information that can help in developing autonomous vehicle technology.

In November, VTT’s autonomous vehicle, named Martti, a Volkswagen Touareg equipped with three laser scanners, reached a speed of 40 km/h on the snow-covered E8 highway when no road markings were visible.

VTT project manager Matti Kutila believes Martti likely could have reached higher speeds, but the test was programmed not to exceed 40 km/h.

The Finnish government said it has not made any changes to Aurora’s testing program in light of the Uber fatality, but it will follow the investigation in Arizona and make adjustments “if something significant comes up.”

Koskela said one thing the Uber incident has highlighted is the importance of being transparent throughout the development of autonomous vehicle technologies.

“AV developers need to clearly explain what they’re doing, why they believe it is reasonably safe, and why we as authorities should believe them,” Koskela said in an email.

“It is important to be upfront about the potential challenges and failures, and testing organizations should actively aim to mitigate the harms caused by any failures.”

Experts contend that fully autonomous vehicles are still decades away from hitting the roads, but Koskela said snow testing needs to be a priority now in order for adoption to be seamless in the future.

“It’s important for us to show that autonomous vehicles will be resilient to different kind of conditions, whether it’s heavy rain, snow or ice,” she said. “That is the core question if we really want to see the market changing and people accepting, using, and buying automated vehicles.”

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**An autonomous vehicle travels Finland’s E8 highway. Winter testing of driverless vehicles is critical to the technology’s future success. CREDIT: SUPPLIED BY VTT TECHNICAL RESEARCH CENTRE OF FINLAND.**