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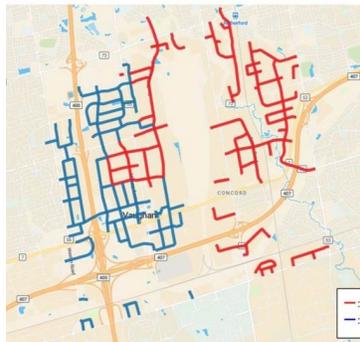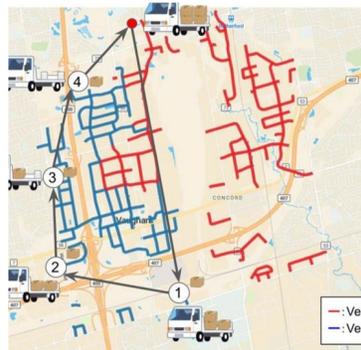
Fleet Management Innovation

Demonstration Project: Snowplow and Salting Prioritization

Innovator: BluWave-ai in Partnership with Groovenauts Inc.
Product: BluWave's EV Fleet Orchestrator & Groovenaut's Magellan Blocks
Demonstration Period: June 18 – September 25, 2025

Executive Summary

The City of Vaughan is testing leading-edge technology to evaluate how innovative solutions can address real-world mobility and transportation challenges.

Through the Ontario Vehicle Innovation Network (OVIN) Demonstration Zone, BluWave-ai partnered with Groovenauts Inc. to digitally test their EV Fleet Orchestrator platform that aims to optimize snowplow and salting routes across the City of Vaughan.

This demonstration was completed in partnership with **Vaughan's Transportation and Fleet Management Services** team. The OVIN Demonstration Zone is an initiative that is part of Vaughan's Transportation Innovation Program (TIP), which aims to test smart mobility solutions in real-world environments.

The Innovator

BluWave Inc. (operating as *BluWave-ai)* is a Canadian technology company applying artificial intelligence (AI), edge computing, and cloud-based optimization to solve energy and mobility problems. Its mission is to accelerate the adoption of renewable energy and electrification through data-driven decision-making for utilities, fleets, and municipalities.

BluWave-ai's EV Fleet Orchestrator platform uses AI-enabled models to predict energy generation and grid load, optimizing the operation of energy storage systems, electric vehicles (EVs), and distributed energy resources (DERs). This technology is also applicable to complex logistical challenges such as snowplow routing.

Groovenauts Inc., based in Japan, specializes in combinatorial optimization using AI and quantum computing. Their platform, Magellan Blocks, was used in this demonstration to simulate optimized snowplow and salting routes using Vaughan's Geographic Information System (GIS) data.

Demonstration Overview

The demonstration evaluated how AI-powered management tools could improve snow maintenance response times and provide insights into logistical challenges during weather events. Using real-world data, the Magellan Blocks generated multiple potential routes aimed at reducing travel time and balancing workloads for snowplows and salters.

The simulation focused on three key areas within Vaughan's internal winter maintenance routes, including Portage Parkway, Vaughan Metropolitan Centre, and Pioneer Village.

Key Outcomes

The Magellan Blocks platform successfully generated multiple potential routes that could optimize the operation time and distance travelled by snowplows and salters during weather events. The model considered several operational constraints that were prioritized by the project's Project Advisory Team.

Simulated models were produced based on these constraints.

Key Outcomes included:

- BluWave and Groovenauts produced a simulated model to optimize route paths for selected three internal winter maintenance routes.
- The system processed and optimized 133 kilometers across three routes
- BluWave and Groovenauts produced a simulated model that demonstrated a potential 27% improvement of overall delivery time and more balance route execution time than current operations.
- City confirmed the feasibility of using a model to provide data for reclassifying primary roads to secondary to meet service levels with fewer vehicles.
- The model produced a simulated route that reduced salt usage, which may lead to environmental improvements in the City's watershed.
- The model had capabilities to weight constraints to optimize routes, such as avoiding left hand turns.
- The Project Advisory Team provided insights to BluWave on specific municipal standards and best practices for product improvement and model development.
- The demonstration provided the City with insights on how simulated models and quantum computing power could be potentially incorporated into operations, and allowed for an understanding about how it affects our best practices.

Capital savings produced from model condition for the following resources:
- Reduced vehicle requirements.
- Salt usage optimization could save the City up to $150,000 in material costs and $95,000 in operating costs annually, with environmental benefits to the watershed.
- The two-vehicle implementation demonstrated potential capital savings of up to $800,000 over a ten-year period through reduced fleet requirements.

Simulation model results showed opportunities for optimization in operational efficiencies for:
- Minimized turns throughout route delivery
- Reduced average service time and improved workload balance across vehicles.
- Reduced salt usage, which may lead to environmental improvements in the City's watershed.
- Balanced route execution times (±6.8% to 11.1%) were achieved in simulations, compared to ±35% in current operations.

Participants benefited from the project collaboration:
- The Project Advisory Team provided insights to BluWave-ai on municipal operations for routine winter maintenance
- The demonstration provided the City with insights on how simulation models could be potentially incorporated into operations, and allowed for an understanding about how it affects our best practices

At the time of the demonstration, additional data is needed to validate improvements in service levels and route execution feasibility.

Exclusions

Demonstration projects through the OVIN Demonstration Zone are temporary and limited in scope and duration due to the time constraints of the OVIN Demonstration Zone program. The project evaluated key features as determined by the Project Advisory Team.

The demonstration was conducted virtually and did not include real-time route execution.

Obstacles

As the demonstration project is executed in a limited time, operational feasibility of the optimized routes was not validated.

Conclusions and Recommendations

The demonstration confirmed the potential of BluWave-ai's EV Fleet Orchestrator and Groovenaut's Magellan Blocks platforms to provide alternative and optimized snowplowing and salting routes.

A key insight from this project is the value of high-powered and quantum computing in solving complex logistical challenges. By leveraging advanced algorithms capable of processing diverse inputs – such as GIS data, operational constraints, and weather conditions – BluWave-ai and Groovenauts demonstrated how AI and quantum-assisted optimization can generate actionable solutions for fleet operations. This approach enables municipalities to explore multiple routing scenarios rapidly, balancing efficiency, cost, and environmental impact.

Further work is still required to validate the routes produced by the EV Fleet Orchestrator, as the data is based on simulated models. Live trials and operational feedback will be essential to confirm the feasibility and effectiveness of the proposed optimizations.

Demonstration Zone Project Profiles: www.vaughanbusiness.ca/demozone/projects