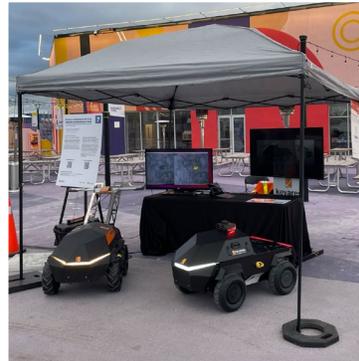# 2025

Inspection and Maintenance Robot

Demonstration Project: Autonomous Grass Cutting

Innovator: Kevares Inc.
Product: Autonomous Lawn-Mowing System
Demonstration Period: June 24, 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, Kevares tested their automated grass-cutting technology. The demonstration aimed to assess how the technology could support routine turf maintenance, reduce operational demands, and contribute to more sustainable and efficient park operations.

This demonstration was completed in partnership with **Vaughan's Public Works (Parks, Forestry and Horticulture Operations)** 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

Kevares Inc. *(operating as Kevares)* is a company that has been in business for more than five years and is creating the future of property maintenance services with autonomous robots that are fully electric, with swappable batteries and service modules (or pods, as they call them). These modular pods enable year-round operation and allow for different tasks to be performed by the same autonomous robot in a single day, simply by hitching different towed pods or attaching service modules to the front and trunk of our robotic system.

Kevares designs both the proprietary hardware and the artificial intelligence-powered software that powers its autonomous robots, offering flexible, multi-season maintenance solutions for high-circulation environments such as sidewalks, bike lanes, parks, and parking lots. The robots are equipped with embedded collision and obstacle avoidance systems, optimized for safe operation in shared public spaces, including sidewalks, cycle lanes, parking lots, and lawn fields. Their solutions are designed for versatile applications of commercial and municipal property maintenance tasks.

The platform supports interchangeable service pods, allowing for scalable deployment across seasons and service types. Kevares' autonomous services are designed to help municipalities do more with less – reducing the need for manual labour in routine or hazardous tasks, lowering carbon emissions through electric operation, and freeing up staff to be allocated to more critical work. Kevares' autonomous services are offered under a "Robot as a Service" model for a flat monthly fee, enabling municipalities to access a diverse range of robotic functions without upfront capital investment. These services include pavement inspections, snow clearance, salting, lawn mowing, and other routine or seasonal maintenance tasks. By reducing the need for manual labour in routine or hazardous tasks, lowering carbon emissions through electric operation, and freeing up staff to be allocated to more critical work, Kevares helps municipalities do more with less. The system is designed to operate reliably in high-traffic areas, providing a safe and efficient alternative to traditional maintenance methods.

Demonstration Overview

The demonstration evaluated Kevares' autonomous grass mowing system in a controlled, real-world municipal setting. Conducted within an enclosed soccer field at Vaughan Grove Sports Park, the robot performed grass cutting without human intervention. The system operates within

a GPS-defined geofence, which is programmed by teaching the robot the field boundaries. Once configured, the robot autonomously generated mowing paths and navigated the area. For safe operation, the robot was developed with onboard sensors for obstacle detection and collision avoidance.

While the platform is designed for a three-pod formation to maximize coverage and efficiency, only one pod was deployed during this demonstration due to the time constraints of the OVIN Demonstration Zone program. This setup served as a foundational test to validate future full-system performance and support Kevares' commercialization roadmap.

Key Outcomes

- Kevares' robot autonomously cut an eighth of a soccer field in 26 minutes. It took two minutes to set up the geofence. The robot's blade successfully cut the grass at 2 1/4 inches (starting height ranged from 3 – 4 inches).
- The geofence required more than one pass of the perimeter to calibrate at a new location.
- The robot successfully performed autonomous mowing within a defined geofence, achieving acceptable cut height in the areas covered.
- The collision avoidance test was successful in detecting large, projected objects.
- The City learned there is an iterative improvement process for autonomous systems to detect different sizes and positions of objects.
- The demonstration validated the robot's ability to operate safely and autonomously in a controlled soccer field.
- Operational data – including navigation traces, obstacle detection logs, and coverage plans – was collected to support evaluation and future refinement.
- The demonstration showcased some of the robot's safety features for a public setting.
- The Project Advisory Team provided insights to Kevares on grass cutting standards for product improvement.
- The demonstration provided the City with insights on how autonomous maintenance could be potentially incorporated into operations and allowed for an understanding about how it affects our best practices.
- Kevares had an opportunity to create collaborative marketing materials to support the commercialization of their product.

<u>Opportunity Areas</u>
- Kevares to continue their development to improve sensitivity on small object detection
- Kevares is recommended to include a feature that has the cutting blade height at the required municipal standard to reduce preparation time

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 of Kevares' lawn-mowing solution, as determined by the Project Advisory Team.

The demonstration was conducted using only one mowing pod, rather than a three-pod formation. The full three-pod configuration is expected to optimize to achieve full coverage, edging precision, and operational throughput. As a result, the test served as a foundational evaluation of the robot's autonomous capabilities rather than a full performance assessment. Though the testing on June 24, 2025 showed successful completion of tasks, a limited assessment was conducted.

The robot's side-mounted cameras, which are part of its object detection system, were installed but not operational during the demonstration, limiting the positioning and variety in size of objects that could be detected during a test for collision avoidance at the time of the demonstration.

Additionally, at the time of the demonstration, the robot was not equipped with audible or visual alerts – features that are essential for safe deployment in public environments but can be added in future iterations. However, as Kevares has a modular design, further features could be developed in the future.

Obstacles

While the demonstration was successfully completed within the scheduled window, some operational obstacles provided valuable learning opportunities.

- GPS initialization and geofencing setup required multiple attempts, which temporarily delayed the start of mowing operations but were ultimately resolved on-site. A longer preparation period would be useful in enabling a smoother geofence process for the test site.
- Object detection was partially evaluated due to limited camera functionality; not all directional cameras were active during the test, which affected the robot's ability to detect a variety of positions or sizes of debris in real time.

Despite these challenges, the robot demonstrated its core autonomous capabilities, and the test provided meaningful insights that will inform future multi-pod deployments and system enhancements, which were already scheduled for Kevares.

Kevares also encountered supply chain issues, which caused a delay in the demonstration start date. This was a globally affected delay, and provided an opportunity for Kevares to relocate production locally.

Conclusions and Recommendations

The demonstration confirmed the potential of autonomous mowing to support municipal maintenance operations. While the robot showed promise, further testing with the three-pod formation is recommended to evaluate areas such as small object detection, coverage optimization, and safety signaling to complete the safety assessments.

Overall, this preliminary demonstration shows the technology has potential to improve operational efficiency and sustainability by reallocating staff to other tasks and reducing emissions through battery-electric operation. However, the City would require further evaluations for additional considerations of the product and services.

In alignment with Kevares' safe and responsible process of adopting autonomous technologies, future demonstrations should include further testing of necessary features for public-facing activities to evaluate safety conditions:

- Full three-pod configuration to assess coverage, edging, and throughput.
- Enhanced perception systems, including side-mounted cameras and improved field-of-view geometry primarily for object detection and other safety features.
- Testing with a mulching blade to evaluate different clipping sizes and consistency.
- Integration of auditory and visual alerts for public safety.

Kevares would benefit from additional demonstration projects to refine the product and its safety and operational features.

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