

Drones gaining ground and transforming technology

Airborne robots poised to transform retail delivery, security surveillance and artificial intelligence.



SCOTT SIMMIE / TORONTO STAR [Order this photo](#)

Technician Fraser Hahn works on a DJI Phantom drone. Drones Plus colleague Matt Pflugfelder stands in background.

By: [Scott Simmie](#) World Affairs, Published on Tue Nov 17 2015

Flying at 60,000 feet, powered by the sun, Facebook's huge unmanned Aquila aircraft provides an airborne bridge to the information highway — beaming Internet access to people in technologically barren parts of the planet.

At a major construction site, a squad of flying robots hoists and lays bricks with military precision, pausing only for battery swaps or a recharge.

And at Amazon, Walmart, and the Vaughan-based Drone Delivery Canada — tests are afoot to transform the delivery of small packages using robots in the sky.

The common thread is the ubiquitous unmanned aerial vehicle, or “drone.” And the above scenarios, more likely than not, will be realized in the not-so-distant future. The Vaughan company exists (though it’s not delivering yet), demonstrations of intelligent swarm assembly (using foam “bricks”) have been carried out — and a 42-metre wingspan Aquila prototype has been built.

“They’re really now becoming new tools in a company’s toolbox,” says Michael Cohen, president of Toronto-based Industrial Skyworks, or ISW.

It’s one of many firms globally that see massive opportunities in the use of unmanned aerial technology. Flying high-end quadcopters manufactured by Waterloo-based Aeryon Labs (which just secured \$60 million in venture capital financing), ISW does everything from inspections of building envelopes through to work in the electrical, telecommunications, and oil and gas sectors. Multiple types of high-resolution sensors can be taken aloft depending on the task at hand.

“If one needs to look at a hard-to-reach place like the top of a telecommunications tower to understand how much rust is on equipment, drones are now able to get this information and we’re able to present it in a valuable way,” says Cohen, who is also an airline-rated captain.

One of ISW’s core businesses is thermal inspections of massive roofs on industrial buildings. The work is carried out at night, and — until ISW came along — had been done by people carrying handheld thermographic cameras. Using a drone is safer and faster.

And — potentially — better at many, many things.

“We’ll see them in everything from deliveries to construction sites to all sorts of other applications,” predicts Cohen.

Such as precision agriculture — where unmanned aerial systems gather ultra-precise data while flying over farms.

“A very simple way of thinking of it is optimizing inputs to increase outputs,” says Pat Lohman, VP of Partnerships with North Carolina-based PrecisionHawk.

Their fixed-wing aircraft was designed by U of T aerospace PhD Ernie Earon to carry a variety of swappable sensors. The device is hand-launched and flies a programmed circuit over the fields (though it must — except with special permits — remain within sight of an operator on the ground). After it lands, the data is processed and can be presented as an easy to interpret, colour-coded map. Do parts of the crop require less nitrogen? More? Are there areas where, in fact, no fertilizer whatsoever is required?

A drone can capture that data — and other crop parameters — faster and at lower cost than ever before.

“So to be able to fly over a field . . . to see where bad areas are and good areas are — a prescription can be created to match that map,” explains Lohman.

That prescription can then be meshed with the brains of the tractor doing the actual spraying. The result? Reduced costs and increased yields.

“Historically, it (nitrogen application) was full blast over the entire field,” says Lohman. “But if you save five or 10 per cent and you can actually get better results, there’s a lot of cost savings there on input.”

PrecisionHawk both sells its \$18,000 (U.S.) UAVs directly to farming operations, and also operates as a service provider.

In December of 2013, when Amazon’s Jeff Bezos announced his company’s intention to start testing drones for delivery, many accused him of hype. The devices would be at risk of crashing into trees, power lines, buildings.

But it was not hype.

In early November, there were 19 openings on Amazon Prime Air’s company’s job page — everything from carbon fibre technicians to research scientists. In late October, there was news Walmart Inc. had been testing small unmanned aerial systems indoors for months — and had applied to the FAA for permission to take those tests outside.

Reuters reported the application seeks to test drones in “deliveries to customers at Walmart facilities, as well as to consumer homes.”

According to the Reuters report, Walmart plans to use drones manufactured by China’s DJI — a company that has continuously advanced drone technology while simultaneously reducing price. Last year, the company recorded \$500 million (U.S.) in sales. This year, it is set to surpass \$1 billion.

So stable is the platform that many small entrepreneurs have launched businesses with DJI products. Gateway Data Systems Inc. started with a sub-\$2,000 device and accessories. The Etobicoke-based company monitors construction sites and provides high-resolution, date-stamped video progress reports.

“It holds people accountable to their project timeline,” says president and CEO Mike Smith. “Boots on the ground is fine, but to get an actual overview of an entire project you really need a bird’s eye view.”

Smith, an IT specialist, has plans to take his company far beyond progress reports and into the realm of security surveillance. He says he’s already exploring partnerships with academic institutes, hoping to push the artificial intelligence of these flying robots.

He envisions drones triggered by motion sensors autonomously capturing video evidence of construction site theft — even potentially following suspects.

“How do we push that platform — and see how far we can take it?” asks Smith. “How much more can we make it do — and how fast?”

If the progress of the past few years is indicative of the future — the sky’s the limit.