



Drones: Without Intelligence, They're Just Flying Cameras

Aerialtronics, Aeryon and Drone America on Neurala Artificial Intelligence in Drones



Smart drones have many different applications, from the neighbors' backyards and military missions to virtual sightseeing and intended delivery services. In the energy, telecommunications, public safety and security sectors, drones are making significant contributions by generating highly valued data, but humans are still needed to guide drones or interpret that data. Artificial intelligence (AI) is the missing piece of the puzzle in the drone industry, providing the needed intelligence to process this new "drone data deluge."

The Tipping Point: Artificial Intelligence

Drones have revolutionized humans' ability to collect aerial data but have created two additional "jobs" for us: the need of a human pilot to drive drones step-by-step in their data collection and the need for a human to analyze, either in real time or post-flight, terabytes of data to look for relevant information. Adding AI to drones is the missing ingredient to flying cameras, relieving human operations by embedding AI directly on the drone (at the edge) or after data has been collected, in diverse sectors.

INTELLIGENT INSPECTORS

Intelligent inspections Drone inspections for cell towers, wind turbines or pipelines reduce human risk and save time in the physical inspection. Typically, a single inspection of a single tower will generate about a half hour of video which is then relayed to a server for review by a human. Inspecting video is tedious work. This type of pattern-matching task is fatiguing for the human brain and can lead to errors.

"It's been said that drones can do everything better and safer, but it's not actually true," said Robin van de Putte, the Founder and Chief Marketing Officer of Aerialtronics, a drone manufacturer and solutions provider. "Safety has certainly improved, but another problem has emerged: drones generate too much data to sort through. How can customers get through this data and get actionable results?"



PHOTO: AERIALTRONICS



We've done our job well if the client doesn't even know we put an aircraft or drone in the sky. It's seamless—we gather a significant volume of data easily and deliver it to the customer.

While inspecting a single cell tower or wind turbine can be overwhelming, consider the added dimension of inspecting hundreds of miles of pipeline or electrical infrastructure. This is the type of work that Drone America does with their large unmanned aircraft, as Zack Clark, Integration Specialist, explains: “We inspect 300 miles of pipeline or 500 miles of utility line. A technician isn't out there to instruct the drone operator on anything. The drones are out of range to feed real-time video back, and they are out of the line of sight for operators. Drones collect vast amounts of data, and this data needs to be reviewed and processed later to detect defects in the pipelines.”

Adding AI to the drone means processing and handling all of that data. A drone in flight could identify all the components on a tower or line and identify and point out defects. A human inspector would only need to review the sections of video identified by the AI, saving time, increasing accuracy and providing fast, actionable results. “The goal is to automate full flight with real-time data analysis, making post-processing review obsolete,” said van de Putte.

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PHOTO: DRONE AMERICA



When the drone can become self-navigating, it will be able to avoid obstacles or environmental events in the flight path, allowing it to fly without incident for hundreds of miles.

Managing the data is key, but, for Drone America, Neurala's ability to make the device autonomous is as important as saving time finding objects and defects. When the drone can become self-navigating, it will be able to avoid obstacles or environmental events in the flight path, allowing it to fly without incident for hundreds of miles.

"We're really excited about sense-and-avoid technology. We fly out of the line of sight. A human pilot can identify and avoid hazards or conflicts, but unmanned drones cannot. We want to replicate that with AI for the aircraft. We can't use a video feed for an operator to make a decision about a hazard; cruising at 40 mph, there are only seconds to avoid collisions, so by the time video reaches the ground, it's worthless. We can alleviate this issue by using AI to add autonomy," said Clark.

PROVIDING ANSWERS IN MISSION-CRITICAL SITUATIONS

Real-time search is a more complex task than inspections, and it demands more functionality from the AI. Search is also a scenario where lives can be at risk, making the need for AI even more critical.

In an inspection, the drone is looking for a known stationary object. A real-time search involves looking for unknown moving objects, such as searching for a person in a wooded area. A video feed may be helpful, but analyzing video and trying to spot a person in those conditions is slow and inaccurate.



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A drone that can correlate thermal imaging data with location data and feed anything of interest back to a search team in real time would solve the problem. A lost hiker in the woods could be quickly found, without hundreds of people fanning out through the forest looking for him.

With 10 years' experience, Aeryon Labs is an "old-timer" in the security and public sector drone space. Aeryon drones handle traffic scene reconstruction, allowing roads to open to the public faster; optimize search and rescue operations; assess fire damage; and gain access to a fire or accident scene.

Helping officers is a major task, and using artificial intelligence to automate pilot tasks and assist or complement an operator is the goal today. In this sector, it is too early for unmanned missions.

"Today, a video feed of a car traveling on a highway needs to be analyzed, which takes up too much of an officer's time. However, if you can tie the position of your video feeds to a specific car driving north at 60 mph on a highway and then provide the officer with a location and a direction, that saves time. This makes safety and security more efficient and provides actual support to traffic regulation officials," says Charlie Elliot, Product Manager at Aeryon.

In this highly regulated space, Aeryon needs to introduce capabilities slowly, but there is a clear fit for smaller, faster technology that is easy to use in high-adrenaline scenarios.

NEURALA TECHNOLOGY: HELPING DRONE COMPANIES COMPLETE THEIR VISION

Because Neurala technology is adaptable, these drone companies are able to use the technology for a variety of tasks and serve many different customer needs.

For Drone America, partnering with Neurala is helping them realize their vision of autonomy.

"We are very passionate about our systems. Neurala is, too. Neurala is not just trying to sell us the latest widget. They are open to adapting the technology to our missions. It's a true joint effort. The aircraft has more functionality with AI.



PHOTO: AERYON

Our aircrafts can perform more functions in a single flight that would otherwise take multiple flights to do, giving Drone America a huge competitive advantage,” said Clark.

For Aeyron, Neurala’s feature set and architecture are making it possible to migrate into the public sector. Explained Elliot, “Neurala’s architecture is well-suited to run on the edge. It’s small and lightweight, and we can get the technology as close to the sensors as possible. There is a feature set that is available now that’s real and tangible. Neurala has an architecture that can evolve as customer needs and requirements change.”

For Aerialtronic, their mandate to provide fast, actionable results and eliminate post-processing is underway. A future for predictive capabilities for maintenance is clearly in sight.

Added van de Putte, “While getting actionable results is today’s goal, Aerialtronic’s vision calls for much more. The plan is to move from reacting to data to using predictive data. We will detect deviations from the norm—is there corrosion or a new piece of equipment on the pole? Then we will be able to move to a model where you can predict maintenance problems and thereby prevent them.”

Each of these companies is working on a slightly different vision of the future, but the commonalities are clear. AI is the key to providing actionable results to customers for a variety of applications. Neurala's approach—one that provides deep learning and processing on the edge—is well-suited to applications in which speed or saving time is of the essence. The ability to provide this in a small, lightweight package makes the application to drones particularly attractive. The company's expertise in both deep learning and robotics, combined with a zeal for working with clients on their specific solutions, makes Neurala the partner of choice for implementing AI.





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