

improvements. For example: we manufacture the power source, we manufacture the airframe, we manufacture the engine control unit—and because we own the entire technology stack, we can make 1 to 2 percent improvements everywhere across the board, and those things add up over time.”

While I don’t have the engineering know-how to assess Mestler’s explanation in detail, I can say that examining his aircraft in person, I was impressed with the level of refinement on display. Every other gas-powered multirotor I’ve ever seen looks like it’s got a leaf-blower engine bolted to it. In the case of the Skyfront aircraft, however, the engine and generator were compact, streamlined and fit nicely within the overall design.

In terms of the missions, these aircraft are payload agnostic. Mestler reports strong interest from land surveyors owing to their ability to carry robust, and

heavy, LiDAR sensors for several hours at a time, as well as security officials, particularly overseas, who have equipped them with cameras for surveillance missions.

Initially, I was incredulous at the thought of a gas-powered surveillance drone, since those I have previously seen—and heard—are about as subtle as your neighbor’s lawn mower at 7 a.m. on a Saturday morning.

“We’ve spent a fair amount of time muffling the vehicle and understanding its sound signature,” Mestler explained. “That way, the operator knows when it can and cannot be heard. During our training sessions, we advise the pilot how to fly it so that they can evade detection.

“At about one kilometer, you can start to hear the vehicle, but it’s very faint. However, since we can carry such heavy payloads, it’s easy to use a camera with a powerful zoom lens that lets you keep an eye on a subject

from one kilometer away.”

### The Best Defense

With the rapidly increasing capabilities of drones, the possibility that they will be used for mischief—or worse—is greater than it has ever been, and only expands with each passing year. As at previous shows, counter-UAS technology was again on display at Xponential in 2021, although one company stood out from the rest: D-Fend Solutions.

To date, the CUAS mission has been achieved by one of two basic approaches: jamming and interceptors, but each have their own drawbacks. Jamming a drone also wipes out everything else in the vicinity that relies on the same radio frequencies—including WiFi, cordless phones, GPS and countless other modern conveniences—and may also cause the drone to behave erratically, possibly increasing the hazard it was intended to mitigate.

Interceptors use nets

to physically capture and restrain rogue drones, but they are necessarily larger and heavier than their prey, making it a serious challenge if their target is hovering over a crowd of people, for example. Also, a near-miss by an interceptor could send the intruder tumbling out of the sky, again with the potential to make a bad situation worse.

D-Fend Solutions has come to market with an entirely new approach, as Jeffrey Starr, the company’s chief marketing officer, explained: “Our technology is based on radio-frequency, cyber take-over of intruding drones. We detect the communications between the remote control and the drone, and then we literally take over the drone and push it along a safe route to a safe landing in a pre-designated zone to reduce the danger.

“Alternatively, we can do what is called a fend-off, which sends the drone back where it came from. We can even cause it to hover

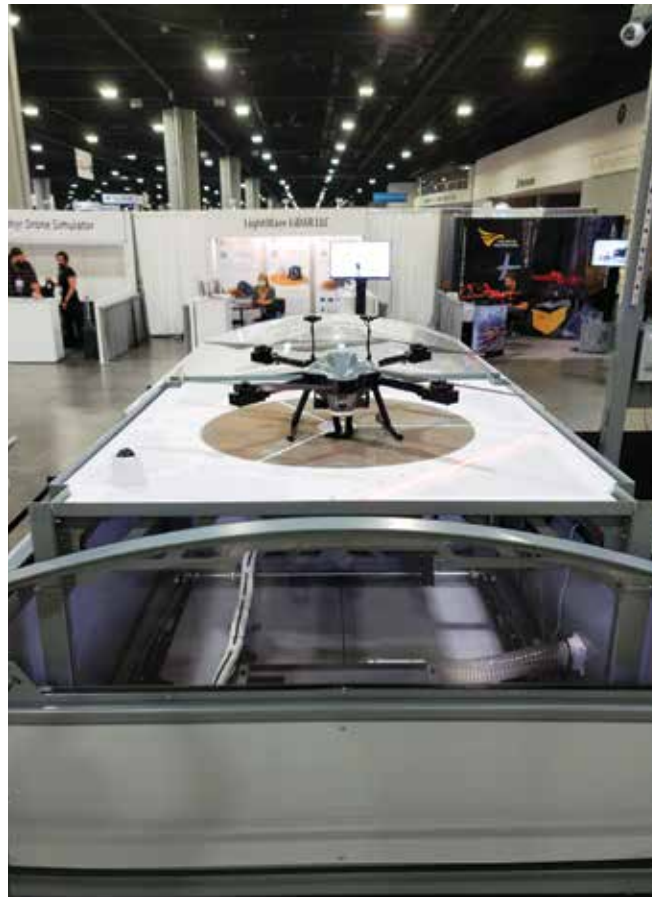


The D-Fend Solutions EnforceAir, the company’s flagship anti-drone product, detects, locates and identifies rogue drones in airspace and then neutralizes the threat by allowing you to take full control over the drone and land it safely in a predefined zone. (Photo courtesy D-Fend Solutions)

in place, but it's basically a system based around continuity, control and safety."

As you would imagine, the core component of this system is an array of antennas connected to sophisticated radio gear, all directed using a computer interface. The system contains a database of communications signatures and protocols for numerous different types of drones and is constantly being updated.

"We realize that there are both the nefarious and also the careless when it comes to rogue operators—we want to help security agencies safeguard sites and people against them, while enabling good drones to continue operating and thus helping support the new drone economy," said Starr. "We love drones. What we are doing is seeking to preserve continuity: we want operations, communications, transportation and everyday life to continue, while detecting and mitigating



**Previously only seen in a miniature diorama, the FIRST iZ drone port was on display as a fully functioning prototype, which will soon be launching autonomous aircraft to an emergency ahead of first responders, to provide them with a view of the scene even before they arrive.**

potentially hazardous drones."

That focus on continuity is what sets D-Fend Solutions apart. If a jammer is used to protect a large, outdoor sporting event, for example, it will disable any hostile drones that are detected in the vicinity, but it will also interfere with drones that are there serving a beneficial function: such as providing security or aerial video of the event. Rather than a shotgun scattering pellets everywhere, striking friend and foe alike, D-Fend Solutions offers the pinpoint accuracy of a sniper rifle—eliminating recognized threats while allowing other drones to continue their missions unaffected.

### Back for Round 2

As a journalist who has been covering the civilian drone industry basically since its inception, I've witnessed the rise of a few remarkable products and companies over the years that have survived and ultimately

## Bucket List: A Standard Method to Test and Evaluate Drone Pilots

**O**n the first day of Xponential 2021, the National Institute of Standards and Technology (NIST) partnered with the DroneResponders Public Safety Alliance to demonstrate its pilot proficiency testing apparatus. Made from a few simple components available globally—such as lumber, bolts and five-gallon buckets—the apparatus allows organizations to establish a benchmark for drone pilot proficiency.

Essentially an "obstacle course" for drones, variations on the NIST standards are already employed by certifying bodies such as the AUVSI Trusted Operator Program (TOP) and the Airborne Public Safety Association (APSA) Basic Proficiency Evaluation for Remote Pilots (BPERP).

The event was held at Mercedes-Benz Stadium, home to the Atlanta Falcons, and gave attendees the opportunity to become familiar with the standards. By employing standardized tests, it is possible to compare the performance of drone pilots all around the world on a level playing field, or the performance of a single pilot across time.

At its most basic level, the NIST testing apparatus serves as a sort of skills test to complement the knowledge test drone pilots are required to pass in order to earn a Part 107 certificate. Effectively, these standards serve as a "check ride" for drone pilots, verifying their ability to actually operate the aircraft in real-world conditions.



**With some lumber, five-gallon buckets and basic hardware, NIST apparatus like this makes it possible to establish a benchmark for drone pilot skills that can be compared worldwide and through time.**



**Mercedes-Benz Stadium, home to the Atlanta Falcons, was the venue for a NIST evaluation apparatus demonstration held on the first day of Xponential 2021. The domed arena offered a welcome respite from the sweltering outdoor heat and humidity.**