

# Drone Racing Goes Mainstream

## BEHIND THE SCENES OF THE U.S. NATIONAL DRONE RACING CHAMPIONSHIP

TEXT & PHOTOS BY PATRICK SHERMAN

A racing drone successfully navigates a gate, with One World Trade Center in the background. The iconic structure, the tallest in the Western Hemisphere, was built on the site of the World Trade Center following the 9/11 attacks.



In the Green Room, on-deck pilots wait for their chance to compete.

**“In three days, we probably did seven years’ worth of learning,”**

said Scot Refsland, the chairman of the Drone Sports Association (DSA) and the organizer of the U.S. National Drone Racing Championship. “From the perspective of some of the individual pilots, I understand that there was some real frustration, but as far as establishing drone racing as a professional sport, it was a big success.”

Scot proudly reels of the achievements of the event, held August 5–7: the first live, national broadcast of a drone sporting event, the first event open only to pilots who had previously qualified at other races, and certainly the first to occur in a bustling metropolis with a constant parade of manned air traffic overhead.

“I did some calculations, and I figure we logged about 1,000 drone flights over those three days. And during that time, we had about 500 helicopters pass through the airspace, along with blimps and airplanes, and we had more than 10,000 spectators coming and going—and all without a single incident,” he said.

About 150 pilots attended the event: 75 of them competing in the individual quad racing, 25 in the freestyle competition, another 30 flying race wings, and the balance being members of the racing teams that turned out to compete.

The race was administered by a team of 10 people affiliated with the DSA and its partners and supported by about 75 volunteers, among them Steve Cohen, the President of the Drone User Group Network, who spent the past year laying the groundwork for the event.

“This is the debutante ball of the drone-racing sport,” Steve said. “The best and brightest are here, and this is a big production we’ve got coming together. I’m really proud to be part of it.”



Scot Refsland, chairman of the Drone Sports Association, looks on as work on the racecourse proceeds ahead of the competition. Scot designed the course himself using computer-aided design (CAD) software.

### Lost in Transmission

For all of its achievements, the event itself was hamstrung by a series of breakdowns that left pilots grumbling, both in the pits and on online discussion forums afterward, a fact Scot readily acknowledges.

“We probably deserve a pretty low score on race management,” he said. “In other areas, we really knocked it out of the park. But in that one, we were definitely less successful.”

Scot traces all the problems back to the first-person-view (FPV) video links that make drone racing possible.

“Video was the Achilles’ heel of this whole event,” he said.

The site of the racing was Governors Island, just 800 yards off the tip of Manhattan. Realizing that could pose a challenge for a





**The U.S. National Drone Racing Championship was held on the "Play Lawn" on Governors Island, located just 800 yards off the southern tip of Manhattan. Ordinarily set aside for Little League baseball, the field provided a dramatic setting for the event.**

sport entirely reliant on analog video broadcast at 5.8GHz—a common frequency used for Wi-Fi, wireless video, and numerous other applications—Scot and his team made three visits to that island during the winter and spring.

"We had a spectrum analyzer with us, and there was so little radio-frequency interference that I had to double-check that it was working. We got a little splatter coming from the Coast Guard facilities on the island, but other than that it was completely quiet," he said. "What we didn't account for was the increasing amount of traffic in the summer months.

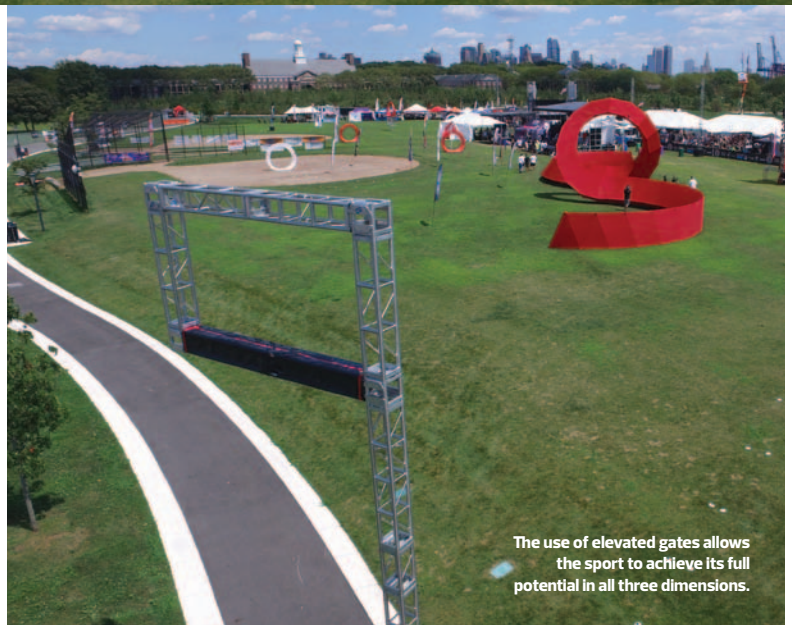
"When they switched on the wireless video system at the Statue of Liberty, we could see it. Also, there was a direct correlation between the size of the audience in the stands and the level of interference we were getting from cell phones, Wi-Fi connections, and so forth."

Another big source of interference was related directly to one of the event's signature accomplishments: the five hours of live coverage on ESPN3 that it received on Saturday and Sunday, August 6 and 7.

"We had a 50-megabit wireless Internet connection with a tower in New Jersey, which carried our video stream. Even though we set up the antenna 250 feet away from where pilots were sitting, the splatter from that system alone knocked out a couple of channels on 5.8GHz that we were relying on for racing," he explained.

The link also proved vulnerable to the passage of cruise ships and large ferries that ply New York Harbor.

"It took us a while to understand what was happening," said Scot. "At first, all we knew was that our stream to ESPN would break up periodically,



**The use of elevated gates allows the sport to achieve its full potential in all three dimensions.**

and then we realized it was happening whenever a ship came through west of the island. So then we assigned a spotter to watch for them, and every time one was approaching, we went to a commercial break."

Finally, there were issues that crop up at every drone-racing event, such as a pilot in the pits powering up a video transmitter on the same frequency that is in use on the track.

"The good news is all of this is an easy fix," said Scot. "We can fix those race management issues moving forward. What's most important about this event is that it served to cement the future of drone racing as a legitimate sport."



## The Next Big Thing

The success of any spectator sport is determined by the number of spectators who are actually willing to show up and watch—either in person or through a broadcast outlet like ESPN. According to Scot, the response from the people who paid \$10 to sit in the stands was generally positive.

"They had a little trouble figuring out who was flying which aircraft, but overall they said it was a thrilling experience," he reported. "The pilots are so technically skilled now and so good at close proximity flying that people kept wanting to get closer and closer to the action—they felt safe because of how well these guys can handle the aircraft."

One unique feature included in the course design was the "Aquarium": a box built out of bulletproof Plexiglas, which allowed fans to stand directly in the path of the oncoming quads and get an up-close view of the action. Other spectator areas were protected by netting, suspended 30 feet off the ground.

"It was kind of a schizophrenic experience," Scot recalled. "On one side of the netting, we had the pilots, who were frustrated with the process, but that never leaked over to the other side and affected the audience experience—and I give the pilots a lot of credit for that.

"Our ultimate goal was to have spectators come in, watch a drone race, and go away happy—and that happened."

The reaction to the event has also been positive among two other key constituencies: the sponsors—which included GoPro, AIG, Ernst & Young, EMC {code}, Lumenier, ImmersionRC, and LiveRC.com—as well as the popular media.

"The reviews from the big news magazines—*Time*, *Fortune*, *Forbes*, and *Inc.*—have all been glowing. They all say that drone racing is the sport of the future," said Scot.

As a counterpoint to the frustration that some pilots experienced at the event, Scot highlights what it has achieved for the entire sport, which goes far beyond a single weekend of flying.

"Inside the VIP tent, we had people who manage \$20 billion hedge funds, and they were there to see if drone racing is going to be the next big thing," he said. "Yeah, we have some pilots who are upset because they didn't burn three packs, but we have these fund managers who are now interested in sponsoring teams."

## Flying into the Future

Of course, regulatory approval is another critical issue for drone racing to succeed as a professional sport, and the weekend brought some substantial



**Above:** Spectators pack into the "Aquarium" to get a close-up look at the action. Made out of bulletproof Plexiglas, this unique feature provided the audience with an opportunity to see the drones flying at full speed, without netting to mar their view.

**Left:** Renowned FPV racer and freestyle pilot Tommy "Ummagawd" Tibaja waits for the next heat to begin.



progress in that regard as well.

"On the Monday after Nationals, we got a call from the FAA [Federal Aviation Administration], telling us that as of January 1, DSA will become the first accredited, professional drone-racing association. This is essentially the same process that Red Bull and the Reno Air Races have gone through," Scot explained.

Although this year's event was technically an amateur competition conducted under the auspices of the Academy of Model Aeronautics (AMA), beginning in 2017, all DSA racing will be strictly professional events.

"That means pilots will be required to have their Part 107 certification, as well as a Letter of Authorization (LOA), issued by the DSA. In addition, our racecourses will receive a Certificate of Waiver and will be designed to incorporate safety features specified by the FAA," said Scot.

He emphasized that some qualifying events will likely still be conducted at the amateur level with AMA sanctions, but top-level competition will require pilots to hold appropriate professional credentials.

"It looks like paying spectators is where the line will be drawn between the two types of events," he said. "If people pay to watch, it's a professional event."





Father and son Conrad and Sorell Miller traveled all the way from Idaho to compete in the race, after qualifying at an event held in Bend, Oregon.



Zachry Thayer of Team Big Whoop (left) won the individual drone-racing championship, while Paul Nurkkala took home the second-place trophy.



In addition to team and individual quad racing as well as freestyle competition, the event also featured race wings. Here, Heather McDowell from Team Legit launches a teammate's aircraft at the start of a race. Race wings proved to be one of the more popular events with spectators. Owing to their distinctive sounds and large overall size, they were easy to track and identify during the competition.

Another crucial hurdle the sport will have to overcome in order to be successful is the very same issue that plagued this year's championship event: clear, reliable FPV video links.

"We just can't continue running on 5.8GHz," said Scot. "We're talking to the FCC [Federal Communications Commission] about moving to a different portion of the spectrum, but that's a long-term project."

Another solution would be to move to a digital standard, such as the recently released Connex ProSight system from Amimon. The technology promises clear, real-time video transmissions with up to 16 channels in use simultaneously.

"Unfortunately, that system just wasn't ready in time for Nationals. But we're moving ahead with testing to verify that it's a workable solution," Scot said.

The next big event for the DSA will be the Drone Worlds, to be held on the Hawaiian island of Oahu, October 17–22. The competition, which will bring together pilots from more than 30 countries, will be held at Kualoa Ranch on the island's eastern shore. The lush green valley with rugged rock outcroppings has been the setting for numerous film and television productions, including *Jurassic Park*, *Godzilla*, *Tears of the Sun*, *50 First Dates*, *Mighty Joe Young*, *Hawaii Five-0*, and *Lost*.

### Lessons Learned

"There are two ways to learn something," Scot said. "Either you just stumble on the right answer, or you fail. Failing makes you better, faster. We had some breakdowns at the Nationals, but we learned from them—but far more important than that, we cemented the future of drone racing as a professional sport. That's going to allow all of us to succeed, moving forward."

According to Scot, there are five things that drone racing needs in order to succeed: recognition from the FAA, a broadcast model, nonendemic sponsors—which is to say, sponsors, like AIG and Ernst & Young, that are not directly connected to the drone community—insurance, and an engaging spectator experience.

"We made real progress on all of those issues at Nationals," he said. "If we didn't get the sponsors, if we didn't get the FAA and ESPN to say, 'Yes,' then this is still just a hobby, not a professional sport. Instead, we found out that this thing can grow more quickly than any of us ever imagined.

"To tell you the truth, I didn't have the opportunity to see much of the actual competition at Nationals—I was too busy working behind the scenes. But when the final race ended, the winners came together on the podium and opened that bottle of champagne, and they were completely surrounded by cameras capturing the moment, I knew it was all worth it." ✨