

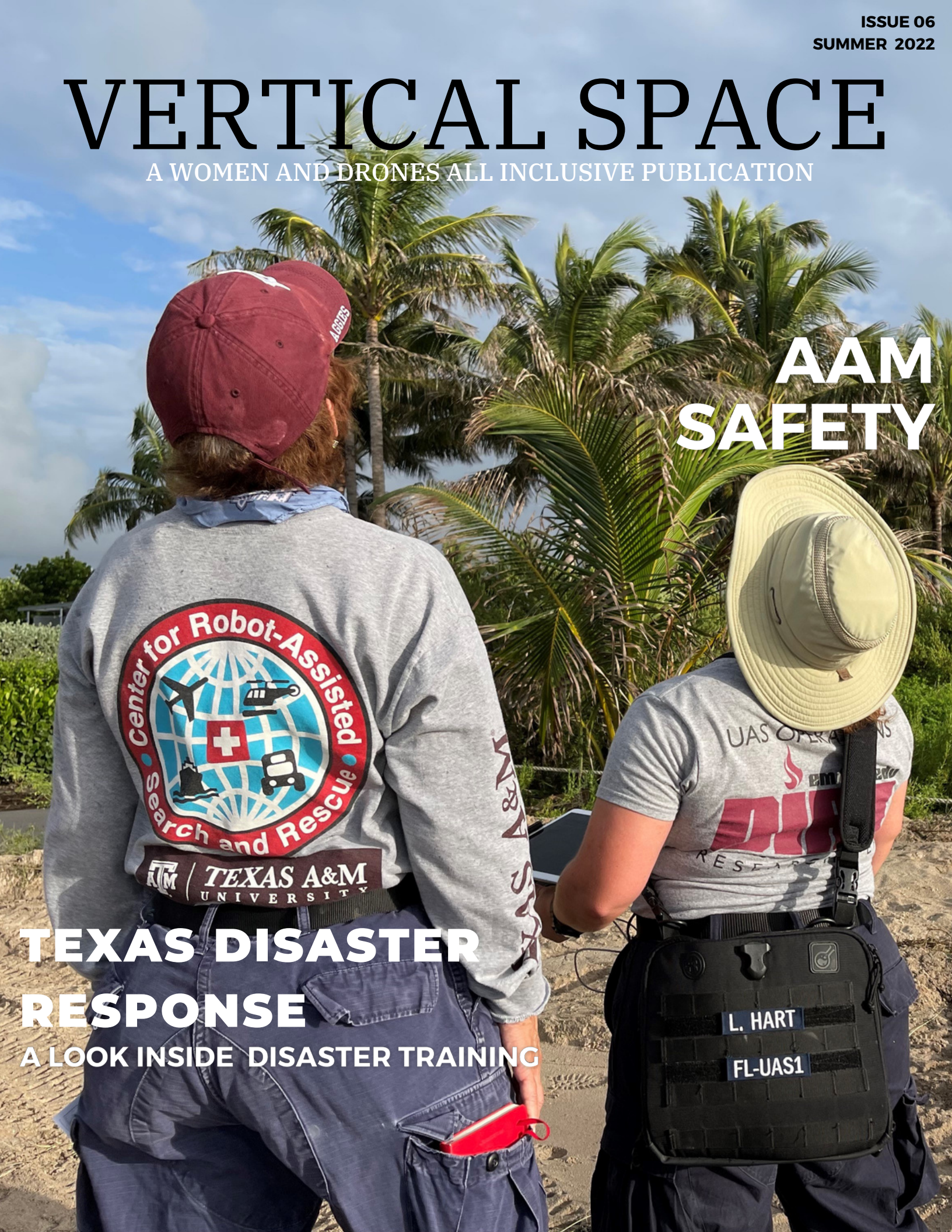
VERTICAL SPACE

A WOMEN AND DRONES ALL INCLUSIVE PUBLICATION

AAM SAFETY

TEXAS DISASTER RESPONSE

A LOOK INSIDE DISASTER TRAINING



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BY DR. RENEE JONES-WELCH



VERTICAL SPACE

A WOMEN AND DRONES ALL INCLUSIVE PUBLICATION

A word from the founder and CEO of Women and Drones



The past three years have been unprecedented in their scope with regard to the challenges and opportunities that life has presented to us, not only as individuals but also as companies and organizations. We have all had to change and grow at some point – whether that meant pivoting into a new direction or continuing to move forward in the same direction.

Here at Women & Drones, we have recognized these changes as well. Throughout these past few years, there has been phenomenal growth in the commercial and consumer UAS industries. Alongside the UAS industry, the Advanced Air Mobility (AAM) industry has also grown. And while our flagship publication, Vertical Space, will continue to provide content on UAS, you will see more reporting on the exciting developments happening in the AAM industries. This issue features an article on how the collaborative efforts among private industry, state and local governments, and the military result in the state of Ohio becoming a leader in AAM research and aerospace management. While AAM is still in its nascent, futuristic phase, investors and businesses are beginning to embrace this next generation of aerospace mobility.

We are excited about returning to CES on Friday, January 6, 2023 for our annual awards ceremony. CES is the world's most influential technology event. It is the proving ground for breakthrough technologies and global innovators. CES is where the world's biggest brands do business and meet new partners, and the sharpest innovators hit the stage. We are thrilled to bring our industry once again to the world's biggest tech platform. Details about our newly expanded awards program are available on our [Women and Drones Awards page](#).

Sharon Rossmark

VERTICAL SPACE

A WOMEN AND DRONES ALL INCLUSIVE PUBLICATION

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A word from the managing director of Vertical Space eMagazine

Hello!

As you may know, my name is Belinda, and I am Vertical Space's creator and managing director. I am an FAA Certified Part 107 remote pilot and geospatial services provider in Central Texas and surrounding areas.



Our delay this year in launching this Summer's 2022 issue stemmed from a personal loss. I lost my dear husband to stage 4 colon cancer. He fought a courageous 3 year battle. Even though cancer had taken his body, it did not take his spirit. His spirit to live, laugh and enjoy the time he had. I want to thank you all for reaching out to me with condolences, and donating to his fundraiser it means a lot to us.

As you may know, our idea behind Vertical Space eMagazine is to connect, support, encourage and recognize achievements in the Vertical Space industry.

We are very excited to continue to add to the Women of Color in The Uncrewed Aviation Series. The next issue will feature veterans in our industry.

We hope to help you in your growth and expand your network and even more.

Let's connect, create relationships and grow together.

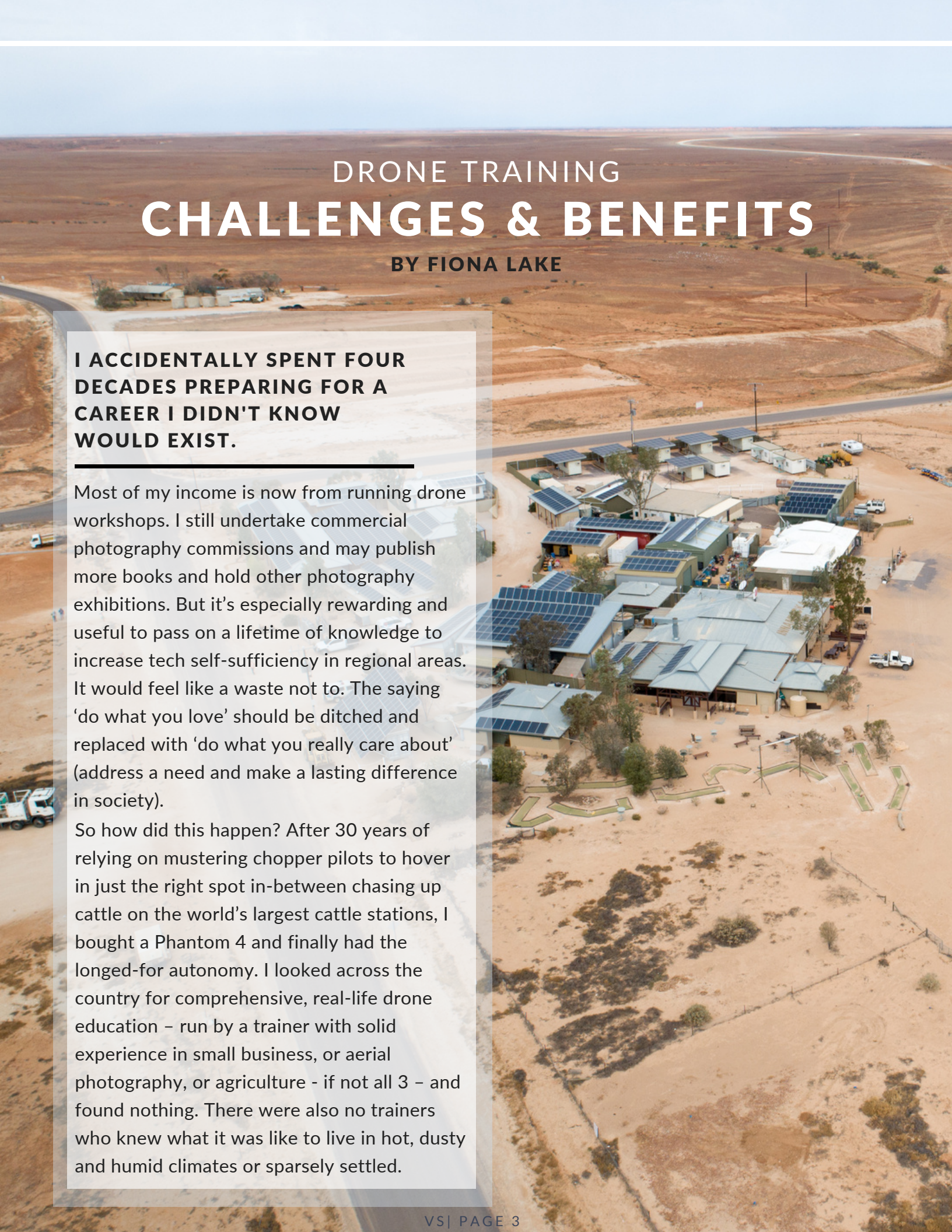
I hope you enjoy our this issue and we do look forward to sharing your story in the very near future.

Happy Mapping,

Belinda

[Mapping Book](#)

[Personal and Business](#)



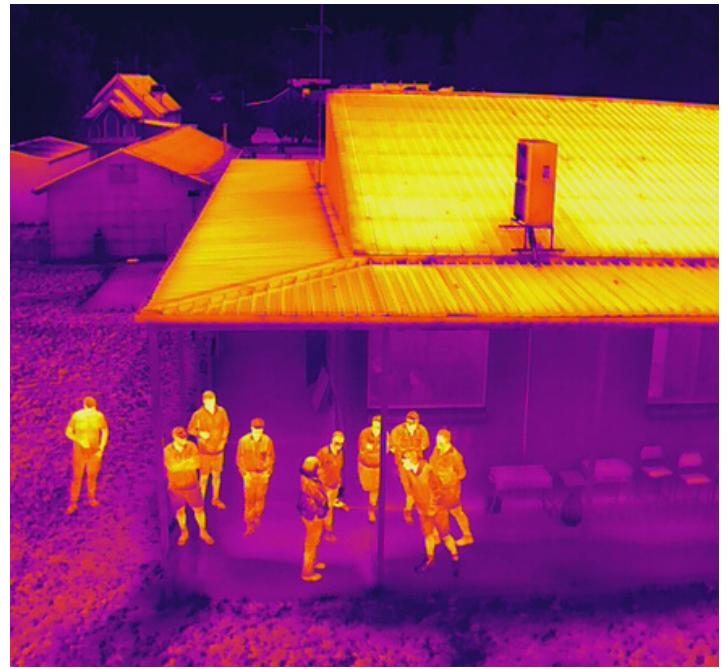
DRONE TRAINING CHALLENGES & BENEFITS

BY FIONA LAKE

I ACCIDENTALLY SPENT FOUR DECADES PREPARING FOR A CAREER I DIDN'T KNOW WOULD EXIST.

Most of my income is now from running drone workshops. I still undertake commercial photography commissions and may publish more books and hold other photography exhibitions. But it's especially rewarding and useful to pass on a lifetime of knowledge to increase tech self-sufficiency in regional areas. It would feel like a waste not to. The saying 'do what you love' should be ditched and replaced with 'do what you really care about' (address a need and make a lasting difference in society).

So how did this happen? After 30 years of relying on mustering chopper pilots to hover in just the right spot in-between chasing up cattle on the world's largest cattle stations, I bought a Phantom 4 and finally had the longed-for autonomy. I looked across the country for comprehensive, real-life drone education – run by a trainer with solid experience in small business, or aerial photography, or agriculture - if not all 3 – and found nothing. There were also no trainers who knew what it was like to live in hot, dusty and humid climates or sparsely settled.



Regions – with the challenges of dodgy internet, no mobile phone reception and hundreds of miles from the nearest drone sellers or repairers. So I set up a drone training business full of the fundamental and advanced information that I wanted to find out on day one but had to learn piecemeal. The mix of training content remains unique – and there's no other drone educators who are close to my age, a woman, and bringing training to every state and territory. Like so many women in the drone industry I've become an accidental role model.

Australia is the most urbanised country in the world - around half our population lives in or beside our 3 largest capital cities. There are few fully licenced drone pilots in the top half of the continent, or the inland. City visitors cherry-pick the most lucrative regional drone work so it's harder for locals to establish viable businesses.

Locals always have an edge over visitors – existing contact networks plus detailed knowledge of weather, seasons, geography, infrastructure, industries and a plethora of cultural nuances that make the difference between producing a passable result vs something excellent with heart. But many people need a hand to recognise personal assets they can capitalise on and develop the confidence to launch into drones. Building on existing knowledge, skills and interests is the only way to create an unassailable, long-term business.

Like every other country, Australia has relatively few women who are commercial drone pilots. Our licencing is amongst the strictest and most expensive in the world, requiring at least a week of study (including in-person and a flight test) and \$4,000 AUD. Women are more likely to be more time-poor due to caring responsibilities, work part time and be on lower fulltime incomes so it's a lot harder to afford or justify outlay.

Australia really needs a quicker and cheaper licencing tier sitting between having no formal training at all and a RePL & ReOC. Regional drone owners don't need to be trained to fly around Sydney Harbour.

Commercial photography & agricultural industries are male dominated but I've never seen anything like the level of disrespect that commonly occurs in the drone industry. How to manage exceptionally aggressive people online and in person is something discussed in detail in drone photography workshops. I'm a member of many Facebook drone groups with 10-20,000 or more members and I'm the only woman regularly posting and commenting, although 10% of members are usually women. Many of the things that have been said to me are unprintable, there is a segment that cannot abide outspoken women prepared to air dissenting views. (My favourite comeback of 'would you say that to your mother or your daughter?' doesn't faze the most disrespectful.) But some need to go back to troll school as 'get back in the kitchen' no longer cuts it as an insult, it's so tired. There are also some group moderator double standards re the behaviour of male and female members and I dream of going to the trouble of creating a fake account to prove it. Being older attracts more disrespect but age has a durability advantage – personal insults do not hurt as they once did, I have nothing to lose and know that pushing back may make it easier for younger women.

Drone organizations and events also have major issues with a lack of diversity. At one event I spoke at last year, the first three speakers were named 'Andrew'. Now I have nothing against Andrews, but 3 speakers in a row with the same name just screams lack of diversity re gender, age, culture! We must all push harder for more women to be speaking at events, step up ourselves, and encourage good men to advocate for women as well as age and cultural diversity. ('Manels' – all male speaking events or panels - are called out on Twitter regularly.)

All the drone training I've attended has been run by men and the audience is usually 20/80 women/men. It was surprising to discover that when I run a workshop it usually turns out to be 50/50 women/men.

Women have told me 'I decided to come because I saw it was a woman running it'. Not only are there more women present than usual, they speak up with more questions and opinions. Women typically underestimate their ability and kids will sometimes say to me 'my mother would never do anything like that'. Many older people have also fallen for the 'old people aren't any good with new tech' myth – although they've already spent more than half a century mastering new tech, problem solving long before YouTube how-to videos existed. A diversity of age and experience results in more detailed and useful discussions and fosters mutual respect. If attending one of my workshops lifts anybody's confidence up enough to do something they otherwise wouldn't have dared, then my job is done, I'm thrilled with that.

My business was originally set up to address a need – for authentic cattle station images produced by someone who knew weeds from good plants, well bred stock from ferals and who portrayed rural residents with respect not as uneducated hicks. It morphed into many different aspects - as the need for a service diminishes I move on to one of the many other gaps that I can address. I'd thought my efforts to build regional drone capacity would have a two-year lifespan but now realise that like the introduction of computers then smart phones, it usually takes years for revolutionary tech to become part of the furniture. I learn a lot by teaching. Educators here have to be on their toes as Australians typically don't just swallow what they're told - most ask: 'why'? Being required to clearly communicate reasons means having to know far more than you're teaching and have no qualms about saying 'I don't know but I'll find out for you'. The differences and similarities in the drone industry between countries remains endlessly fascinating and I look forward to meeting more outspoken and entrepreneurial women at global drone events.

www.fionalake.com.au



For Fiona Lake, 2022 marks 40 years of selling images. She has had fingers in a few pies – outback photography, producing postcards & books of cattle station images, solo exhibitions, photography workshops and farm tours. She has also been running unique drone workshops via the Rural Drone Academy and bringing training to remote residents across Australia. She passes on a lifetime of learning via ‘trial and terror’ to help capacity-build in smaller communities. Fiona loves a challenge, diversity and adaptability – traits fostered on the family farm she grew up on. Her business was founded on recognising and addressing a succession of unmet regional needs. In 2019 Fiona was named a Women and Drones ‘Woman to Watch in UAS’. This year she was an AirWards finalist and last year received the 2021 Safety & Education award from Australia’s largest drone organisation, AAUS.



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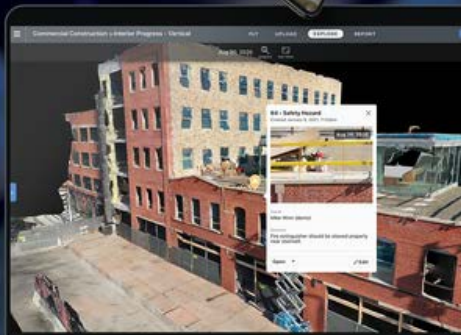
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Friday, January 6, 2023





Inspiring Next Generation of Women Drone Pilots: Skydio's Youth Fly Day



According to the Federal Aviation Administration's annual statistics, women comprised only 7.6% of registered Remote Pilots (aka licensed drone pilots) at the end of 2021. While it's a slight increase from past years, there's no question that the drone industry can and should make closing the gender gap a priority.

At Skydio, we're committed to doing our part. Building off last year's successful Women's Fly Day, Skydio committed to expanding this year's efforts into our local community by providing a welcoming space for young women to engage with drones and learn more about the technology.

Recently, we were excited to host a Youth Fly Day, bringing together 75 Freshman students from ICA Cristo Rey All Girls Academy of San Francisco for a day of hands-on exposure to and education about drones. It was an exciting opportunity for the Skydio team to help inspire the next generation of women pilots and engineers.

ICA was selected due to their ongoing investment and dedication to education and the proven success of supporting young women to and through college - over 85% of ICA Cristo Rey graduates are first-generation college bound. Additionally ICA has an ongoing commitment to new areas of academics, including a focus on STEM classes and programming, where they offer a range of classes for the students including conceptual physics to web programming.

"I was incredibly lucky to be exposed to drones and robotics at a young age, and we are super passionate about sharing that opportunity. By hosting events like this for our local community and youth groups, we're hoping that what we do day to day can inspire the next generation of pilots, engineers, and technologists of the future."

- Adam Bry, CEO of Skydio

At the Youth Fly Day, students rotated between stations to learn about a variety of topics, from the physics of drones and use cases to photogrammetry scanning and cinematography with drones. They even were able to fly the drones themselves, and experienced some of Skydio's unique capabilities like tracking and 3D Scan firsthand. Students gained insight into a range of technical functionality from how thermal cameras and antennas work to photogrammetry and how propellers work on quadcopters.

The day also featured a career panel where many of the women of Skydio shared advice and learnings from their own journeys pursuing STEM careers in the drone industry.



"Many of us who now work at Skydio or in the drone industry came in through round-about ways, so when we look at supporting the next generation of young women, it's vital we share how we all got here, what we overcame, what were the biggest impacts to our success, and what we wish we knew before starting our careers."
- Mira Marquez, Skydio For All

After the event, 30% of the students who attended the sessions shared a newfound interest in pursuing a career within technology and drones, with many noting that hearing from other women in the field during the career panel was invaluable.

Closing the gender gap in the drone industry won't happen overnight and while our Youth Fly Day event was a great start, it's just the beginning.

ICA's Corporate Work-Study program has been a part of the ICA Network of high schools for the past 26 years and uniquely integrates a rigorous academic curriculum with four years of professional work experience, providing students an opportunity to develop a life-changing career skills at an early age. As part of our commitment to helping foster the new generation of women engineers, pilots, and technologists, we're excited to continue our partnership with ICA through this program by offering their students the ability to apply and work with Skydio for the upcoming academic year.



We are thrilled to be working with ICA in the program and are looking forward to welcoming the first round of ICA students into our offices. ICA has over 30 schools across the country, all with corporate work-study programs. If you'd like to get involved and host students, we encourage you to reach out to your local ICA.



THE LINK BETWEEN UAS AND AAM

BY BILL JOHNSON

Wisk's Cora

Photo courtesy of Wisk Aero LLC



PRESIDENT, SINGLE SEAT CONSULTING

Bill "Whiteshoes" Johnson is a retired 26-year career as a Naval Officer who flew high performance jet, carrier-based aircraft. In 2007, he joined Northrop Grumman Mission Systems as program director for various advanced technology development efforts. In November 2020, he founded the independent consulting firm, Single Seat Consulting, LLC.. Bill holds a BS of Aerospace Engineering from the US Naval Academy, an MBA from Florida Institute of Technology and a MA of National Security and Strategic Studies from the Naval War College.

Advanced Air Mobility (AAM) encompasses aircraft with designs unique from the classical aircraft, either because of their propulsion system (electric) or their mode of propulsion (multirotor, blown-lift wing). These new designs provide a flexibility in operations that allows for a tremendous expansion of the existing mobility market. Grown from the initial focus on Urban Air Mobility and "air taxi" services, AAM vehicles now support a broad range of services. While the name still covers the shorter-range services in metropolitan areas, the AAM umbrella also includes the mid-range intracity- and regional market, and even the long range, transcontinental/transoceanic operations. Additionally, AAM vehicles provide not only passenger service, but cargo delivery. Therefore, by definition AAM encompasses the unique nature of Uncrewed Aerial Systems (UAS) for any of these markets.

Uncrewed Aerial Systems have been on the scene much longer, and, it can be argued, are the foundation of AAM. Many of the technologies seen first in the UAS market underpin the launch (pun intended) of AAM. Beyond pure technological examples, explosion of UAS operations drove significant changes by the FAA to allow the safe use of these vehicles in the National Airspace. Finally, identified as critical to the future success of AAM, public acceptance of uncrewed vehicles as safe and reliable is being proven everyday by the hundreds of thousands of accident-free miles flown every day by UASs.

Unique multi-rotor designs began with extremely small vehicles used for simple purposes and grew into a global market. These vehicles developed the key principle of distributed electric propulsion (DEP) - providing both safety and controllability with uniquely positioned, electrically driven rotors. While the ground electric vehicle explosion of the early 2000s accelerated battery and electric motor technology, the UAS market pushed electrification of aircraft forward by adopting these and other technologies as viable options for propulsion on aerial vehicle. Electric motors provide cost and mechanical efficiency through reduced parts count and exceptional effectiveness in converting energy to propulsive force. Battery and hybrid-electric systems have been successfully applied to commercial UASs operations from cargo delivery to crop-dusting for many years. All these advancements are being applied to the broader AAM industry.

Development of uncrewed and autonomous operations stands out as the most important technical development that will be affecting AAM. Safely eliminating the pilot and creating truly uncrewed aircraft allows an economic advantage due to the elimination of non-revenue producing passengers and cargo on the vehicle. This makes the smaller, UAM vehicles more economically feasible as a true replacement for ground-based mobility options like Uber, Lyft, and taxi cabs. The US military first demonstrated control of the uncrewed vehicles through remote piloting. The integration of autonomy to relieve the pilots of mundane tasks has been ongoing since the early stages of aviation.

The FAA is now working on integrating fully autonomous capabilities and BVLOS operations for uncrewed systems for commercial UAS vehicles into the National Airspace within the next decade.

The AAM market is exploding today due in large part to the significant advancements in aviation provided by the UAS industry. This raising tide of opportunity in aviation will also lift the UAS sector. Businesses will continue to enjoy the expansion of their acceptance by the public as well as increased operation authority.

Individuals working in the UAS industry will find even more openings to their unique talents. Thanks to the efforts of the UAS community, the future is growing brighter by the year!



Joby S4 Aircraft

Courtesy of Joby Aviation. © Joby Aero, Inc.

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Drone Harmony is a great help in Alaska



Randy Fulweber: GIS & Remote Sensing Manager for Toolik Field Station at the University of Alaska Fairbanks, makes use of Drone Harmony for research, monitoring and mapping the progression of once permanently frozen ground (permafrost) in northern Arctic Alaska. We were invited to talk with him.

Drone Harmony: Randy, please introduce yourself

I am the manager of the Toolik Field Station GIS and Remote Sensing Department, but I started my adventure with Toolik in 2008 as an analyst and field technician. My staff and I work closely with visiting scientists to integrate geospatial data and analysis into their research. During the relatively warm Alaskan summers, we battle mosquitoes to collect UAS and other geospatial field data in some of the most remote and beautiful areas in northern Alaska. During the cold winters, we return to our warm offices at the University of Alaska Fairbanks to process and analyze the data we collected and deliver products to our colleagues.

Drone Harmony: For what research do you use Drone Harmony?

We use Drone Harmony exclusively to plan and execute our UAS flights in northern Arctic Alaska, where we support ecological research, such as monitoring and measuring changes in plant phenology across different tundra communities and mapping the progression of snow melt across landscapes. Drone Harmony has been especially helpful in planning and executing UAS flights in support of thermokarst research.

Thermokarsts

As the Arctic becomes warmer and wetter, pockets of once permanently frozen ground (permafrost) are beginning to thaw causing the formation of sinkholes known as thermokarsts. When individual thermokarsts form and expand, an influx of soil nutrients and sediment are transported into streams and lakes, which can change the water chemistry and may have potentially negative impacts to local food webs.

Toolik Field Station (TFS) scientists have been studying thermokarsts in northern Alaska for more than a decade. As the prevalence and size of the thermokarsts have increased throughout our region, the tools and techniques we once used to measure and map these features quickly became inefficient. Using traditional field survey techniques, our field team of 3-4 people would need 4-8 hours to complete measurements of a single thermokarst. Now with our drones and DH, our field team can image an entire thermokarst in about 2 hours. From this image, we can complete measurements of the thermokarst from our office computers. Especially important to our research, the terrain-aware function in Drone Harmony has enabled us to more accurately track volumetric changes in soil erosion and deposition within thermokarsts over time.



Fig.1

Fig.1 -The yellow line delineates the perimeter of an active thermokarst. Within the yellow perimeter, the grey-colored areas are a slurry of thick, muddy, thawed permafrost soil slowly sliding down the hillslope and into the lake located in the bottom left corner of the photo. The white cloudy color of the lake water is a result of high soil deposition. The patchwork of green-colored areas with the yellow line are clumps of vegetation. The blue line delineates the perimeter of an older thermokarst that is no longer active and is undergoing revegetation.

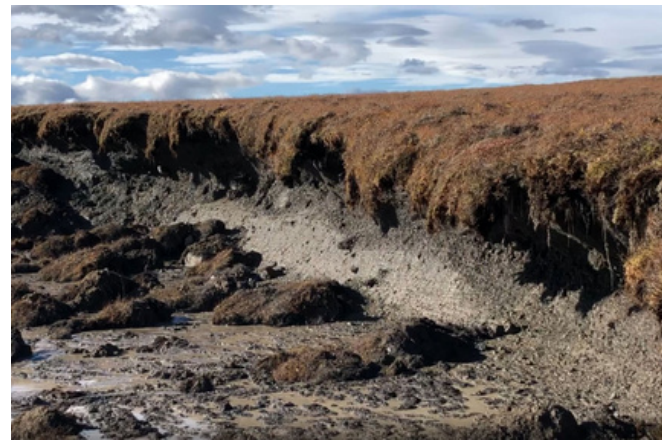
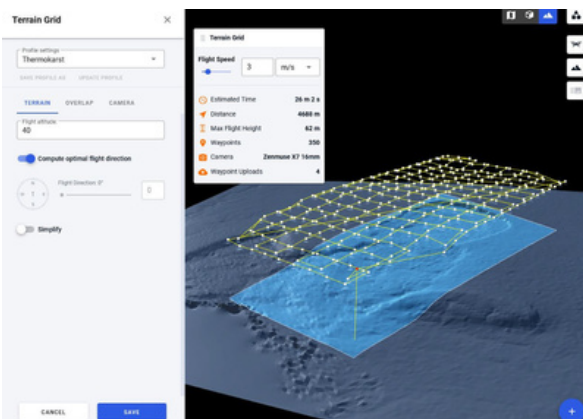
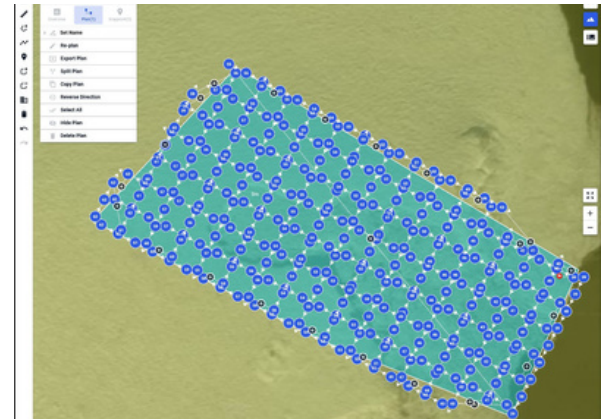


Fig.2

Fig. 2 -The thermokarst headwall- site of active thawing of permafrost soil.



Thermokarst flight planning with Drone Harmony terrain view.



Thermokarst flight planning with Drone Harmony 2d view.

Drone Harmony: Which drones and cameras do you use?

We fly two drones: a DJI Matrice M210 v2, and a DJI Matrice M210 v2 RTK. To produce high resolution imagery and Digital Elevation Models, we collect imagery with a DJI x4s camera or a DJI x7 camera with a 16mm or 24 mm lens. To support vegetation research we use a Micasense RedEdge MX camera. We use a Klau Geomatics PPK system to improve the accuracy of the GPS coordinates written to each photograph.

Drone Harmony: What are the challenges that you are facing when performing your work?

In northern Alaska, weather windows that allow for safe drone flights are often short. The ability to preplan flights with Drone Harmony in the office and to make rapid adjustments in the field has been invaluable.



After a soggy 1.5km hike across tussock tundra, Pilot-in-Command Rowan McPherson (r) monitors Olivia Cronin-Golomb (l) as she pilots our DJI Matrice M210 fitted with a DJI x4s camera and a Micasense multispectral camera to capture images of tundra vegetation on the North Slope of Alaska.

Drone Harmony: How much time do you need for planning and executing the mission?

For us, flight planning with Drone Harmony begins in the office and takes less than 15 minutes. Once we arrive at a research site, we often need to make slight alterations to our flight plan on our drone tablet to account for unexpected terrain features or conditions. Thanks to the user interface, we can make and save edits in less than 5 minutes and then immediately execute the flight plan.



Jorge Noguera (top) acts as Visual Observer to monitor the airspace and keep the flight area free of curious pedestrians while Rowan (bottom) carefully lands the drone.

Drone Harmony: Are drone inspections in general already established for your kind of work and studies?

In our field of research, there is rapid growth in the use of drones to record environmental change across broad spatial scales while maintaining high levels of detail. Some of the data that DH helps us collect has been shared with the High-Latitude Drone Ecology Network (HiLDEN), a group of ecologists who specialize in the use of drone technology to capture ecological data across the Arctic.



On our way to fly our drone in our "backyard". The area immediately south of Toolik Field Station is home to a variety of research projects. Access to this area is via elevated boardwalk which protects the delicate vegetation from heavy foot traffic. Rowan (l) leads the way carrying a 20lb backpack full of drone batteries and accessories while Olivia (r) packs our drone in its case.



Rowan launches our drone at the hillslope research site near Toolik Field Station.

Drone Harmony: Do you have other thoughts you would like to share with us?

Drone Harmony makes it easy to plan and execute flights. Even the most novice of our student interns and seasonal employees can readily pick up the skills necessary to operate our drones, allowing them to effectively participate and contribute to our drone research. It is exciting and rewarding to watch their confidence and enthusiasm grow as they quickly gain experience with Drone Harmony's user-friendly interface.

Drone Harmony: What did using Drone Harmony enable for your research?

The most important feature to us is the ability to use custom DEM files to plan and execute terrain-following flights. This feature enables our drones to follow the contours of the terrain and allows us to make more accurate calculations for our image products than would otherwise be possible. Another favorite feature of ours is the ability to resume flights. We have many large flight areas that require multiple drone battery swaps to complete the mission. With Drone Harmony, we can change the batteries and immediately resume a flight where it left off, helping us to efficiently complete long missions without having to manually edit flight plans to remove completed waypoints.



To supplement our drone data, Reyce Bogardus (now a PhD student with the University of Alaska Fairbanks' Arctic Coastal Geoscience lab) paddles an inflatable pack raft rigged with our sonar and GNSS equipment to collect 3D bathymetric data of a research lake.

Toolik Field Station (TFS) is a research station located in northern Alaska, operated by the Institute of Arctic Biology at the University of Alaska Fairbanks, and receives base funding support from the Office of Polar Programs and the National Science Foundation. TFS welcomes scientists from the US and around the world.



© Toolik Field Station

Thank you Randy for these exciting insights into your work and keep up the safe flights!

TAKING DIVERSITY TO NEW HEIGHTS IN THE DRONE INDUSTRY

By Corliss Hill



Diversity Hands Vectors by Vecteezy

In recent times, many organizations have announced diversity, equity and inclusion (DEI) as a top priority for their industry or company, but some still struggle to fully understand what it entails and the full significance of how important it is to business.

Leaders in the aviation and drone technology may especially be unclear about ways to elevate DEI initiatives given the historical implications of this sector, which has struggled to represent diversity specifically across gender and ethnicity.

DIVERSITY IS KEY TO GROWTH

It's simple, diversity matters... and is good for people and business. According to a [McKinsey report](#) titled "Diversity Wins: How Inclusion Matters," companies in the top 25 percent for racial and ethnic diversity are a whopping 35% more likely to have financial returns above their respective national industry median. And diversity of thinking enhances innovation by 20%

Based upon research from [Deloitte](#), findings show that diversity of thinking leads to enhanced creativity - enabling groups to spot risks, reducing these by up to 30 percent.

CURRENT STATE

The drone industry represents a \$22 billion industry - but it lacks diversity. Of all certified drone pilots, only 6.7 percent are women, and less than 3 percent are women of color. The industry stats are alarming showing that there is a tremendous opportunity for growth within this lucrative industry.

The aviation industry has historically been male dominated. According to most recent statistics in the U.S., less than 7 percent of all pilots are female, and only 3% in non-pilot, aviation careers. These systemic challenges continue to reinforce a bias toward male participation in the aviation industry worldwide.



CORLISS HILL

Corliss is a seasoned Marketer and DEI Strategist with experience leading high-visibility campaigns and new business initiatives in financial inclusion and health equity to make a significant impact in marginalized and undeserved communities. As an award-winning Marketer, Corliss has been recognized for driving ground-breaking brand initiatives, award-winning MarComm campaigns, innovative multicultural marketing programs, and sustainable community engagement efforts. Corliss is also a former Lifestyle Editor at Essence magazine.

TAKING DIVERSITY TO NEW HEIGHTS

Shifting to a diversity mindset within the aviation and drone industry will require a steady drumbeat of change. As the saying goes, "you can't boil the ocean," but you can create sustainable change if you do it right from the start. As you think about ways to effect change - big or small - here are eight best practices to start your journey.

1. Define your purpose.

Why does your organization or business want to engage in a DEI initiative? If your answer is, "because it's the right thing to do," it's time to dig deeper. Forming a business case for diversity that defines your purpose for engaging in DEI efforts is one of the first steps you should complete as an organization. This involves aligning your overall business goals with your DEI goals, as well as identifying and engaging key stakeholders.

2. Build your DEI vocabulary.

There are several terms to understand within your DEI work. Too often, folks tend to only equate diversity with gender, race and ethnic identity; but it also encompasses a full spectrum of other characteristics and unique attributes, including sexual orientation, gender identity, age, social class, physical ability, and religious or ethical values system.

To learn more, refer to various DEI resources such as the [Harvard University Glossary of Diversity, Inclusion and Belonging \(DIB Terms\)](#) or [University of Pittsburgh Diversity, Equity, and Inclusion Glossary](#).

3. Assess Your Current state and Set Measurable Goals.

Take the time to work through the state of your organization to assess where you are and where there's room for improvement.

1. Examine your data. What is the current diversity breakdown of your organization? What about within the leadership team? Where are opportunities for growth?
2. Look at your recruitment efforts. Where are you recruiting? Are you seeing diverse individuals applying for positions? If so, are they receiving interviews and offers? Are there opportunities to reduce/remove bias in your hiring process?
3. Listen to your team. Create opportunities for your employees to provide feedback in a safe environment.

Reviewing and answering these critical questions is just the beginning. Once your assessment phase is complete, create goals and metrics that are actionable and will address areas of concern you've identified.

4. Lead with Passion.

Moving the needle takes a commitment from the top down. The best way to gain commitment is to make diversity and inclusion an organizational goal and include it in performance metrics. It's critical your leadership team is committed to diversity, equity and inclusion. Without this buy-in, these efforts are doomed to fail.

5. Communicate, Communicate. Communicate

When you're just starting out with DEI work, it's best to over-communicate your vision, goals and business case for diversity. Leaders should explain the process every step of the way to set and manage expectations and to help peers and employees understand how they can participate. Regular communication will become important for creating a culture of accountability and making sure your words translate into tangible action.

6. Leverage a Pro.

If you don't already have a subject matter expert managing diversity and inclusion, hire one. Building a successful diversity and inclusion initiative requires a unique set of skills, including leadership, influence, collaboration, strategy, strong communications skills and expertise in multiculturalism. And if you do have someone in place, set them up for success by ensuring resources are in place to help them efficiently execute the task at hand.

7. Training is Key.

Training is one of the best ways for employees and colleagues to understand how their perceptions may be sabotaging inclusive words and behaviors. Sometimes it's as easy as a short video at a team meeting and a facilitated exchange. Other times, organizations may require a deep dive on unconscious bias and how it negatively impacts certain groups of people.

8. Celebrate Progress.

Executing a successful DEI initiative takes time and valuable resources. Take time to celebrate accomplishments along this journey and highlight how individuals and businesses within the aviation sector are benefiting. Culture change is a slow process but, any and all, progress is worth sharing.

The importance of diversity, equity, and inclusion is a reflection of a shifting culture and dynamic within the U.S. Developing a strong strategy and metrics are critical to creating a culture that is inclusive, equitable, and safe, while also attracting and retaining diverse talent. And staying the course is critical to flying high and helping to break down greater systemic barriers and biases.

To learn more and gain insights about the current DEI benchmarks for the UAS and AAM industry across a range of sectors in the market, download the [2021 UAS/AAM Industry DEI Survey Report](#).



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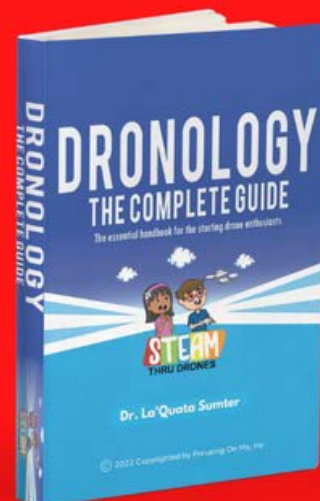
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DRONE LAW WITH LORETTA

FAA Changes Drone Enforcement Sanction Policy

AND IT'S NOT A GOOD THING FOR REMOTE PILOT CERTIFICATE HOLDERS

By Loretta Alkalay and Kathy Yodice

What is the FAA's Enforcement Handbook?

For decades, the FAA has had in place an internal handbook for employees to follow when deciding how to process possible violations of federal aviation laws and regulations, including setting out appropriate sanctions for such violations. FAA's Order 2150.3C, FAA compliance and Enforcement Program, is that handbook and is the FAA's internal guidance for handling FAA investigations and enforcement decisions.

Without any notice or explanation to the drone community, the Federal Aviation Administration made a significant change to its enforcement sanction policy last year specifically directed to cases the FAA takes against drone operators accused of violating FAA's regulations. While this change doesn't affect the criteria the FAA will use to determine when to take an informal administration action versus a legal enforcement action, it does change what sanctions against remote pilot certificate holder can flow from those circumstances when the FAA does take legal action. This new policy changes decades of prior airman sanction policy and applies only to drone pilots.



That is, going forward, when the FAA makes the decision to revoke a remote pilot certificate, the FAA intends to also impose and collect a civil penalty against the individual who held that remote pilot certificate. For almost all other airman certificate cases, when the FAA revokes the certificate, that is the only action the FAA takes. Now, for remote pilot certificate holders, the FAA will take double action. The FAA justifies this change by claiming that "the FAA has observed a proliferation of 14 C.F.R. part 107 violations evidencing a lack of care, judgement or responsibility, including by remote pilot certificate holders." The FAA legal office appears to have quietly drafted and adopted this new policy into its enforcement handbook in February 2021.

While not regulatory or strictly mandatory, the handbook sets policy guidance that is generally intended to be followed by agency employees to promote standardization and uniformity: "[t]his order guides FAA personnel in the exercise of discretion in handling compliance and enforcement matters." It is possible to deviate from the handbook, but it's generally understood that the handbook will be followed unless there are extenuating circumstances.

This Order is internal only and directed at how FAA employees are expected to act in gathering evidence and analyzing that evidence and moving forward, or not, with an action. Because the documents sets forth procedures for how matters are handled internally, it's not something that anyone in the flying public would normally consult when determining how to safely and compliantly conduct their own flying activities. And, while it is a document that is available to the public, it was drafted exclusively by FAA personnel without any public comment or input.

What is the FAA's Sanction Policy?

Included in the enforcement handbook are the FAA's guidelines for setting sanctions for statutory and regulatory violations by individuals and entities regulated by the FAA, including drone pilots. That sanction policy is generally contained in Chapter 9 of the FAA's Order with changes and exceptions sometimes captured elsewhere in the Order. The sanction policy is intended as general guidance to FAA personnel for setting a sanction once it has been determined that legal - as opposed to administrative - action is warranted. While the general guidance on choosing when to take remedial (revocation) versus punitive (suspension or civil penalty) sanctions allows for both sanctions when specific circumstances warrant, the FAA recognizes that, "the FAA does not generally impose both a remedial and a punitive sanction when the remedial sanction is the revocation of an airman certificate." Now, the reverse is true for drone pilots- both remedial and punitive sanctions will be the norm whenever the FAA determines that a drone pilot's Part 107 certificate should be revoked.

So, What exactly Is this New Drone Pilot Sanction Policy?

The new sanction policy requires FAA prosecutors to generally seek both remedial and punitive sanctions when a drone pilot's actions are determined to demonstrate that the remote pilot certificate holder lacks the "care, judgement and responsibility" the FAA will revoke her remote pilot's certificate (remedial sanction) AND pursue a monetary civil penalty (punitive sanction).

Specifically, the FAA's guidance states as follows:

Action: Until further notice, the following sanction guidance is in effect for holders of a remote pilot certificate who engage in conduct in violations of 14 C.F.R. part 107 that demonstrates a lack of care, judgement, or responsibility.

When the holder of a remote pilot certificate engages in conduct in violations of 14 C.F.R. part 107 that demonstrates a lack of care, judgement, or responsibility, the FAA generally will proceed with both remedial legal enforcement action in the form of a civil penalty for any regulatory violation.

What Violations Demonstrate a Lack of Care, Judgment, or Responsibility?

According to the FAA's enforcement handbook, "the FAA may revoke any certificate holder lacks the qualifications to hold the certificate. A certificate holder may lack the qualifications to hold the certificate because of a lack of technical proficiency or a lack of care, judgement or responsibility required of a certificate holder." While the FAA does not specifically define what conduct demonstrates a lack of care, judgement or responsibility, the FAA maintains that such deficiencies can be demonstrated by a pattern of conduct or by a single event.

From experience, violations that normally result in revocation include,

- falsification or intentionally false statements on any FAA required record, such as an application for a certificate or a logbook entry;
- cheating on a test;
- acting or attempting to act as a pilot while under the influence of alcohol or drugs, with an alcohol concentration of or above, or within 8 hours of consuming alcohol;
- refusing to submit to a drug or alcohol test; performing a safety-sensitive function with a prohibited drug in the system;

- operating an aircraft with knowledge that illegal controlled substances are carried;
- drug convictions other than for simple possession (some exceptions for convictions more than 5 years old) ; and
- repeated or intentional conduct in violation of a single or multiple regulations.

In addition, violations that the FAA determines are "egregious" include those that result from deliberate conduct that poses a significant threat to aviation safety.

Where Do We Go from Here?

There is little that the public can do to change the FAA's internal guidance. First and foremost, all drone operators should be diligent in staying informed, in maintaining proficiency, and in planning and executing their flights in compliance with all laws that apply to their activities. Avoiding an FAA action in the first place is your best defense. However, if you do find yourself in the FAA's crosshairs, defending against this FAA policy of "double jeopardy", and winning, may be the only way to rid the FAA of this particular sanction policy.



LORETTA ALKALAY

Loretta Alkalay is an aviation attorney, specializing in issues related to compliance with federal aviation regulations, including drone rules. She was an attorney for the Federal Aviation Administration for over 30 years with more than 20 of those years as Regional Counsel in New York. Loretta is also an adjunct professor at Vaughn College of Aeronautics and Technology where she teaches drone laws, aviation safety and other courses. She has taught for Vaughn in joint degree programs with universities in Hyderabad, India and in Shanghai, China. Ms. Alkalay holds a B.A. from Cornell University and a J.D. from the NYU School of Law. She holds an FAA remote pilot certificate with sUAS rating. She is on the Board of the Professional Aviation Maintenance Association, the chair of the Scholarship Committee of the Aerospace Maintenance Council and an adviser to Woman Who Drone.



KATHY YODICE

Kathy Yodice has been practicing aviation law for 37 years, starting her career as an FAA attorney before going into private practice. She represents individual and corporate clients on all aspects of aviation law, including issues relating to FAA compliance and investigations, airport and airspace access, corporate governance, aircraft transactions and business contracts. Kathy enjoys close relationships in the aviation community through her membership and leadership roles in many organizations, including at General Counsel and member of the Board of Women in Aviation International, and through her writings and her presentations at aviation events. She is an adjunct professor at Kent State University, and Kathy is an instrument rated private pilot.

WOMEN OF COLOR IN UNCREWED AVIATION



Our Women of Color series profiles a remarkable group of accomplished women. Like many in the industry, they bring extensive career experience and have developed a love for the industry. Because of their range of backgrounds, we've asked them to share their journey before coming into the industry. We think you will enjoy reading about the ladies who are, in their own way, contributing to the growth of the UAS/AAM industry.



Meet the First Black Woman to Lead Drone Delivery Operations in Atlanta, GA

Drone Express is taking package delivery to new heights.

Stephanie Jones, A Mid-West native (Go CAVS!) has made ATL her home for over a decade. She is the Associate Vice President for Drone Express, where she inspires and nurtures a team of talented Drone Pilots and Visual Observers. She brings to Drone Express years of experience in education, consultation, creativity, and public speaking. An avid drone enthusiast, before joining Drone Express, she founded the group Women Who Like Drones to spread her knowledge and enthusiasm for drone operations to women who are often in an unrepresented group here in the Atlanta area and across the country.

She is proud to be a part of Drone Express and looks forward to many years of expansion and growth with the company.

DESCRIBE YOUR CURRENT ROLE IN THE INDUSTRY

I am the Associate Vice President for Drone Express. I lead an incredible team of Drone Pilots & Visual Observers with whom I am honored to mold into UAS (Unmanned Aircraft System) Aviators capable of keeping our operations safe and efficient. I am a leader who believes in our mission to explore the limitless possibilities through drone technology.

PLEASE SHARE A FEW FUN FACTS ABOUT YOURSELF.

People close to me, except for my spouse, thinks I have a great sense of humor LOL See?! I just made you laugh LOL

I said to myself, "Self, if this drone thing doesn't work out, I'll do standup comedy."

Then my spouse always dips in and says, "But you're so good with drones." LOL

DESCRIBE YOUR "DREAM JOB" IN AVIATION.

Honestly, working with Drone Express is a "dream job." I look forward to helping us expand even more. I used to want to join the Air Force to fly planes, but I did not have perfect vision. Flying drones, for me, is the next big thing.

WHAT ADVICE WOULD YOU GIVE TO THE NEXT GENERATION OF FEMALE LEADERS?

"Move forward, be as great as you know you are, and never lead your people astray."

REFER A FRIEND OR COLLEAGUE



SHARE YOUR FAVORITE BOOK OR MOVIE:

My favorite book is, "The 17 Undeniable Laws of Teamwork" by John C. Maxwell. The subheading says it all... "Embrace Them & Empower Your Team."

My true intention as a leader is to empower my team. The book has done an excellent job of breaking down the importance of keeping the goal in front of the role.

TELL US ABOUT SOMEONE WHO HAS INSPIRED YOU

I am continually inspired by the audacity of Bessie Coleman's example. As the first Woman and African American to fly winged aircraft, she embodies the courage, will and foresight we need to be the brilliant leaders of tomorrow. The landscape of drone technology is dominated by men, and I feel fortunate to not only have these historical examples of women pioneers in this industry, but also lead and work under the leadership of other forward-thinking women. Together, we are changing the face of who and what a drone pilot looks like.

THINGS THAT PEOPLE MAY NOT KNOW ABOUT ME.

Although many find me easy to talk to and fun to be around (an apparent extrovert). Many people don't know that I avoid large crowds and gatherings because the energy overwhelms me and it gives me anxiety. It can be a downer sometimes because it can be hard to enjoy a cool festival or an event that comes to town. Many times, I'll choose to go anyway in order to experience the small victories when I move beyond temporary discomfort. I also have a fear of heights that used to sort of paralyze me, but that is getting better too. It's interesting to be a drone pilot, with a fear of heights.

www.droneexpress.com





Sky is not the limit anymore!

Time to fly, we can fly!

Horten L. Pomales is a successful Puerto Rican woman established in Texas since 2018. She works for the University of Texas Medical Branch in Galveston as an Acquisition Specialist, in the purchasing and procurement department. She has more than 15 years of experience in purchasing in which she focuses on achieving delineated objectives, focuses on excellence, enforcing the necessary rules, and follows procedures and applicable laws.

As part of her duties she identifies qualities and strengths necessary to perform successfully. She achieves this by paying attention to details, focusing on achieving results, identifying the good qualities and strengths of other people to motivate them, and working in harmony as a team. She considers her best quality as being very optimistic.

Horten has a Master's degree in Public Administration with a concentration in Human Services Administration. Although she has never exercised this in her current profession. She has

applied her knowledge by serving in various non-profit organizations, either collaborating or as a volunteer.

One of her passions is to serve the community, the people, and to share knowledge. She takes part in this by educating and providing information from organizations that she participates in. The information is accessible and valuable. Various programs, and projects are created and have to be revealed and shared. To do that we must disseminate the information and bring it to the population. To sow the little seed, the curiosity, the new skills and knowledge to achieve change. This can be done through volunteering.

The passion for learning, exploring new horizons, making things happen has led Horten to join non-profit organizations and work as a volunteer. In Altrusa International Humacao Club, she carried out community services and activities for disadvantaged children. At the Permaculture Institute of Puerto Rico, she offered talks in sustainability and also was featured on television shows informing citizens of how to apply sustainability in their newspaper. 4-H National Youth Science Day 2016- Drone Discovery, she joined the 4H Club as a volunteer and this program welcomed her to the technological and fascinating world of drones.

She was trained to provide the activities in one of the schools where the Club existed. The amazement, the excitement, and the advancement in the technology inspired her to know more and consider it further.

She arrived in Texas after seeing the ravages of Hurricane Maria in Puerto Rico in 2017, having participated in the various programs and phases of reconstruction for the victims of the island as an inspector. She recognized the importance of carrying out inspections responsibly, so she studied and earned her Adjuster license. She is now preparing to complement it with aerial roof inspections using a drone.

Horten continues to learn and join additional organizations. In 2020 she joined the CERT group where she participated in the academy and joined the Drones team. She earned her NASAR SARTECH II Certification as well.

She earned her Part 107 and received her FAA remote pilot certification. She then officially jumped into this drone adventure. She joined the Women and Drones group, to find a supportive community. This was a great opportunity, that provided valuable information and excellent resources. She later contacted Sharon Rossmark the CEO and founder of Women and Drones to discuss the up and coming Disaster Response Workshop. The conversation was both inspiring and mentoring. In May 2022 Horten had the opportunity to participate in the training workshop covering Emergency Management with Women and Drones at Texas A&M University, located in College Station. Dr. Murphy was in charge of training and shared her expertise in this workshop. The workshop was filled with amazing women and it provided great knowledge of the drone industry. Horten believes that learning, serving, teaching and motivating is her passion. The future is bright for everyone.

THINGS THAT PEOPLE MAY NOT KNOW ABOUT ME

I love to take pictures.

I jumped from an Airplane! I made tandem skydiving in Puerto Rico

WHAT ADVICE WOULD YOU GIVE TO THE NEXT GENERATION OF FEMALE LEADERS?

- Do not settle. Do your best every single day. Keep the passion for learning new things, challenge yourself and have intention in everything you do.
- Work in leaving a long-lasting legacy.
- Be a volunteer. The world needs your hands, knowledge, and skills to make things happen.
- Believe that something amazing will happen. Work with determination for what you want. Keep trying.
- Failure is a good teacher. It shows you that you are trying to make things possible. Have enough courage and determination to learn from your errors and put into actions your desires to achieve your goal
- Plant the seed of curiosity in your kids, and share your passion with others. You will be surprised how much you can transform their lives.
- In this new world of robotic era being a human is a superpower, be kind, motivate and level up others too. It is a must!

DESCRIBE YOUR CURRENT ROLE IN THE INDUSTRY

I am currently a beginner, a newbie, and apprentice in the drone industry. With an enormous passion to learn from this industry. This is the perfect time to be immersed, to prepare, and be equipped in this field that is growing exponentially with a promising future.

In February 2022 I obtained the FAA Part 107, and became a Certified Remote Pilot. My main goal at this stage is to acquire skills and abilities to reach an advanced level in the next six months. At this point I will be able to maneuver, understand the adjustments, the settings, and to take good photos and videos. All this while I acquire the specialized knowledge needed as an independent adjuster in the aerial roof inspections industry.

I belong to the Galveston County CERT Drone Team since 2021. At this moment, I am performing exercises and training so I may gain the skills that will help me advance in flight for emergency management, disaster management, security, and search and rescue.

SHARE YOUR FAVORITE BOOK OR MOVIE:

Books:

- The little Prince Antoine de Saint-Exupery
- The Ten Ancient Scrolls for Success Og Mandino
- Elevate your Standards: Building an Operations Manual for your Uncrewed Aircraft Systems Company, Desiree Ekstein

Movie:

- The Intouchables, comedy-drama film 2011 (inspired by a true story)





Taking to the skies in Africa

Delay is not denial

TELL US ABOUT SOMEONE WHO HAS INSPIRED YOU.

To be honest my mother Janet is my inspiration. She gave up a comfortable life in Africa so that I could have a better future. My mother and I relocated to America back in 2000, she had a well paying job back in Kenya but she gave it all up for me. With chronic backpain she started all over in America making a lot less then she previously did. It wasn't easy for her but she did what she had to do to see me through school. Eventually she went to nursing school and she currently works as a nurse in Illinois. I have never come across a woman as strong as she is. She inspires me a lot and she is the reason I keep going even when things get tough. I love you mom.

**REFER A FRIEND
OR COLLEAGUE**

Lyela Mutisya graduated from Lewis University with a B.S. in Aviation Administration and minor in Unmanned Aircraft Systems in 2017. Later that year she became a certified Part 107 as well. Lyela's passion for drones begun while she was in college. She had the desire to use drones to help her father grow quality coffee. Her goal was to use drone technology to help him increase his yield and the quality of his coffee all while decreasing his output costs. Several years later Lyela's desire will soon be a reality. In addition, she is currently on the forefront of using drone technology to deliver critical medical supplies to rural and inaccessible places within Africa. She currently operates VTOLS and primarily flies BVLOS missions. She currently holds a class 3 medical certificate, and she is licensed to fly drones in Kenya.

DESCRIBE YOUR CURRENT ROLE IN THE INDUSTRY

I am currently a Drone Pilot Lead for a medical logistics company. In my current role I oversee all the drone operations within Africa. I am responsible for creating Standard Operating Procedures, ensuring pilots are trained and obtaining the required operating licenses.

In addition, I am a Director at Agri Drone Technologies a private for profit company that offers services for profit and research purposes as well. At Agri Drone Solutions we offer leading agricultural drone solutions to both large and small scale farmers. We also offer trainings, and we are currently working on becoming an authorized distributor for a particular multispectral sensor company within Africa.

WHAT ADVICE WOULD YOU GIVE TO THE NEXT GENERATION OF FEMALE LEADERS?

Never ever give up on your dreams, delay is not denial. In an article written by Drone360 back in 2016 I first shared with the world my dream of using drones to help my father grow quality coffee. Several years later everything I said I wanted to do is slowly but surely becoming a reality. I have learned a lot over the years and I look forward to what the future holds.

My second and the most important advice I would give to the next generation of female leaders is to put God first, Matthew 6:33 "Seek the Kingdom of God above all else, and live righteously, and he will give you everything you need".

DESCRIBE YOUR "DREAM JOB" IN AVIATION.

It has always been my dream to fly drones here in Africa. I am currently living my dream and I thank God for making it possible.

THINGS THAT PEOPLE MAY NOT KNOW ABOUT ME

I was born in Nairobi Kenya but I was raised in Chicago, IL. After living in Chicago for 21 years, I relocated back to Kenya last year.

My passion for unmanned aircraft's started after taking an Intro to Unmanned Aircraft's System elective course while at Lewis University.

I want to become a full time preacher.

PLEASE SHARE A FEW FUN FACTS ABOUT YOURSELF.

I enjoy Safaris and wildlife so I couldn't be happier now that I get the opportunity to see wildlife often,

I take mini monthly vacations where I spend a whole weekend in church. During this time I disconnect from the outside world and focus on my relationship with God. I am usually a lot more focused and empowered.

SHARE YOUR FAVORITE BOOK OR MOVIE:

Favorite Book:

The Bible

My favorite movie is "The Boy Who Harnessed The Wind". I would recommend it because it is a great example of what happens when you persevere. Nothing good in life comes easy, so long as you keep working and moving forward, you will be successful and end up just where you need to be.





Charting my own path to success

Influenced by the steps ahead of me

WHAT WOULD BE YOUR "DREAM JOB" IN AVIATION.

As my career takes varied turns in the industry, I am fascinated more and more by trying to inform others about aviation and my path. I find that many people and particularly young people in my community, never consider aviation as a means for a viable career path. Ultimately, I want to reach out and inform others to consider aviation as a unique opportunity.

[REFER A FRIEND OR COLLEAGUE](#)

Lissa Bern has always been an aviation enthusiast. She fell in love with aviation at a young age as her family traveled via airplane almost every vacation. This led her to pursue an interest in getting her Pilots License, seeking out her passion for aviation and attending Embry-Riddle Aeronautical University. In college, Lissa faced challenges, as did many when 9/11 drove the aviation industry into a slump. However, for Lissa, this created an opportunity to continue with further studies. Lissa proceeded to earn a Master's in Safety Science at ERAU. Upon completing her master's degree, she headed into the industry with a job at Rockwell Collins as a Safety Engineer. Lissa still resides in the Midwest and works today as a Sr. Principle System Engineer with Collins Aerospace where she currently supports Unmanned Aircraft System (UAS) and Integration for her organization. She has been with the company for over 16 years and supports various initiatives, including the African American Professional Forum (AAPF). Lissa enjoys working on new and novel technologies, defining parameters, and seeking the answers to unanswered questions. Her passions continue with pursuing additional skills and is currently in her second year as a doctorate student at ERAU, focusing on UAS. In her minimal spare time, she enjoys spending time with her family, traveling, and flying her DJI Mini 2.

TELL US ABOUT SOMEONE WHO HAS INSPIRED YOU.

The person who inspires me both professionally and personally is my mother. She has consistently shown me that in any situation, regardless of your skill level, the way you carry yourself and respect others is how others view you professionally. This equates to treating others with respect and, at the same time, challenging the status quo to complete a task with the utmost integrity. She inspires me because while trying to advance her career and going back to school, she was always very supportive in any study or challenge we needed to overcome. Although she never graduated college, she excelled professionally by increasing her skill set on the job and making the appropriate connections, all while holding her integrity when faced with adversity. At a very young age, she was the first in her family to travel abroad to study in a foreign country in a field she knew nothing about or even anyone for that matter. She persevered against all odds during her career to push the needle for herself and others to follow in her footsteps. Seeing her push through many barriers and being the first woman and person of color many times proved to me that I could have the same outcome. Although it is not as easy as it sounds, she always gave me the truth about how to handle varied situations and what to expect. This allowed for a more realistic approach to expectations and the reality of outcomes. As I continue in my career, I use these skills today in my current field within the aviation industry, which has given me the ability to constantly push boundaries and become the first in my area to represent others like myself. Although my mother is retired from a long career in the medical field, she still supports and inspires others to challenge the status quo with integrity constantly. This has always been what I believe needs to be done when doing a job and task successfully.

THINGS THAT PEOPLE MAY NOT KNOW ABOUT ME

Over the course of my career, people have always been intrigued when I have told them I have my Private Pilot License single and multi-engine ratings. Once they find out I am a pilot, the conversations take a different turn which I genuinely enjoy entertaining. From there it can evolve into other great topics. Since my family is originally from the Seychelles Islands, conversations around that always is a game-changer as most people haven't ever heard of the islands and have many more questions such as "where is that" or "how do you pronounce Seychelles" (it always makes for a great ice breaker).

WHAT ADVICE WOULD YOU GIVE TO THE NEXT GENERATION OF FEMALE LEADERS?

I would encourage the up-and-coming leaders to keep learning and challenge the things that do not make sense. As change occurs it is important to learn how to evaluate, maintain and adapt as necessary to allow for appropriate action. When things do not make sense it is important as well to understand why to appropriately take the next steps. Only then as a leader will you be able to help and lead teams effectively. Although all challenges are unique and varied it is important to address both failures and successes to learn from both outcomes.

PLEASE SHARE A FEW FUN FACTS ABOUT YOURSELF.

I have two s's in my name and is most often pronounced incorrectly.





Every Move I Make Develops My Dream

Strengthening Communities One Drone Flight at a Time

WHAT ADVICE WOULD YOU GIVE TO THE NEXT GENERATION OF FEMALE LEADERS?

- Commit to a people first mindset.
- Lead from an authentic you. We don't need cookie cutter leaders, it delays growth.
- Keep moving. You will have great moments and failures, but just keep going
- Develop your instinct and trust it. You will do more harm than good second guessing yourself.

REFER A FRIEND OR COLLEAGUE

For more than 20 years, Alecia Kates has served as community developer and is experienced from nearly every angle. She is a leader, facilitator and implementer for neighborhood, district and regional community development initiatives with environmental platforms that empower communities to excel socially, environmentally, and economically.

Alecia graduated from Iowa State University in Ames Iowa with a degree in Rhetoric and Professional Communications, Technical Writing. She pivoted from a career in technical writing to community development when she became the membership director and eventually program executive director of a YMCA branch in Des Moines, Iowa. She oversaw operations and program development for the member services, childcare, aquatics and health and fitness departments. Some of her favorite YMCA experiences involve expanding the active older adult program, helping to develop a city-wide youth life skills conference and introducing wellness coaching to the community.

While taking time away from the workplace to raise her son, Alecia started a 1/4 acre, 30-bed community garden featuring native plants. Through the community garden initiative residents were paid to deliver garden-based nutrition classes at the neighborhood elementary school and local teens earned money preparing neighbors sites for gardening.

Alecia returned to the workplace as the executive director of the 6th Avenue Corridor urban commercial revitalization program. Alecia led the completion of a comprehensive streetscape master plan for this commercial, multi-cultural corridor revitalization effort which focused on improved pedestrian access, bike lanes and green infrastructure.

After living 20 years in Iowa, Alecia returned to the Kansas City area and joined Mid-America Regional Council (MARC) on the Green Impact Zone team as a community development specialist. The Green Impact Zone was an initiative started by Congressman Emmanuel Cleaver, Missouri 5th District Representative, that aimed to serve as a national model for place-based investment, demonstrating how targeting resources in a concentrated area that had seen decades of disinvestment and neglect could lead to significant, sustainable improvements. She eventually assumed the role of MARC's water quality planner delivering water quality public education and watershed and green infrastructure planning and policy development of for the Greater Kansas City Region.

Alecia learned about drones from a local urban farmer. Immediately she envisioned how drones could benefit neighborhoods to help cultivate the natural environment and provide essential up-to-date data for neighborhood revitalization initiatives. She then got her FAA Part 107 and in 2020 she leaped into full-time entrepreneurship by founding Cannonball Development Group LLC.

Cannonball Development Group (Cannonball) is a community development company igniting communities across the globe to solve social, economic and environmental challenges. Cannonball performs community action planning, project management, program design and property assessment, all enhanced by drone technology

THINGS THAT PEOPLE MAY NOT KNOW ABOUT ME

I aspire to be a competitive rower.

I'm a former Division I Women's basketball player.

DESCRIBE YOUR "DREAM JOB" IN AVIATION.

My short-term goal is to develop a community-based tech and data hub to improve the accuracy and productivity of community development. Often, neighborhood level or district level data is outdated or inaccurate because it was collected at a larger scale, which take much longer to update and requires ground truthing to confirm at the city, county, regional, or state level. I believe drones are an accessible way to bridge this gap for dynamic initiatives.

I am living out my dream job right now as an entrepreneur igniting communities across the globe to solve social, economic and environmental challenges. I get to use drones to support these endeavors by gathering data and creating maps for neighborhoods in the Greater Kansas City Region. I hope to expand internationally.

TELL US ABOUT SOMEONE WHO HAS INSPIRED YOU.

I am inspired by so many women it's hard to mention just one. I'm mostly inspired both professional and personally from the women in my family and my sister-friends. When I think about my grandmothers Fannie and Galena, I'm reminded to be industrious. They raised very large families with little resources. My mother Damita literally reminds me to work smart, she says it nearly every time I see her. My sisters Lacreteria and ShaRon motivate me to be decisive and to lighten up. My aunts, too many to list, influence me to be assertive. My sister-friends Toni and Carmen encourage me to have a servant heart.

DESCRIBE YOUR CURRENT ROLE IN THE INDUSTRY

I am a Part 107 Remote Pilot using drones to help businesses and communities gather data for community development planning and implementation projects. This could mean capturing aerial photos and videos to find patterns in illegal dumping sites and egregious property violations or learn more about the landscape to determine the best use of green infrastructure (trees, gardens, streams, etc.) to help communities sustain themselves. I also provide orthomosaics and 3D modeling for building envelope investigations to determine building efficiency and opportunities to use renewable energy and passive building design.



WOMEN AND DRONES AFRICA!



Fireside Chat



Women And Drones Fireside Chats Live from South Africa
with Kim and Louise

Fireside Chat sessions are free and open to everyone!

Join us the first Thursday of every month at:
17:30 hours (South African Standard Time)

[Register Here](#)





Written By:
DR. RENEE JONES-
WELCH, PHD



"This flight workshop offered camaraderie, inquisitiveness and awesome flight time with Autel products"
- Carolyn White



Dr. Renee Jones-Welch, PhD is founder and the Chief Grantologist at Drone Grantology. Drone Grantology specializes in grants development, strategy, and consultation services to help streamline the funding process for stakeholders in the unmanned aircraft systems (UAS) industry. Dr. Welch is a FAA licensed remote pilot, with years of experience as a grant writer coupled with more than fifteen years as a seasoned grant reviewer.

The opportunity to be a pilot participant of Autel Robotics, during a recently held Women and Drones workshop hosted by UAS industry expert Jon McBride, Director of Training, Autel Robotics, was remarkable. "This flight workshop offered camaraderie, inquisitiveness and awesome flight time with Autel products", says pilot participant Carolyn White, a recent owner of an Autel Evo ii v2. Carolyn was psyched to travel with her drone to the snowcapped mountains of Utah and wide open, Class G airspace to fly!

Jon, known as Drone Jesus, guided a small learning group of six pilots' participants through the A-Z of drones at Autel's training lab, in Salt Lake City- Ogden, Utah on Saturday, April 2, 2022. He preached the word, sharing guidance and best practices at this experiential professional development experience. It was insightful learning about the evolution of Autel Robotics, getting up close and personal reviews of consumer and enterprise product lines, as well as the overview of the robust mission capabilities of the Dragonfish Series.

The day began with a comprehensive deep dive into the core technologies of the various Autel drones including drone safety, flight logs, and calibrations settings. The pilot participants diverse in experience and professional focus, each had an opportunity to ask questions, swap drone travel tricks and tips, peer share and learn from Jon and his team, Tommy Gunn and Hudson Mendoza. I agree with one of the pilot participants, "Jon provided our group with instructive and concise insights which allowed for great interaction and numerous questions fielded throughout the morning segment."

Then we headed to outdoors for hands-on flight training. As we gathered at the flight field two used their own drones, while others rotated flying various Autel drones. Teams of two paired with an experienced instructor for this personalized experience mindful of participant pilots' skill, experience, and purpose for attending.

We ended the day with a flight narrated and navigated by Jon, demonstrating mapping and flight capabilities of the Autel Dragonfish. The results of a day spent learning and flying together were priceless. We concluded with reflections, parting words of encouragement, and D'Lisa Foote' winning a special surprise – an Autel Robotics EVO Nano Series Mini Drone.



APPLIED AERONAUTICS

Applied Aeronautics Joins Women and Drones to Elevate Female Voices in the Industry

Women and Drones, the premier global platform for women in the UAS (drone) and AAM (Advanced Air Mobility) industries, is proud to announce its partnership with Applied Aeronautics, a U.S.-based UAS (uncrewed aerial systems) manufacturer specializing in the design and manufacturing of affordable, long-range composite drones.

“Applied Aeronautics is a mission-driven company founded to slash barriers to entry in the drone space,” said Meg Annand, COO, and co-founder of Applied Aeronautics. “While some of that revolves around affordability and ease of use, of equal importance to our team is encouraging diversity and inclusivity. Women should and will play an essential role in moving this industry forward, and we’re so pleased to be joining Women and Drones as we work to elevate female voices.”

Sharon Rossmark, founder and CEO of Women and Drones said, “Applied Aeronautics’ vision to not only break through financial barriers but also obstacles that prevent women from gaining an industry foothold is inspiring and fits well with our own mission. We are proud to partner with them and look forward to working together to inspire more women to enter the UAS/AAM industry.”

About Advanced Applied Aeronautics:

Applied Aeronautics is a U.S.-based UAV manufacturer specializing in the design and manufacturing of affordable, long-range composite drones. Applied Aeronautics’ flagship product, The Albatross, is an electric fixed-wing UAV designed for use in most industries, ranging from agriculture and research to disaster management and defense. This entirely customizable solution was engineered for accessibility and to meet the growing demand for a professional UAV that married robust capabilities with an affordable p

UAS and AAM Industry Diversity, Equity and Inclusion



"This was an absolute labor of love".

DAWN ZOLDI:

Today, a triad of women-owned businesses, Women and Drones, P3 Tech Consulting and the Diversity Development Network of Canada (DDNC), announced the release of the first-of-its kind Uncrewed Aircraft System (UAS) and Advanced Air Mobility (AAM) Diversity, Equity and Inclusion (DEI) 2021 Survey Report.

The Report culminates more than eight months of work that began in July 2021. At that time, the three companies collaborated to develop and implement a national survey to understand the current DEI status within the UAS and AAM sector.



Marlene Conway Diels, President of DDNC, explained the purpose of the project. "We hoped, through this DEI Survey report, to set the bar in establishing a DEI benchmark and provide real opportunities to provide access, opportunity and sustainable growth for both diverse peoples from all groups and the AAM/UAS industry," she explained. The project achieved those ends.

The survey remained open between August 6 and September 17, 2021. It probed a range of topics, including respondent organizations' UAS/AAM size, location, funding, identity group composition at all levels, as well as their available DEI efforts and initiatives. The survey also addressed respondent perceptions relating to DEI and willingness to participate in future change-making programs.

The Vertical Flight Society (VFS), the world's only international technical society for engineers, scientists and others working to advance vertical flight technology, sponsored \$50 gift cards in support of a random draw as an incentive for survey completion. Ultimately, over 1000 UAS/AAM industry professionals provided survey responses.

The co-authors then compiled and analyzed the data over the next several months. The data validated that women and other minority identity groups remain underrepresented in the UAS and AAM industry, particularly in leadership positions. The African American identity group consistently surveyed as the least represented across all employee categories (entrant, middle management, and leadership).

That said, respondents also expressed beliefs that DEI is important to the success of UAS/AAM and UAS/AAM - related businesses, that a lack of DEI would result in financial impacts to businesses and that it is important for the industry to understand the value DEI brings to the table. Perhaps most heartening, the data also indicated that the industry, as represented by respondents, desires change and that they are willing to help make that change happen. Specifically, almost all respondents expressed interest in participating in an UAS/AAM DEI Advisory Group (DAG) to provide industry input towards DEI, skills & competencies development, programming and training to ensure Industry relevance.

"This was an absolute labor of love," explained Dawn Zoldi, CEO of P3 Tech Consulting and host of the popular Dawn of Drones podcast. "We spent countless hours working on this project because we believe in the importance of DEI and accessibility to the industry." Zoldi also dedicated the month of March on her podcast to DEI. Rossmark was one of several diverse industry guests.

DroneLife TV:



In late January of this year, the companies released a [free downloadable preliminary summary](#), consisting of the top ten industry takeaways from the survey.

As an additional lead up to the Report's final release, Sharon Rossmark, CEO Women and Drones, participated in a [VFS DEI panel](#), Zoldi appeared on VFS' new [DiversiFlite Podcast](#) and Zoldi and Conway Diels presented to the North Central Texas Council of Governments' [Know Before you Fly Your Drone Workshop](#).

"We knew we had a diversity problem in the industry. We wanted to understand the extent of the problem and gauge industry interest in changing it. Our survey and report scoped both of these things. We are ready to now do the work needed to impact change, together," said Rossmark.

"Individuals and companies interested in learning more about the state of industry DEI and how to make changes in their own organizations should seriously consider obtaining this report," she continued.

As follow up to the report, the collaborators plan to put out a call for Diversity Advisory Group members soon, with follow-on educational initiatives. They also plan to launch a 2022 survey in August.

The 125- page market report is now available for purchase through the [Women and Drones](#) website, on the [DDNC](#) website and through the [P3 Tech Consulting](#) site.

For additional information on the report or to get involved to make change, contact POCs Dawn Zoldi, Marlene Conway Diels or Sharon Rossmark



Women And Drones is the leading membership organization dedicated to driving excellence in the uncrewed aircraft systems (UAS) and Advanced Air Mobility (AAM) industry by advocating for female participation in this dynamic segment of the global economy. The organization partners with companies committed to an inclusive culture where women can thrive. Our educational programs range from kindergarten to career in efforts to balance the gender equation in the industry now, as well as for the future of flight.



P3 Tech Consulting LLC is a U.S. company that connects people who have a passion for advanced technology platforms with full spectrum policy-relevant information to propel their companies and to do global good. Its services include consulting, expert presentations and publications on tech legal & policy issues, strategic planning and policy/program creation with an emphasis on UAS and AAM. P3 Tech delivers unique education programs that partner with academia, the legal ecosystem, technical programs and commercial expos and produces the weekly Dawn of Drones podcast, affiliated with DroneLife news.



The Diversity Development Network of Canada Corp. (DDNC) is a Canadian non-profit corporation that supports Industry, Industry Organizations, Academia, Other Diverse Groups, Individuals and Government spanning Aerospace & Aviation, Defence & Space, Advanced & Digital Manufacturing industries such as Automotive, Rail and Marine sectors. It aims to leverage resources to directly increase diverse peoples' access, entry and advancement to fill current and future highly skilled employment gaps to directly support workforce actualization and sustainable Industry growth.

WOMEN OF ACTION:

Using Draganfly's Drones to Provide Humanitarian Aid in Ukraine



Fighting across Ukraine has made it dangerous for emergency crews to provide aid to those in need. According to the World Health Organization's (WHO's) Surveillance System for Attacks on Health Care (SSA), there have been more than 30 attacks since the start of the war with Russia. These attacks have led to at least 12 deaths and 34 injuries.

To help crews safely access hotspots and provide humanitarian aid in major Ukrainian cities, non-profit organizations such as Revived Soldiers Ukraine (RSU) are turning to Draganfly's drone solutions.

Founded in 2015, RSU has developed a logistical network in Ukraine and the United States to deliver essentials in the shortest possible time. To date, the organization has allocated more than \$19 million USD towards supplies for Ukrainian civilians and hospitals.

"There is an urgent need for medical supplies and equipment across Ukraine," said Iryna Vashchuk Discipio, President of RSU. "Roads, buildings, and entire cities have been destroyed, displacing millions of Ukrainians.

Draganfly's Medical Response, Search and Rescue, and Situational Assessment Drones are crucial for ensuring that those in dangerous and hard-to-reach areas have access to the aid they require."

Vashchuk Discipio was recently awarded the *Order of Princess Olga* by Ukrainian President Volodymyr Zelenskyy. The Ukrainian civil decoration is bestowed on women for their achievements in state, production, scientific, educational , cultural, charity, and other social activities.

In May, RSU received its first Medical Response Drone from Draganfly in Poland.

The drone is able to carry up to 35 pounds. When equipped with Draganfly's temperature-managed Medical Response Payload Box, it can transport temperature- sensitive medical supplies including insulin, blood, vaccines, water, and wound care kits. The innovative payload ensures ease of access when top mounted and effective quick-release operations when bottom mounted.

From Poland, Vashchuk Discipio and members of her staff transported Draganfly's Medical Response Drone to Ukraine. Before incorporating the uncrewed aerial vehicle (UAV) into the organization's existing operations, RSU's drone operators participated in a virtual training session with Draganfly's experienced pilots.

"To save lives, we need to understand how to effectively operate drone solutions such as Draganfly's Medical Response Drone," said Vashchuk Discipio. "Every drone will help us effectively scale up our humanitarian aid operations in Ukraine."

Following the successful deployment of the first Medical Response Drone, Draganfly is working on providing additional drone systems to Revived Soldiers Ukraine.

The company recently received an order for its Medical Response and Search and Rescue Drones from Coldchain Delivery Systems for immediate deployment with RSU. Initially, Draganfly will provide the organization with five of each drone system.

While the total size of the initial order from Coldchain Delivery Systems could change due to the rapidly evolving situation in Ukraine, it is expected to be as large as 200 units.

For more information on Draganfly, please visit: www.draganfly.com



Indoor Drone Flights

Techniques for Mission Success

Photography and Content provided
by FoxFury Lighting Solutions

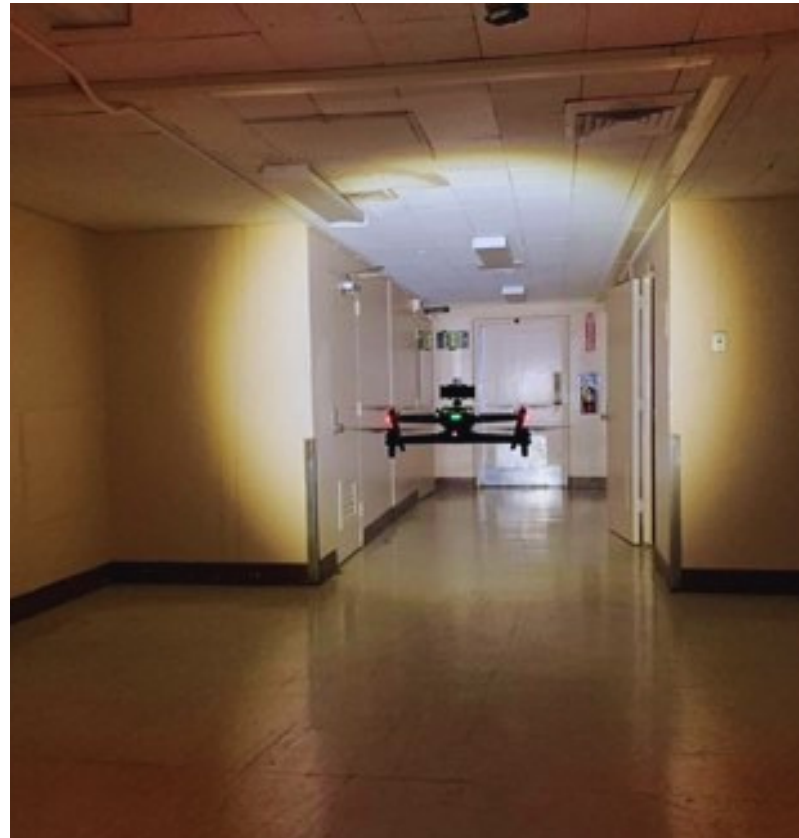
The ability to fly drones indoors opens up a world of opportunity for law enforcement and first responders. Drones can go into spaces that pose a potential threat to responders, either physical or biological. It could be an active shooter in a school or a chemical leak in a factory. The price of losing a drone is significantly lower than that of human life. But flying indoors is not easy. It requires different skills and some specialized equipment.

Why Do First Responders Need to Fly Indoors?

- Recon or threat assessment
- Toxicity or biohazard threat
- Object retrieval or drop off

The Challenges of Flying Indoors - Lack of GPS - ATTI mode

When flying outdoors, your drone has a connection with multiple satellites. The drone constantly sends signals back and forth to the satellites for positioning data. That GPS connection is responsible for the smooth, controlled flight we've become accustomed to in modern drones. When you fly forward and release the controls, the drone will slow to a stop and hover at the same altitude until you control it in another direction. GPS makes flying A LOT easier.



GPS also provides the drone the ability to return home safely. If you or your drone run into an issue, you can hit the return to home, and for the most part, your drone will fly up to a certain elevation and then fly back to the home coordinates and land.

When you fly indoors, that GPS connection is lost due to the structure you are flying in. The drone can not triangulate between multiple satellites to control its position. When the GPS is lost, the drone switches to ATTI mode or Attitude Mode. The drone will maintain altitude in ATTI mode by measuring barometric pressure and using the sensors.

But unlike flying outdoors with GPS assistance, if you let go of the controls, the drone won't slow to a stop but will continue in whatever direction you are flying until you control it in another direction.

Learning how to fly in ATTI mode without GPS is highly recommended. It will make you a better pilot in all conditions. And if you suddenly lose GPS, you will be more prepared to safely adjust and control your drone.

As for piloting your drone indoors, ATTI mode takes a little getting used to, and your touch on the controls should be more controlled and subtle. You need to be more aware of your surroundings and positioning. Be aware that the small confines of flying indoors add additional risk.



Drone Lights Assist the Camera and Sensors

When flying indoors, you typically fly in tight small spaces like hallways, bedrooms, and stairwells. Even a small drone, all of a sudden, feels really big when trying to navigate through a small doorway. Drones are equipped with excellent obstacle avoidance sensors. These sensors need to be able to see the area around them to work. If it's a dark building, they need additional light.

Drone lights mounted to the bottom or sides of the drone will illuminate the surrounding area and help the sensors to work more effectively. This will help both in obstacle avoidance and landing. If you are flying indoors, you are probably looking for something. The other benefit of lights is being able to see what you're looking at in darker building environments.

FPV (First Person View)

When flying indoors, you most likely will not be able to see your drone physically. You will need to rely 100% on the video feed of the drone camera to know where you are going and what's around the drone. Remember, if your drone crashes or goes down in a building, you may not be able to retrieve it, and it could compromise the mission.

When entering a room or hallway, it's good to take a visual inventory of what is in the room, such as doorways, partitions, furniture, ceiling fans, etc. This will help you move through the space sideways, backward, or upward. Your camera's view will be limited in these directions unless you are constantly spinning around to get a complete perspective.



extensive labyrinth of hallways and rooms

Since the Live Deck gets its feed directly from the Evo, it does not need to be connected to the controller. This gives the pilot some freedom in setting up a command center with multiple monitors so that the rest of the team can watch on separate monitors. The Live Deck has very low latency, so the pilot can trust it for making complex maneuvers.

One Secret Benefit of Flying Indoors - You are not constrained by FAA regulations!

Since you are inside a building, you are not in federally regulated airspace. FAA regulations do not apply to the airspace within a building. Once that drone flies out of the building, it is then flying in regulated airspace, subject to the FAA regulations in that area. And it is always recommended to fly as safely inside as if you were outside in regulated airspace. Flying indoors can be challenging but opens up unique possibilities for teams that need to access inhospitable areas inside buildings. By applying some of the techniques above, you can enjoy a higher success mission rate. Once you get used to flying by FPV and having better situational awareness, you'll be more confident and relaxed flying in the trickiest of areas.

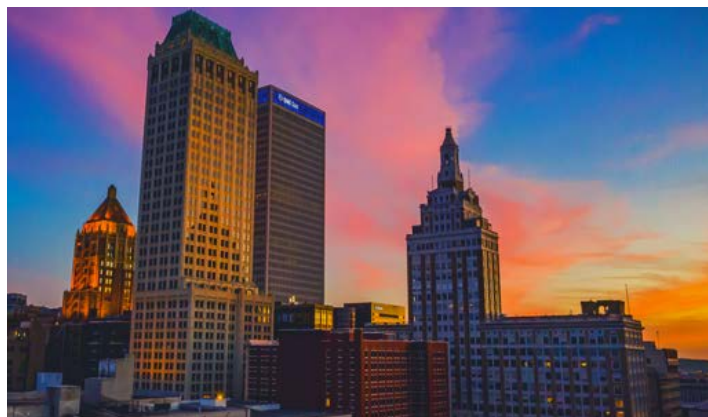


EXPAND THE CAPABILITY OF YOUR DRONE!

Anti-Collision Lights | Spotlight
Landing Systems | Payload Delivery



THE PATH TO UBIQUITOUS ADVANCED AIR MOBILITY RUNS THROUGH THE HEARTLAND



In the half-century between the first powered flight and the dawn of the space age, the aviation and aerospace industries saw rapid innovation that revolutionized the mobility of people and goods. These new technological innovations came from across the country and fueled the economies of regions from Florida to Ohio and Oklahoma to Washington.

As the tech sector has exploded over the past few decades, the geography of innovation has become more concentrated in a handful of cities, while other regions have struggled to compete as legacy manufacturing and resource sectors have declined. But as we enter the next phase of mobility innovation – which will be defined by electric, unmanned, and autonomous vehicles – Heartland communities again have the chance to spearhead this transformational shift.

JENNIFER HANKINS

is the head of Partnerships at Tulsa Innovation Labs, where she is responsible for corporate and university engagement, stakeholder relations, and governance and advisory bodies.



DANIEL PLAISANCE

leads the Advanced Air Mobility portfolio at Tulsa Innovation Labs, where he oversees program development and strategic investments in research, entrepreneurship, and workforce development initiatives.



Industries like agriculture, energy, and logistics – those that have a storied history and strong existing presence in the Heartland – will be early adopters and provide proof of concept for drone technology. The need for complex testing facilities and the regulatory imperative of piloting new technologies in less densely populated areas mean that rural and mid-sized cities have a distinct advantage over larger counterparts in certain components of this industry. The shifting geography of talent, rising costs of living, and availability of remote work are only further catalyzing this shift.

As an organization dedicated to economic revitalization in Tulsa, Oklahoma, Tulsa Innovation Labs sees the advanced air mobility industry as a rare and exciting sector in which regions like ours have a true right-to-win. Tulsa's status as an urban hub in a rural region, an incumbent aerospace powerhouse, and concentration in the oil and gas and manufacturing industries – seen, until recently, as economic vulnerabilities – are now creating the ideal conditions for testing, producing, and deploying UAS technologies and thus leading in this emerging industry.

To capitalize on this opportunity, a coalition of partners in Tulsa has united to reimagine how to build the most inclusive and supportive community for AAM companies and professionals. To capitalize on this opportunity, a coalition of partners in Tulsa has united to reimagine how to build the most inclusive and supportive community for AAM companies and professionals.

To do this, we're building innovative partnerships and making significant investments to launch a suite of programs, including:

- An applied research and development center in partnership with Oklahoma State University's Unmanned Systems Research Institute (OSU USRI), to create seamless partnerships and technology transfer between academic researchers and industry
- A state-of-the-art beyond visual line of sight (BVLOS) flight testing infrastructure in partnership with OSU and Osage LLC, which will capitalize on Tulsa's unique geography and the city being directly adjacent to rural areas to create the nation's premier site for BVLOS testing on the urban-rural divide
- Venture capital and entrepreneurial support programs in partnership with firms based in Tulsa and the region, to ensure that the AAM industry is an engine of wealth creation for Tulsa entrepreneurs
- Workforce programs for students at all levels and from all backgrounds, based on rigorous analysis of local labor market skills and the competencies most demanded by the industry.

This vision has been recognized by the US Economic Development Administration as one of the top regional growth cluster concepts from any sector proposed under the Build Back Better Regional Challenge. More importantly, it has galvanized support from across our community and the AAM industry nationally. Tulsa is staking a bold claim to be the next hub of AAM innovation, and we're just getting started.

HELPING HEARTS OF SERVICE: DRONE USE IN DISASTER RELIEF MISSIONS



DR. ROBIN MURPHY



A fascinating discussion with Dr. Robin Murphy, Director of the Center for Robot-Assisted Search and Rescue on the essential and evolving role of drone technology in disaster response.



BY ERICA COOLEY

Every day innovative minds around the world find new ways to use drones to improve the quality of life and solve important problems to change our world and the way we live. Dr. Robin R. Murphy, Raytheon Professor of Computer Science and Engineering at Texas A&M University and a director of the Center for Robot-Assisted Search and Rescue (crasar.org) is one of those innovative individuals reshaping the landscape of disaster relief missions using drone technology.

Dr. Murphy has deployed ground, aerial, and marine robots to over 30 disasters in five countries since 9/11. Leading the first use of small drones for a disaster, Hurricane Katrina, in 2005, she has led subsequent deployments to Fukushima, Hurricane Harvey, the Surfside collapse, and numerous other floods, landslides, and hurricanes.

Recently, I had the opportunity to discuss with Dr. Murphy about her nearly 30 years of experience as an academic and disaster relief. During our discussion on [Aloft's B4UFLY Check the Map podcast](#), Dr. Murphy shared her incredible stories of integrating UAS technology into disaster relief response from hurricanes, earthquakes, landslides and all types of disasters.

"My background is a bit odd- I am a traditional academic working as a professor, doing research in artificial intelligence applied to robotics. In 1995, I became involved in using robots for disasters. I started with ground robots at 9/11 and subsequent events. In the early 2000s, drones started to come in the field. During Hurricane Charlie, I was working as a technical search specialist, I observed ground robots were not a great tool during a hurricane. In observing aerial systems at the time, we realized how helpful it would have been to the emergency managers to see the aerial perspective to aid in effectively responding during the hurricane. Following when Hurricane Katrina hit in 2005, this was the first time small unmanned aerial systems were used by emergency responders and we have been using this technology ever since. Since then, we have also added marine-based vehicles because 80% of the population [in the U.S.] lives by water. So these tools are important as well."

Our discussion progressed to how UAS technology has evolved over the years, going from potentially unreliable connectivity in a drone which cost

upwards of \$75K in the early 2000s to now nearly twenty years later, UAS being highly reliable, extremely cost effective and including many advanced features like LIDAR, thermal imaging, etc. Though, Dr. Murphy expressed she still feels adoption of this incredible technology has a long way to go and training is a key element to educating operators for specialized uses of drones.

As an academic, Dr. Murphy's passion and expertise in educating bright minds on the use of robotics to solve problems in real world applications intersected with the Women and Drones organization recently. This past May, Dr. Murphy led a three and a half day drone pilot training for disaster response in College Station, Texas for Women and Drones members. At the Women and Drones' Disaster Response Training, participating drone pilots received hands-on flying as well as the important, but often overlooked, aspects of data management and the expectations of emergency managers. Participants had one and a half days of hands-on training, then flew missions under realistic operating conditions at Disaster City and nearby emergency management training facilities at Texas A&M.

"I and my colleagues greatly enjoyed training Women and Drones members on the missions and skills needed for flying for most types of disaster response- hurricanes, floods, tornadoes, and even active shooter events- and getting to know the next generation of pilots," said Dr. Murphy.

Dr. Murphy shared insights from her experiences of why training programs like the collaboration with Women and Drones are so important for those passionate about using drones to aid in disaster response.

“We see a lot of people thinking, I have some skills and equipment, I’m just going to show up and help at a disaster like a flood or hurricane. This situation is not so nicely referred to as disaster tourism. In these disaster situations you can not just show up uninvited. For instance, during Hurricane Harvey we had people showing up with drones wanting to help, not realizing that our teams already had drones and now more people were being added to a disaster area already experiencing food, fuel, water and lodging shortages. Effective disaster response includes a lot of specialized knowledge, expertise and procedures that you and I would not know about unless trained specifically with the group you are going to the field with. Therefore, if you are interested in using drones for disaster response you need to receive the trainings and work with your local agencies in advance so when an emergency situation occurs it is easy for the entire team to work together to be effective.”

Dr. Murphy concluded our conversation with this advice to those who have a heart of service and a passion for learning how to use UAS technology to aid in disaster response, "I'd like everyone to remember, not so much don't be a 'disaster tourist', instead, don't be the person who doesn't use your great skills, equipment, and heart to help during the wake of a disaster. Just use your drone equipment and skills in the right way by getting in contact with your local agency, start taking the disaster response courses and trainings, and work with the local organizations to get involved and connected. Then let us know your success stories using UAS technology for disaster relief because as scientists we are always trying to keep up in this rapidly changing field.”

You can learn more about the work and trainings Dr. Murphy and her team at CRASAR provide at crasar.org. Listen to the full discussion with Dr. Murphy on the B4UFLY Check the Map podcast [here](#). Stay up to date about future Women and Drones Disaster Response workshops [here](#).



WOMEN AND DRONES CINEMATOGRAPHY BOOT CAMP

SONY AND HOLLYWOOD DRONES ARE OFFICIAL PARTNERS OF WOMEN AND DRONES

EVENT COORDINATOR: Skip Fredricks,
Hollywood Drones

WORKSHOP: Women and Drones Cinematography
Boot Camp

DATE: Spring 2023

LOCATION: Palm Springs, CA

BOOT CAMP CONTENT:

- Drone cinematography & photography flight techniques
- Night flight cinematography
- Prep, safety equipment and camera set-up
- Flying techniques, tips, tricks, night video and photos.
- Sony Airpeak cinematography drone demonstration.

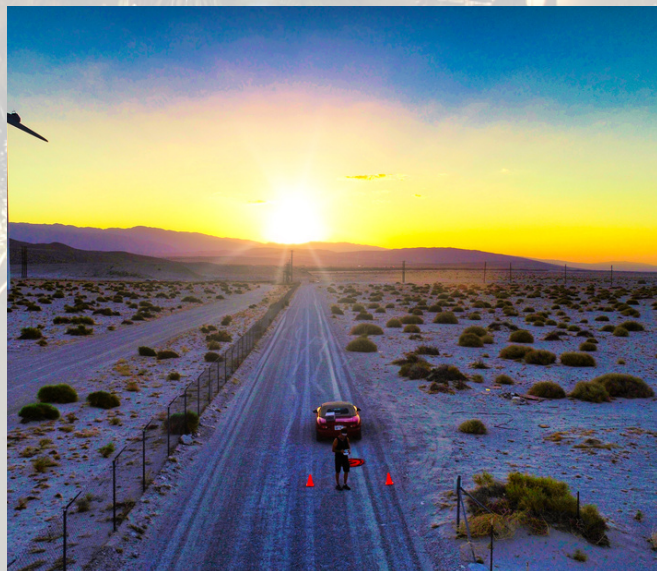
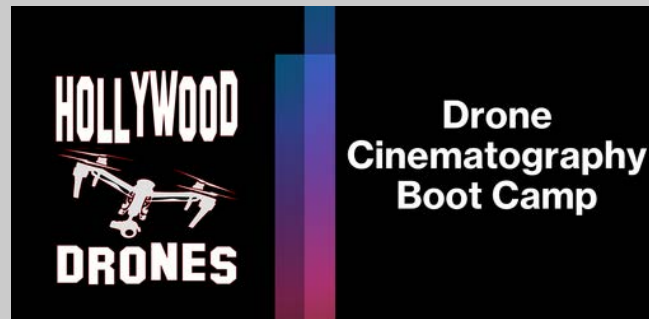
BOOT CAMP LOCATION:

The classroom portion of the Drone Cinematography Boot Camp will be held at the Miracle Springs Resort & Spa, Hot Springs, CA. The Boot Camp will have a block of rooms available at the resort for attendees. However, attendees may stay at another location of their choice. Attendees staying at the resort will have access to discounts for the onsite spa, restaurants, etc.

PARTICIPANT/PILOT REQUIREMENTS:

- Part 107 preferred but not required.
- The FAA Recreational UAS Safety Test (TRUST) is required for all non-Part 107 participants.
- All pilots must be skilled at flying a drone.
- Must participate in both days of the boot camp.
- Pilots must bring their own drone.
- Pilots are required to have drone liability insurance covering both days of the boot camp.
- Must bring a laptop to download footage captured during your flights.
- Must wear closed toe shoes. Hat with bill or a wide brim hat highly recommended.
- No guests. Only approved, registered participants are permitted to attend.

[**LEARN MORE**](#)



WOMEN AND DRONES DISASTER CITY

Women and Drones Attend Disaster Response Training at the world-renowned first-responder training compound, Disaster City.

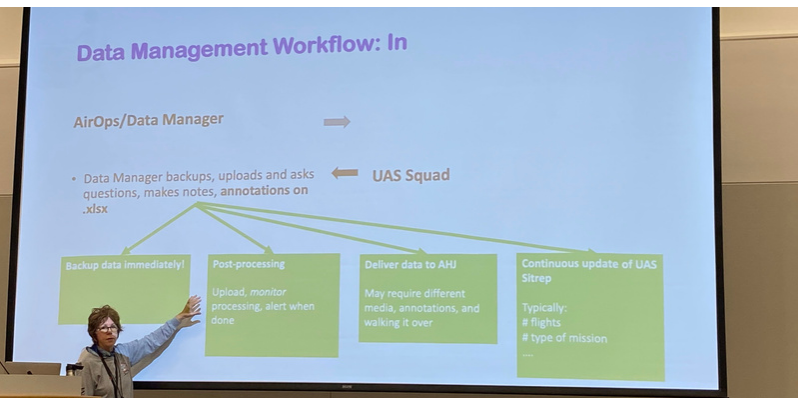
Disaster City is a part of the Texas A&M University,
located in College Station, Texas

Co-Authored by Sheila Bugbee & Horten Linnette



Situational Awareness - Blueforce

- Law Enforcement
 - Supervisors can see location of all others
 - Out of the box, all law enforcement



“ALTHOUGH I ARRIVED A LITTLE ANXIOUS AND CURIOUS ABOUT THIS UNFAMILIAR LEARNING EXPERIENCE TOPIC, I DEPARTED WITH MORE CONFIDENCE, PEER INSPIRATIONS, AND ENLIGHTENMENT OF MISSIONS AND THE SKILLS NEEDED TO CONTRIBUTE TO VARIOUS TYPES OF DISASTER RESPONSE”
OVERALL, HANDS DOWN AN EXTRAORDINARY TRAINING EXPERIENCE!”

/DR. RENEE WELCH /

The CRASAR support staff included talented Certified Remote Pilots, Ms. Rayne Hawkins, the Logistics Manager for the Disaster Incident Research Team at Florida State University. Dr. Robert Ladig, Assistant Professor at Ritsumeikan University's College of Science and Engineering, Department of Robotics. Alex Robic, Texas A&M Graduate Student

Lucky for the Women and Drones members, we have the founder of Women and Drones, Sharon Rossmark and Dr. Robin Murphy working together, behind-the-scenes, crafting such an impressive and essential training opportunity.

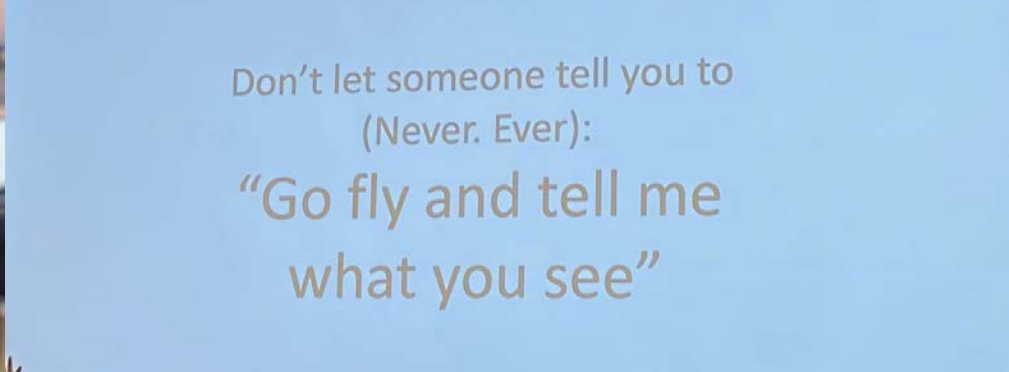
We traveled from across the United States to College Station, Texas, eager to learn from leading experts, Dr. Robin Murphy and Mr. Justin Adams, co-founders of The Center for Robot-Assisted Search and Rescue about how drones provide first responders an advantage in a disaster.

“The Center for Robot-Assisted Search and Rescue (CRASAR), was established in 2001 to foster uncrewed systems being effectively used by formal emergency management agencies through voluntary national and international activities that deploy, promote, train, document, analyze, and disseminate scientific knowledge, making it the oldest institution dedicated to unmanned systems technology for public safety. CRASAR is a nonprofit corporation organized for exclusively charitable, scientific, and education purposes”. <http://crasar.org/>

Included in the course description for the Women and Drones, Disaster Response Training:

“Flying 3 scenarios (flooding, active shooter, tornado) during the highly realistic InterOp’22 exercise the Texas management agencies, Texas National Guard, and other groups at Disaster City and surrounding facilities. Remote Pilots will work in teams to experience flight missions just as they would in support of a real disaster”.

The majority of the Women and Drones contingent attended the first evenings gathering for pizza. The atmosphere was palpable with excitement, and enthusiasm, all while being around the inspirational folks we now have the golden opportunity to learn from!



Left: Hands on Field work / Top: Workshop Presentation / Bottom: On site - Group Picture

Day 2, Morning

Beginning in the classroom, Dr. Murphy presented data from disasters that CRASAR has responded to since the 2001 World Trade Center attack, where robots were used to check underground. Also, how underwater robots were used in a Fukushima, Japan marine port, to survey and open within eight (8) hours, so essential supplies can be brought in. Otherwise, the devastated area would have had to wait weeks for a dive team to be able to get to the port and physically dive the area. The time saved to transmit critical supplies to victims is incalculable.

President of CRASAR, Mr. Justin Adams, with over 30 years of "boots on the ground " disaster response experience, presented varied scenarios and we began to learn the true impact and challenges that you will run across in a disaster. We understood we were in the presence of someone who has responded to nearly every type of disaster that has occurred. We knew we were going to be "learning from a fire hose" and Justin Adams confirmed that!

"WHAT MAKES DISASTERS DIFFERENT? AIRSPACE AND CREW RESOURCE MANAGEMENT".

/ DR. ROBIN MURPHY /

"THE CONVERSATIONS THAT WERE SHARED WITH JUSTIN WERE INVALUABLE! I WOULD LIKE TO SPEND MORE TIME LEARNING FROM HIM".

/ DESI EKSTEIN /

"THE MAPPING/COLLECTION EXERCISES DEFINITELY ALLOWED FOR GAINING EXPERIENCE/KNOWLEDGE AS TO HOW THE PROCESS WORKS UTILIZING PIX4D AND DRONE DEPLOY. THE EXECUTION OF THE COLLECTION WITH THE DIFFERENT TYPES OF DRONES WAS A GOOD EXPERIENCE AS WELL".

/ KARYTA BARNES /

Our formal classroom introduction to our missions objectives:

1) **Airspace** - As a Remote Pilot in Command (RPIC), even when responding to a disaster, we must research the airspace, cloud cover, wind speed, and gusts, and realize that the closest tower that provides wi-fi is now gone. Enact contingency plans, and capture the needed data for first responders, while following FAA regulations in the National Air Space.

2) **Mapping: Collection** - Launching the drone and collecting data, FAST, FAST, FAST in order for the data to be shared with first responders, for immediate situational awareness. Was the road washed away? How can you enter the area and retreat safely in a flooded zone?

3) **Missing persons:** thermal sensing - Thermal sensors recognize temperatures, which is very helpful - when it works. In extreme heat, the ground is hot and the sensors can show an inaccurate, or blank reading.

4) **Wellness check:** drone camera settings - Checking on residents who did not evacuate prior to the storm, or the family member they can't get a hold of due to the communications being out.

5) **Missing Persons Search:** lake/meadow - Scenario - A lost child, get the eyes in the sky to check the waterways and pathways the child might have gone to check out or were drawn to.

6) **Recon/Rapid Needs Assessment:** fly river/tornado - Launch the drone into the NAS, get a look at the landscape, path of damage, and best way for fire trucks, police, and ambulance to get in and out. Determine situational awareness and realize that the old maps are no longer what is in front of you.

7) **Technical search:** ATTI mode (short for Attitude Mode) - The drone does not have GPS in ATTI mode. The drone will drift in the wind, the drone has a slower reaction time, and breaks slower. It's almost like flying a boat in the sky the way the drone responds without a GPS lock. In a disaster zone, there is a high potential of flying in ATTI mode when scanning inside buildings, GPS lock is not going to transmit through concrete, and the ability to fly in ATTI mode as a RPIC is critical.

8) **Mapping:** Pix4D-React - First Responders can utilize Pix4D-React software to map the area or zone needed, as quickly as possible. Pix4D-React is specific to assist first responders with the ability to build a map and deploy it immediately.

9) Tactical SA: streaming tracking a person - Specific to the first person shooting exercise. The Women and Drones role was to utilize "Drone Sense" software, allowing the drone video to be mirrored to the Command Center for real-time situational awareness of the University Police and SWAT teams entering the building. The drones did not enter the building, rather provided views of the exterior.

10) ICS 100: FEMA Training - Following a chain of Command, who you take missions from, how to label in your Micro SD Cards, how the data collected remains in a solid chain of custody that will hold up in court, etc. This training is essential to function as a cohesive team and accurately submit the data you collect.

"I COMPLETED THE ICS 100 -FEMA TRAINING. IN ADDITION, I ALSO FOUND THAT FLYING THE DRONE BLIND (YOUR BACK TURNED AWAY FROM THE DRONE) TO BE VERY INTERESTING. IT DEFINITELY WAS A NEW EXPERIENCE FOR ME".

/ PRICILLA NUTT /

*Dr. Murphy's directive to the Women and Drones Cohort teams: if 5 learning experiences could be completed, that's an attainable goal for the week.

**Well, some of us immediately decided to set the goal to complete each lesson this week!





Left: Hands on Field work / Top: Workshop Presentation / Bottom: On site - Streaming

Day 2, Afternoon

After the classroom, we loaded into a limited number of vehicles to enter a Restricted Area of Texas A&M, an old airfield. After setting up, we were able to learn at Justin Adams' office (the back of his truck - which is like a 4-star hotel) and watched the eBee fixed wing drone perform a mapping mission.

The eBee drone has multiple payloads included directly in the \$35,000+ model: LIDAR, Thermal, Hi-Resolution images and video, and we were then able to mortifyingly watch it "crash-land" in the field! According to Mr. Adams, that's a "normal landing" so the screams were not necessary.

Dr. Murphy broke us up into "Cohorts 1, 2, and 3" and assigned an instructor to each Cohort.

"JUSTIN'S DEMONSTRATION FLIGHTS OF A FIXED WING UAS CHANGED MY PERCEPTION OF WHAT DRONES COULD BE AND COULD DO".

/ AUDREY S. RIVERS /

"MY OVERALL EXPERIENCE WITH DISASTER TRAINING WITH DR. MURPHY AND HER TEAM WAS PHENOMENAL. THEY ARE A WEALTH OF KNOWLEDGE, AND IT WAS AN INCREDIBLE OPPORTUNITY TO LEARN FROM THEM".

/ DESIREE EKSTEIN /

THE MISSION GOALS :

- 1) Mapping Collection
- 2) Missing Persons search: Thermal
- 3) Technical Search: ATTI mode missions



"20 MINUTES OF FLIGHT TIME IS EQUIVALENT TO 2 HOURS OF HARD PHYSICAL LABOR FOR NEW AND INTERMEDIATE PILOTS".

/ DR. MURPHY /

Let's not forget the elements, we were out in the Texas heat and humidity, dressed properly in long pants, closed toe shoes, and long sleeve shirts with a consistent color so we could be counted and located quickly, and with sun hats. The hot and humid Texas afternoon was a factor, and we were drinking water while watching out for each other like we would in a real operation. This physical challenge is also something a pilot must be aware of, and a good team will tell you when your airworthiness is in question. The main caveat is you're going to be one of a limited team, capturing the necessary Disaster information, most pilots will push themselves.

Per Dr. Murphy's research, " 20 minutes of flight time is equivalent to 2 hours of hard physical labor for new to intermediate pilots." Considering all the mental and physical pressures, while operating in the elements, is daunting, even through the adrenaline is keeping you going , you need to temper your energy for the days to come.

Our debrief, termed "Hot Wash", included the objectives we originally meant to cover, any items we were not able to cover due to the elements or equipment not performing, etc. The Hot Wash allows for participant feedback in order to better the learning experience and enhance the communication operations overall.

We convoyed out of the Restricted Area, still pumped up with excitement, but drained from the sun and heat. We deviated to our showers, thank goodness!

Justin Adams is also a crewed pilot, and he covered Airspace compliance. Mr. Adams confirmed to the Remote Pilots that in real day-to-day operations, there is NOT ONE crewed pilot aware of a "LAANC" or Low Altitude Authorization and Notification Capability. A LAANC is used by RPIC's to gain clearance through the FAA to fly in the NAS.

Crewed pilots *don't* have any notifications that drones are in the area they are flying in. Drone pilots **MUST** be aware, at all times, of ANY other aircraft we need to yield to - **EVEN WHEN** flying in a disaster.

Note: Shortly after Justin's briefing, a low crop duster, operating under the same Visual Flight Rules (VFR's), buzzed us multiple times and we were on the lookout for that plane throughout the field lessons.

Most of the group were flying their own drones, while working with their instructors. We also had a chance to fly other drone models we had only researched to that point! The opportunity to take control of another drone model allowed us to broaden our skills. Just like driving, you need to be able to safely operate any kind of drone placed in front of you and this is only going to come from experience.



Day 2, Evening

Sponsored dinner with the InterOP'22 participants!

I'll be the first to admit, the scope of the InterOP'22 completely escaped me, as I had never heard of it, and I was laser focused on my Women and Drones goals. As we entered the large banquet room, my wheels were turning, working out how we fit into such a logistical feat.

The large room was packed and as each agency was introduced, members stood up from their tables representing the Texas A&M University Police, Federal Bureau of Investigation, U.S. Department of Homeland Security, Texas Military Department, Texas Department of Public Safety and SWAT Team, Harris County Texas, AT&T, Verizon, T-Mobile, Texas A&M Administrators, American Red Cross, Texas A&M Engineering Extension Service, FirstNet Authority, Brazos County 911 District, Airbus and Wi-Fiber, this is impressive.

Women and Drones closed out the agency introductions, saving the best for last. Dr. Murphy was called up on stage to highlight her area of expertise, and explained the role of the drones in relation to the InterOp'22 mission.

Women and Drones are capturing the data to test the upload speed/ability of video streaming and aerial images for mapping - both datasets include multiple gigabytes being uploading and testing the AT&T, Verizon, and T-Mobile abilities for timely action by the aforementioned participants and first-responders.

Lets just say, the Women and Drones group then collectively understood the true impact that we have on this InterOp'22 exercise, and we were the ONLY Drone pilots!

When Dr. Murphy asked the Women and Drones members to stand, each of us stood tall, cheered proudly and loudly, and the sensation was empowering!

Day 3, Morning

We gathered in the classroom and while most of us were still ready and raring to go, we also agreed with Dr. Murphy's research regarding exhaustion!

Classroom lessons included:

- **Data Management workflow**
- **Uncrewed Aerial System (UAS) Squad assignments**
- **Micro SD Cards and utilizing envelopes to organize and track**
- **UAS Coordination and Software**

Critical information must be managed following established procedures:

1. How will all the images the drone captured be transmitted and utilized?
2. How will the Micro SD cards be managed and stored?
3. Is there a chain of custody needed?

Example: 2021 Surfside Building Collapse, Miami, FL:

All data recovered is being used in homicide cases. Each person lost in that disaster is being treated as a homicide victim. The data the robots collected, post collapse, is being used in court and there is a Chain of Custody the data must strictly adhere to in order to hold up in a court of law.

Field Exercise:

Cohort 1 learned mapping from Justin Adams, we processed the data in the Texas A&M Disaster Response vehicle, and utilized the data captured from the eBee Fixed wing drone from the previous day. Datasets captured by the eBee drone were input into the Pix4D-React software and the 2D map was ready to use, with hi-resolution imagery.

11 AM- WENT TO DISASTER CITY!!

"I COULDN'T WRITE NOTES FAST ENOUGH DURING HER PRESENTATIONS ABOUT THE DISASTER ENVIRONMENT, DRONE DEPLOYMENT, DATA MANAGEMENT SECURITY AND CREW RESOURCE MANAGEMENT ISSUES".

/ AUDREY S. RIVERS /

"Something is on fire!" Samantha Scully expressed as we drove through the main gates.

We drove on to the compound, and saw overturned trains, black smoke in the distance, buildings with collapsed concrete, a car crashed onto a pipe, and in the front of all the disasters was a bunch of letters attached to varied, offset concrete slabs, spelling out: "DISASTER CITY."

Day 3, Afternoon - Hurricane Exercise

Women and Drones entered Disaster city's main administration building and collected our nametags. After lunch we were briefed and one Cohort stayed at Disaster City while two Cohort's returned to the field to collect mapping data on a church and video streaming.

Upon returning to the field, Desi Ekstein was sent to a church, on the Texas A&M campus, to capture the mapping data with her drone. Supporting Desi in her safe flight were Instructor Rayne Hawkins, and Sharon Rossmark was the Visual Observer.

While Sheila Bugbee was to be ready to launch and support a live video stream.

"I NOTED MANY LESSONS DURING THE DISASTER TRAINING BUT THE GREATEST TAKEAWAY FOR ME CAME THROUGH MY PHYSICAL INTRODUCTION TO MAPPING. TO BE ABLE TO PLAN AND EXECUTE A MAPPING ASSIGNMENT AUTONOMOUSLY USING PIX4D ALLOWS ME TO SEE HOW I CAN TAKE MY EQUIPMENT USE AND IMAGINATION TO A WHOLE DIFFERENT LEVEL".

/ D'LISA FOOTE /

The church data was successfully captured and uploaded to Incident Command, and the directive for the video stream was changed to a mapping mission, this time, of a field.

The immediate issue was the size of the field being requested to be mapped. Troubleshooting time, can we fly at a higher altitude to limited the time while still providing usable data to create the map, while accurately mapping the requested zone, and having enough charge left on the drone controller, needing more than one drone battery, etc. With Alex Robic's help, we deciphered the new mission, mapped out the zone, and saved the newly created mission to the drone.

Sheila Bugbee, Sharon Rossmark, Desi and Kenny Ekstein jumped in the car to capture the new field mapping mission. After our one block drive, we jumped out of the car to launch the drone and capture as many mapping paths as possible, before our Hot Wash meeting.

After mapping part of the field, we packed up and gathered for the Hot-Wash. There were many items brought up and addressed, and the testing of the systems was a success.

Day 4, Morning - First person shooter exercise

Upon arriving at Disaster City we entered a large room with all agencies represented. Now they are geared up for the First-Person shooter response exercise, full tactical gear, Emergency Response personnel, 911 Operators, designated victim actors, trucks with a large satellite dishes, and the *Women and Drones Pilots* took our seats.

"HANDS - ON DOES NOT DESCRIBE THIS REALISTIC TRAINING EXERCISE WITH INTEROPS AND COMMUNICATION TESTING".

/ DR. RENEE JONES WELCH /

We're collectively briefed on the exercise, then dispatched to another room so we can be directed by our Air Boss, Justin Adams. Mr. Adams went to a far corner with a Cohort team and launched a tethered drone. Mr. Adams was in constant contact with Dr. Murphy, who led Cohort 1 to begin live streaming the exterior of the building where the exercise occurred. In true Texas form, high winds from an incoming storm system hindered our ability to launch safely, walking the drones to capture the video was the Semper Gumby (Always Flexible) solution.

Day 4, Afternoon

The First-Person shooter exercise continued in the afternoon with adjustments to certain first responders "Push to Talk" devices, and the drone team had a drone on the roof of Mr. Adams' truck, due to the low clouds, in order to continue the live-stream testing.

Women and Drones members who participated in Documentary interviews were able to complete them that afternoon.

Hot Wash completed!

Women and Drones were then able to follow Dr. Murphy, in a convoy, to tour Disaster City and see the extensive training facility, it was jaw-dropping.



Left: Group Pic in front of TEES mobile unit/
Top: / Bottom: Last Day Wrap Up!

Day 5, Morning - Final Day

Message received from Dr. Murphy: We made evening news!

InterOp'22 was featured on the local College Station, Texas news. Dr. Murphy was interviewed and explained why the Women and Drones members were shown walking the drones, streaming the first-person shooter exercise, rather than flying, due to the high-winds.

Returning to the restricted airfield, to complete the final communications and wifi upload testing, while the Command Center at Disaster City is receiving the data. The high-winds returned so our drones got another walk to upload and test the upload ability. Alex Robic was making sure the systems were stressed as much as possible during these last moments for InterOp'22, after he was able to have multiple streams established.

Final Hot Wash session to improve on the training, on the old tarmac.

InterOp'22 tested the systems, allowed for cross training between agencies, communications companies, and of course *Women and Drones* learned so much while leading the data capture!

We shared a final group lunch and proudly received our certificates from Dr. Murphy.

Some final takeaways from this priceless experience would include the realization that Women and Drones took a lead role in the InterOp'22 Exercise, and the group that came together in the beginning of the week was quickly transformed into a cohesive team. Our chances to fly another drone model and expand our operational capabilities, being in the presence of World Renowned Experts in Robot Response, and the importance of maintaining aerial research knowledge up to date. The connections and friendships we made, with like minded women in the drone community, prove there are positive changes coming to our local communities. We excitedly hope to be invited back for InterOp'23

"It was an intense week, with a lot of technical and theoretical learning, networking with other Agencies and professionals in the field of Emergency Management, as well as making new and extraordinary friendships. We trained in the management and use of drones, integrating other technology specialized in disaster management which, in turn, provided new tools, gave us new perspectives on how to take better photos and capture videos, process data for different missions or scenarios. the roles and responsibilities of team members, such as Remote Pilot, Visual Observer were highlighted and emphasized. We understood the standards and complex Incident Commander System and much more. This is definitely another option to consider in this new drone world. Whether you specialize in it or put our skills and knowledge within the reach of our communities, being part of the solution in unforeseen events in the event of disaster or special missions. Let's be prepared...until we meet again. "Semper Gumby".

/HORTEN LINNETTE/

MUJERES Y DRONES EN CIUDAD DESASTRE

Grupo de mujeres, de Woman and Drones asisten a la capacitación de respuesta ante desastres en Ciudad Desastre (Disaster City), el complejo de capacitación de primeros auxilios de renombre mundial.

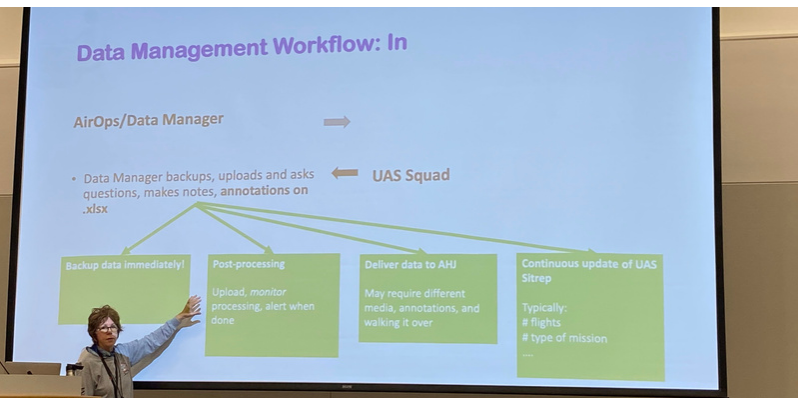
Ciudad Desastre (Disaster City) es parte de la Universidad Texas A&M, ubicada en College Station, Texas

COAUTOR DE SHEILA BUGBEE Y HORTEN LINNETTE POMALES



Situational Awareness - Blueforce

- Law Enforcement
 - Supervisors can see location of all others



“AUNQUE LLEGUÉ UN POCO ANSIOSA Y CURIOSA ACERCA DE ESTE TEMA DE EXPERIENCIA DE APRENDIZAJE DESCONOCIDO, ME FUI CON MÁS CONFIANZA, LA INSPIRACIÓN DE MIS COMPAÑERAS E ILUMINACIÓN DE LAS MISIONES Y LAS HABILIDADES NECESARIAS PARA CONTRIBUIR A VARIOS TIPOS DE RESPUESTA A DESASTRES” EN GENERAL, ¡FUE UNA EXPERIENCIA DE ADIESTRAMIENTO EXTRAORDINARIA!”

/DR. RENEE WELCH /

El personal de apoyo de CRASAR incluyó a los talentosos pilotos remotos certificados, la Sra. Rayne Hawkins, Gerente de Logística del Equipo de Investigación de Incidentes de Desastres en la Universidad Estatal de Florida. Dr. Robert Ladig, profesor asistente en la Universidad de Ritsumeikan, Facultad de Ciencias e Ingeniería, Departamento de Robótica y Alex Robic, estudiante de posgrado Ciencias de Computadoras e Ingeniería de la Universidad Texas A&M.

Afortunadamente para los miembros de Women and Drones, tenemos a la fundadora, Sharon Rossmark y a la Dra. Robin Murphy trabajando juntas, (tras bastidores), creando una oportunidad de capacitación impresionante y esencial.

Viajamos de todos los Estados Unidos a College Station, Texas, ansiosos por aprender de los principales expertos, la Dra. Robin Murphy y el Sr. Justin Adams, co-directores del Centro de Búsqueda y Rescate asistidos por robots, sobre cómo los drones brindan a los socorristas una ventaja en un desastre.

El Centro de Búsqueda y Rescate Asistido por Robots, “The Center for Robot-Assisted Search and Rescue” (CRASAR), se estableció en 2001 para fomentar el uso efectivo de los sistemas no tripulados por parte de las agencias formales de manejo de emergencias a través de actividades voluntarias nacionales e internacionales que implementan, promueven, capacitan, documentan, analizan y difunden información científica y conocimiento. Lo que la convierte en la institución más antigua dedicada a la tecnología de sistemas no tripulados para la seguridad pública. CRASAR es una corporación sin fines de lucro organizada con fines exclusivamente benéficos, científicos y educativos". <http://crasar.org/>

Descripción del curso de Entrenamiento de Respuesta a Desastres para Women and Drones:

“Volar en tres escenarios (inundación, disparador activo, tornado) durante los ejercicios altamente realista InterOp’22 con las agencias de administración de Texas, la Guardia Nacional de Texas y otros grupos en “Disaster City” (Ciudad Desastre) y las instalaciones circundantes. Los pilotos a distancias trabajarán en equipos para experimentar misiones de vuelo tal como lo harían en apoyo de un desastre real”.

La mayoría de las participantes de Women and Drones asistieron a la primera reunió en la tarde para comer pizza. ¡Era evidente que la atmósfera estaba llena de emoción y entusiasmo, todo mientras estábamos rodeados de personas inspiradoras de las que ahora tenemos la oportunidad de oro para aprender!



Don't let someone tell you to
(Never. Ever):
"Go fly and tell me
what you see"



Día 2, mañana

Comenzamos en el salón de clases, la Dra. Murphy presentó datos de desastres a los que CRASAR ha respondido desde el ataque al World Trade Center (Torres Gemelas, NY.) en 2001, donde se usaron robots para revisar el subsuelo. Además, donde se utilizaron robots submarinos en un puerto marítimo de Fukushima, Japón, para inspeccionar y abrir en ocho (8) horas, de modo que se pudieran traer suministros esenciales. De lo contrario, el área devastada habría tenido que esperar un mínimo de ocho semanas para que un equipo de buceo pudiese llegar al puerto y bucear físicamente por la zona. El tiempo ahorrado para transmitir suministros críticos a las víctimas es incalculable.

El presidente de CRASAR, el Sr. Justin Adams, con más de 30 años de experiencia en respuesta a desastres "con las botas sobre el terreno", presentó escenarios variados y comenzamos a aprender el verdadero impacto y los desafíos que se enfrentarán en caso de un desastre. Entendimos que estábamos en presencia de alguien que ha respondido a casi todos los tipos de desastres que han ocurrido. ¡Sabíamos que íbamos a aprender y Justin Adams lo confirmó!

**"¿QUÉ HACE QUE LOS DESASTRES SEAN DIFERENTES?
EL ESPACIO AÉREO Y LA GESTIÓN DE LOS RECURSOS DE LA TRIPULACIÓN".**

/ DR. ROBIN MURPHY /

"¡LAS CONVERSACIONES QUE SE COMPARTIERON CON JUSTIN FUERON INVALUABLES! ME GUSTARÍA PASAR MÁS TIEMPO APRENDIENDO DE ÉL".

/ DESI EKSTEIN /

"LOS EJERCICIOS DE CARTOGRAFÍA/RECOPILACIÓN DEFINITIVAMENTE PERMITIERON GANAR EXPERIENCIA Y CONOCIMIENTO SOBRE CÓMO FUNCIONA EL PROCESO UTILIZANDO PIX4D Y DRONE DEPLOY. LA EJECUCIÓN DE LA COLECCIÓN CON LOS DIFERENTES TIPOS DE DRONES TAMBIÉN FUE UNA BUENA EXPERIENCIA".

/ KARYTA BARNES /

Nuestra introducción formal en el aula con los objetivos de aprendizaje:

1. Espacio aéreo: como los pilotos a distancias certificadas (Remote Pilot in Command, RPIC) cuando respondemos a un desastre, debemos investigar el espacio aéreo, la cobertura de nubes (nubosidad), la velocidad del viento, las ráfagas y darnos cuenta de que la torre más cercana que proporciona wi-fi no se encuentre fuera de servicio. Promulgar planes de contingencia, capturar los datos necesarios para los primeros en responder, mientras se siguen las regulaciones de la FAA en el Espacio Aéreo Nacional.

2. Cartografía(mapping): Recopilación: lanzamiento del dron y recopilación de datos, "RÁPIDO, RÁPIDO, RÁPIDO" para que los datos se compartan con los rescatistas o socorristas, para una conciencia táctica situacional o prevención inmediata. ¿Se destruyó el camino? ¿Cómo se puede ingresar al área y retirarse de manera segura en una zona inundada?

3. Personas desaparecidas: detección térmica: los sensores térmicos reconocen las temperaturas, lo cual es muy útil cuando funciona. En condiciones de calor extremo, el suelo está caliente y los sensores pueden mostrar una lectura inexacta o poco precisa.

4. Verificación de bienestar: configuración de la cámara del dron: verificación del bienestar de los residentes que no desalojaron antes de la tormenta, o del miembro de la familia que no pueden localizarse debido a que no hay comunicación.

5. Búsqueda de personas desaparecidas: lago/pradera - Escenario - Un niño perdido, subir el dron para verificar las vías fluviales y los caminos que el niño pudo haber ido a revisar o por los que se sintió atraído.

6. Evaluación de necesidades rápidas/de reconocimiento: volar sobre ríos y tornados: lanzar el dron en el sistema de espacio aéreo nacional, NATIONAL AIRSPACE (NAS), echar un vistazo al paisaje, la trayectoria de los daños, la mejor manera para que los camiones de bomberos, la policía y la ambulancia, tengan acceso de entrada y salida. Determinar la situación y darse cuenta de que los viejos mapas ya no son lo que tienes frente a ti.

7. Búsqueda técnica: modo ATTI (abreviatura de Attitude Mode) – En este modo se desactiva los sensores de GPS. El dron se desplazará con el viento, el dron tiene un tiempo de reacción más lento y se rompe más lentamente. Es casi como volar un bote en el cielo por la forma en que responde el dron sin bloqueo de GPS. En una zona de desastre, existe un alto potencial de volar en modo ATTI al escanear dentro de edificios, el bloqueo de GPS no se transmitirá a través del concreto, la capacidad de volar en modo ATTI como RPIC es crítica.

8. Cartografía: Pix4D-React: los primeros en responder pueden utilizar el software Pix4D-React para trazar un mapa del área o la zona necesaria, lo más rápido posible. Pix4D-React es específico para ayudar a los rescatistas con la capacidad de trazar un mapa y desplegarlo de inmediato.

9. SA táctico: seguimiento de una persona en transmisión - Específico para el ejercicio de tiro en primera persona. La función de Women and Drones era utilizar el software "Drone Sense", lo que permitía que el video del dron se reflejara en el Centro de Comando para conocer la situación en tiempo real de la Policía Universitaria y los equipos SWAT que entraban al edificio. Los drones no entraron en el edificio, sino que proporcionaron vistas del exterior.

10. ICS 100: Capacitación de FEMA: seguimiento de la cadena de mando, de quién toma misiones, cómo etiquetar en sus tarjetas Micro SD, cómo los datos recopilados permanecen en una sólida cadena de custodia que se mantendrá en la corte, etc. Esta capacitación es esencial para funcionar como un equipo cohesivo y enviar con precisión los datos que se recompilan.

"COMPLETÉ LA CAPACITACIÓN ICS 100 -FEMA. ADEMÁS, TAMBIÉN DESCUBRÍ QUE VOLAR EL DRON A CIEGAS (DAR LA ESPALDA AL DRON) ES MUY INTERESANTE. DEFINITIVAMENTE FUE UNA EXPERIENCIA NUEVA PARA MÍ".

/ PRICILLA NUTT /

***La instrucción la Dra. Murphy para los equipos o grupos de Women and Drones: si se pueden completar cinco experiencias de aprendizaje, esa es una meta alcanzable para la semana**

****Bueno, ¡algunos de nosotros inmediatamente decidimos establecer la meta de completar cada lección esta semana!**





Día 2, Tarde

Después del salón de clases, subimos a un número limitado de vehículos para ingresar a un área restringida de la Universidad de Texas A&M, un antiguo aeropuerto. Después de la instalación, pudimos aprender en la oficina de Justin Adams (en la parte trasera de su camioneta, (que es como un hotel de 4 estrellas), vimos al dron de ala fija eBee X realizar una misión de cartografía.

El dron eBee X tiene múltiples cargas útiles incluidas directamente en el modelo de más de \$35,000.00: LIDAR, imágenes térmicas y de alta resolución y video, ¡y luego pudimos verlo "aterrizar" en el campo! Según el Sr. Adams, este es un "aterrizaje normal", por lo cual los gritos no fueron necesarios.

La Dra. Murphy nos dividió en "Cohort 1, 2 y 3" y asignó un instructor a cada "Cohort" (grupo).

"LOS VUELOS DE DEMOSTRACIÓN DE JUSTIN DE UN UAS DE ALA FIJA CAMBIARON MI PERCEPCIÓN DE LO QUE PODRÍAN SER Y HACER LOS DRONES".

/ AUDREY S. RIVERS /

"MI EXPERIENCIA GENERAL CON LA CAPACITACIÓN EN DESASTRES CON LA DRA. MURPHY Y SU EQUIPO FUE FENOMENAL. FUE UNA GRAN CANTIDAD DE CONOCIMIENTOS, Y FUE UNA OPORTUNIDAD INCREÍBLE APRENDER DE ELLOS".

/ DESIREE EKSTEIN /

LOS OBJETIVOS DE LA MISIÓN ERAN:

1. Colección de mapas
2. Búsqueda de personas desaparecidas: térmica
3. Búsqueda técnica: Misiones en modo ATTI.



Justin Adams también es piloto de tripulación y cubrió el cumplimiento del espacio aéreo. El Sr. Adams confirmó a los Pilotos a Distancia o Remotos que en las operaciones reales del día a día, **NO HAY NINGÚN** piloto tripulado que este consciente de un "LAANC" o autorización de capacidad de notificación y de baja altitud (LAANC) (en inglés) (Low Altitude Authorization & Notification Capability). Los Pilotos a Distancias o Remote Pilot in Commands RPIC utilizan un LAANC para obtener autorización a través de la FAA para volar en el NAS, sistema de espacio aéreo nacional.

Los pilotos de tripulación no tienen ninguna notificación de que los drones están en el área en la que están volando. Los pilotos de drones **DEBEN** estar al tanto, en todo momento, de **CUALQUIER** otro avión al que debamos ceder el paso, **INCLUSO CUANDO** vuele en un desastre.

Nota: Poco después de la sesión informativa de Justin, un avión fumigador amarillo que volaba bajo, operando bajo las mismas Reglas de vuelo visual (VFR), nos llamó varias veces y estuvimos atentos a ese avión durante las lecciones de campo.

La mayoría del grupo volaba sus propios drones, mientras trabajaban con sus instructores. ¡También tuvimos la oportunidad de volar otros modelos de drones que solo habíamos investigado hasta ese momento! La oportunidad de tomar el control de otro modelo de dron nos permitió ampliar nuestras habilidades. Al igual que manejar, debe poder operar de manera segura cualquier tipo de dron que se coloque frente a usted y esto solo vendrá de la experiencia.

"20 MINUTOS DE TIEMPO DE VUELO EQUIVALEN A 2 HORAS DE TRABAJO FÍSICO DURO PARA PILOTOS NUEVOS A INTERMEDIOS".

/ DR. MURPHY /

No olvidemos los elementos, estábamos afuera, en el calor y la humedad de Texas, vestidos adecuadamente con pantalones largos, zapatos cerrados y camisas de manga larga con un color uniforme para poder contarnos y ubicarnos rápidamente y con sombreros para el sol. La calurosa y húmeda tarde de Texas fue un factor y estábamos tomando agua mientras nos cuidábamos unos a otros como lo haríamos en una operación real. Este desafío físico también es algo que un piloto debe tener en cuenta, y un buen equipo le informará cuando su aeronavegabilidad esté en duda. La advertencia principal es que serás parte de un equipo limitado, capturando la información necesaria sobre desastres, la mayoría de los pilotos se esforzarán, pero siempre hay que tener en cuenta que si pasa algo, nadie puede venir a ayudar.

Según la investigación de la Dra. Murphy, "20 minutos de tiempo de vuelo equivalen a 2 horas de trabajo físico duro para pilotos nuevos a intermedios". Teniendo en cuenta todas las presiones mentales y físicas, mientras se opera en los elementos, es desalentador, a pesar de que la adrenalina te mantiene en marcha, necesitas moderar tu energía para los días venideros.

Nuestro informe, denominado "Hot Wash", incluía los objetivos que originalmente queríamos cubrir, cualquier tema que no pudiéramos cubrir debido a que los equipos no funcionaban, etc. El "Hot Wash" permite la retroalimentación de los participantes para mejorar la experiencia de aprendizaje y mejorar las operaciones de comunicación en general. Los "hot washes" son comunes en el campo durante un desastre, ya que permiten que los escuadrones compartan las lecciones aprendidas con otros y los ayuden a aprender.

Salimos en convoy del área restringida, todavía animados por la emoción, pero agotados por el sol y el calor. Nos desviamos a nuestras duchas, ¡gracias a Dios!



Día 2, Tarde

¡Cena patrocinada con los participantes de InterOp'22!

Seré la primera en admitir que el alcance de InterOp'22 se me escapó por completo, ya que nunca había escuchado hablar de él, y estaba muy concentrada en mis objetivos de Mujeres y Drones. Cuando entramos en la gran sala de banquetes, “mis ruedas estaban girando”, descifrando cómo encajamos y conectamos en tal hazaña logística.

La gran sala estaba repleta y a medida que se presentaba cada agencia, los miembros se levantaban de sus mesas en representación de la Policía de la Universidad de Texas A&M, la Oficina Federal de Investigaciones, el Departamento de Seguridad Nacional de los EE. UU., el Departamento Militar de Texas, el Departamento de Seguridad Pública de Texas y el Equipo SWAT, Harris. County Texas, AT&T, Verizon, T-Mobile, Texas A&M Administrators, Cruz Roja Americana, Texas A&M Engineering Extension Service, FirstNet Authority, Brazos County 911 District, Airbus y Wi-Fiber, esto es impresionante.

Women and Drones cerró las presentaciones de la agencia, dejando lo mejor para el final. La Dra. Murphy subió al escenario para destacar su área de especialización y explicó el papel de los drones en relación con la misión InterOp'22.

Women and Drones están capturando los datos para probar la velocidad/capacidad de carga de la transmisión de video y las imágenes aéreas para cartografía; ambos conjuntos de datos incluyen varios gigabytes que se cargan y prueban las capacidades de AT&T, Verizon y T-Mobile para la acción oportuna de los participantes antes mencionados y primeros respondedores.

Digamos que el grupo de Mujeres and Drones entendió colectivamente el verdadero impacto que tenemos en este ejercicio InterOp'22, ¡y éramos los ÚNICOS pilotos de Drones!

Cuando la Dra. Murphy pidió a los miembros de Women and Drones que se pusieran de pie, cada uno de nosotros se puso de pie, vitoreó con orgullo y en voz alta, ¡y la sensación fue fortalecedora y de celebración!

Día 3, mañana

Nos reunimos en el salón de clases y, aunque la mayoría de nosotros todavía estábamos listos y con muchas ganas de comenzar, ¡también estuvimos de acuerdo con la investigación de la Dra. Murphy sobre el agotamiento!

Tema de Clases presenciales incluidas:

- Flujo de trabajo de manejo de datos
- Asignaciones de escuadrones de sistemas aeronave no tripulada, Unmanned Aircraft System (UAS)
- Tarjetas Micro SD y uso de sobres para organizar y rastrear
- Coordinación UAS y Software

La información crítica debe gestionarse siguiendo los procedimientos establecidos:

¿Cómo se transmitirán y utilizarán todas las imágenes capturadas por el dron?

¿Cómo se administrarán y almacenarán las tarjetas Micro SD?

¿Se necesita una cadena de custodia?

Ejemplo: Derrumbe del edificio Surfside en 2021, Miami, FL:

Todos los datos recuperados se están utilizando en casos de homicidio. Cada persona reportada perdida en ese desastre está siendo tratada como víctima de homicidio. Los datos recopilados por los robots, después del colapso, se están utilizando en los tribunales y existe una Cadena de custodia a la que los datos deben adherirse estrictamente para tener peso en un tribunal de justicia.

Ejercicio de campo:

En el grupo de Justin Adams, procesamos los datos en el vehículo de respuesta ante desastres de Texas A&M laboratorio sobre ruedas, y utilizamos los datos capturados del dron de ala fija eBee del día anterior. Los conjuntos de datos capturados por el dron eBee X se ingresaron en el software Pix4D-React y el mapa 2D estaba listo para usar, con imágenes de alta resolución.

11 AM- ¡FUIMOS A CIUDAD DESASTRE!!

"NO PODÍA ESCRIBIR NOTAS LO SUFICIENTEMENTE RÁPIDO DURANTE SUS PRESENTACIONES SOBRE EL ENTORNO DEL DESASTRE, EL DESPLIEGUE DE DRONES, LA SEGURIDAD DE LA GESTIÓN DE DATOS Y LOS PROBLEMAS DE GESTIÓN DE RECURSOS DE LA TRIPULACIÓN".

/ AUDREY S. RIVERS /

"¡Algo está en llamas!" Samantha Scully expresó mientras atravesábamos las puertas principales.

Condujimos hasta el complejo y vimos trenes volcados, humo negro en la distancia, edificios de concreto derrumbado, un automóvil chocado contra una tubería, y en el frente de todos los desastres había un montón de cartas pegadas a losas de concreto. Deletreando: "CIUDAD DESASTRE" (DISASTER CITY).

Día 3, Tarde - Ejercicio de Huracán

Women and Drone entraron al edificio administrativo principal de Ciudad Desastre y recogieron sus tarjetas de identificación. Después del almuerzo, se nos proveyó información, un grupo se quedó en Disaster City, mientras que dos grupos regresaron al campo para recopilar datos de cartografía en una iglesia y transmisión de video.

Al regresar al campo, Desi Ekstein fue enviada a una iglesia, en el campus de la Universidad de Texas A&M, para capturar datos de cartografía con su dron mediante evaluación rápida de daños utilizando el "protocolo 5+1" pionero en el huracán Irma. Apoyando a Desi en su vuelo seguro estaban la Instructora Rayne Hawkins, y Sharon Rossmark era la Observadora Visual.

Mientras que Sheila Bugbee debía estar lista para lanzar y apoyar una transmisión de video en vivo para una misión de conocimiento de la situación táctica.

"OBSERVÉ MUCHAS LECCIONES DURANTE LA CAPACITACIÓN SOBRE DESASTRES, PERO LO MÁS IMPORTANTE PARA MÍ LLEGÓ A TRAVÉS DE MI INTRODUCCIÓN FÍSICA A LA CARTOGRAFÍA. PODER PLANIFICAR Y EJECUTAR UNA TAREA DE CARTOGRAFÍA DE FORMA AUTÓNOMA USANDO PIX4D ME PERMITE VER CÓMO PUEDO LLEVAR EL USO DE MI EQUIPO Y MI IMAGINACIÓN A UN NIVEL COMPLETAMENTE DIFERENTE".

/ D'LISA FOOTE /

Los datos de la iglesia se capturaron con éxito y se cargaron en Comando de Incidentes y la directiva para la transmisión de video se cambió a una misión de soporte geoespacial y de mapeo, esta vez, de un campo.

El problema inmediato era el tamaño del campo que se solicitaba cartografiar. Tiempo de analizar los problemas, ¿podemos volar a una altitud más alta para limitar el tiempo y al mismo tiempo proporcionar datos útiles para crear el mapa, cartografiar con precisión la zona solicitada? ¿Tenemos suficiente carga en el control remoto del dron? ¿necesitaremos más de una batería para el dron? etc. Con la ayuda de Alex Robic, desciframos la nueva misión, cartografiamos la zona y guardamos la misión recién creada en el dron.

Sheila Bugbee, Sharon Rossmark, Desi y Kenny Ekstein se subieron al auto para capturar la nueva misión de cartografía del campo. Después de nuestro viaje de una cuadra, saltamos del auto para lanzar el dron y capturar tantas rutas cartográficas como fuera posible, antes de nuestra reunión de "Hot Wash."

Después de cartografiar parte del campo, empacamos y nos reunimos para el "Hot-Wash". Se mencionaron y abordaron muchos temas y la prueba de los sistemas fue un éxito.

Día 4, Mañana -Ejercicio de disparos en primera persona

Al llegar a Disaster City entramos en una gran sala con todas las agencias representadas. Ahora, están preparados para el ejercicio de respuesta de disparos en primera persona, equipo táctico completo, personal de respuesta a emergencias, operadores del 911, actores designados como víctimas, camiones con grandes antenas parabólicas y Women and Drones ocuparon asientos.

"LA PRÁCTICA NO DESCRIBE ESTE EJERCICIO DE ENTRENAMIENTO REALISTA CON INTEROPERABILIDAD Y PRUEBAS DE COMUNICACIÓN".

/ DR. RENEE JONES WELCH /

Nos informan colectivamente sobre el ejercicio, luego nos envían a otra sala para que nuestro "Air Boss," Justin Adams, pueda dirigirnos. El Sr. Adams fue a un rincón lejano con un equipo y lanzó un dron atado. El Sr. Adams estuvo en contacto constante con la Dra. Murphy, quien dirigió al grupo para comenzar a transmitir en vivo el exterior del edificio donde se realizó el ejercicio. Como de costumbre, en el estado de Texas, los fuertes vientos de un sistema de tormentas entrantes obstaculizaron nuestra capacidad de despegar de manera segura, caminar con los drones para capturar el video fue la solución, Semper Gumby (siempre flexible).

Día 4, Tarde

El ejercicio de disparos en primera persona continuó por la tarde con ajustes en ciertos dispositivos "Pulsar para hablar" de los socorristas, y el equipo de drones tenía un dron en el techo de la camioneta del Sr. Adams, debido a las nubes bajas, para poder continuar, la prueba de transmisión en vivo.

Los miembros de Women and Drones que participaron en las entrevistas del Documental pudieron completarlas esa tarde.

¡Hot Wash completado!

Women and Drones pudieron seguir a la Dra. Murphy, en un convoy, para recorrer Disaster City y ver las extensas instalaciones de entrenamiento. Fue asombroso y espectacular.



Día 5, mañana - último día

Mensaje recibido de la Dra. Murphy: ¡Hicimos las noticias de la noche!

InterOp'22 apareció en las noticias locales de College Station, Texas. La Dra. Murphy fue entrevistada y explicó porque se mostró a las integrantes de Women and Drone caminando con los drones, transmitiendo el ejercicio de disparos en primera persona, en lugar de volar, debido a los fuertes vientos.

Regresamos al aeropuerto restringido, para completar las comunicaciones finales y las pruebas de carga de wifi, mientras en el Centro de Comando en Disaster City se estaban recibiendo los datos. Volvieron los fuertes vientos, por lo que nuestros drones dieron otro paseo para cargar y probar la capacidad de carga. Alex Robic se aseguró de que los sistemas estuvieran lo más comprometidos durante estos últimos momentos para InterOp'22, después de que se pudo establecer varias transmisiones.

Sesión final de "Hot Wash" para mejorar el entrenamiento, sobre el antiguo asfalto.

InterOp'22 verifico los sistemas, permitió la capacitación cruzada entre agencias, empresas de comunicaciones y, por supuesto, ¡Las participantes de Women and Drones aprendieron mucho mientras lideraban la captura de datos!

Compartimos un almuerzo grupal final y recibimos con orgullo nuestros certificados de la Dra. Murphy.

Algunas conclusiones de esta experiencia invaluable incluirían la comprensión de que Women and Drones asumieron un papel de liderazgo en el Ejercicio InterOp'22, y el grupo que se reunió al comienzo de la semana se transformó rápidamente en un equipo unido y compatible. Nuestras posibilidades de volar otro modelo de dron y ampliar nuestras capacidades operativas, estando en presencia de expertos de renombre mundial en respuesta de robots, y la importancia de mantener actualizados los conocimientos de investigación aérea. Las conexiones y amistades que hicimos, con mujeres afines en la comunidad de drones, demuestran que se avecinan cambios positivos en nuestras comunidades locales. ¡Esperamos con entusiasmo que nos vuelvan a invitar a InterOp'23!

"Fue una semana intensa, espectacular con mucho aprendizaje técnico y teórico, "networking" con otras Agencias y profesionales del ámbito de Manejo de Emergencias. Además de hacer nuevas y extraordinarias amistades nos capacitamos en el manejo y uso de drones, integrando otra tecnología especializada en manejo de desastres que a su vez nos brindó nuevas herramientas. Adicionalmente, nos dio nuevas perspectivas de cómo tomar mejores fotos y capturar videos, de procesar datos para diferentes misiones o escenarios. Se destacaron y enfatizaron las funciones y responsabilidades de los miembros del equipo, como piloto de drones, observador visual. Entendimos los estándares y la compleja estructura del Sistema de Comando de Incidentes y mucho más".

Career Pathways for Drones



Photography, Film & TV



Drone Mapping



Drone Transportation



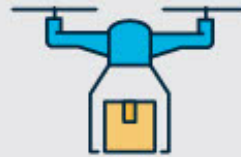
Healthcare



Drones Surveying



Search & Rescue



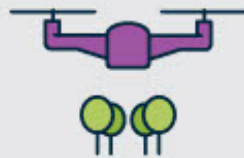
Delivery/Fulfillment



Agriculture



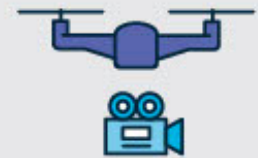
Wildlife Tracking



Forestry



Researcher



Drone Journalism



GIS Mapping & Analytics



Data Analysis



Logistics



Aerial Weed Spraying



Swarm Artist



Theatre Choreographer



Police Drone Operator



Insurance



Real Estate



Construction



Building Inspection



Mining



Roof & Solar Inspection



Energy Inspection



Bridge Inspection



Stockpile Assessment



ARTICLE BY DAWN ZOLDI AND DANIELLE MCLEAN

Vertiflite, March/April 2022

VFS teams with Women And Drones and other partners for positive change across the industry.

Both the vertical takeoff and landing (VTOL) industry and the drone industry are experiencing a talent crisis. According to DroneAnalyst's "2021 Drone Market Sector Report," pilots are at a premium. A 2020 VFS study indicated that 10,000 additional engineers will be needed over the next decade in vertical flight to meet the simultaneous demands of ramping up development of military rotorcraft and electric vertical takeoff and landing (eVTOL) aircraft (see www.vtol.org/workforce). The current talent pool is simply not large enough to meet these demands.

VFS has teamed up with Women And Drones, and its diversity, equity and inclusion (DEI) partners — P3 Tech Consulting (P3 Tech) and the Diversity Development Network of Canada (DDNC) — to help make positive changes across the workforce for all forms of advanced aviation.

It started with a survey.

The Birth of a DEI Initiative

Women And Drones, LLC, is the leading membership organization dedicated to driving excellence in the uncrewed aircraft system (UAS) and advanced air mobility (AAM) industry by advocating for participation by people of color, women and other underrepresented groups in this dynamic segment of the global economy. The organization enables people to connect, collaborate and make global business connections. It also elevates the entire drone industry by bolstering diversity, equity and inclusion, which improves business outputs and profitability.

Since launching in May 2017, the organization's network has connected with women in 22 countries. Its goal is to inspire and encourage more women to pursue careers in aviation and science, technology, engineering and mathematics (STEM), with an emphasis on UAS and AAM. Since 2018, Women And Drones has been named as one of the top companies to watch in the UAS industry.

In furtherance of its mission, Women And Drones partners with companies committed to an inclusive culture where women can thrive, through its education and networking opportunities, such as with VFS, P3 Tech and DDNC.

"We knew it was time to deepen the diversity discussion within the industry," said Sharon Rossmark, Women And Drones CEO. "However, we wanted to understand the scope of the problem and gauge industry interest in doing the work needed to impact change." As a result, she said, "We partnered with experts P3 Tech and DDNC to set the industry DEI benchmark standard and launched 'The 2021 UAS/AAM Industry DEI Survey'."

P3 Tech Consulting, LLC, is a US company led by retired US Air Force Colonel Dawn Zoldi, a 25-year veteran and global UAS and AAM expert. It connects people who have a passion for advanced technology platforms with full spectrum policy-relevant information to propel their companies and to do global good through various initiatives, including the popular weekly "Dawn of Drones" podcast on DroneLife TV.

"Diversity lies at the heart of P3 Tech's values: purpose, passion and purity. Passion is about living out what moves us and what matters. We educate and advocate about these issues in the industry – and at the top of that list are equality, diversity and inclusion," said Zoldi. "For me, it is a passion project to work with Women And Drones and DDNC on DEI for our industry."

DDNC is a Canadian non-profit corporation that supports industry, industry organizations, academia, other diverse groups, individuals and government, spanning all sectors. It was created after founder and president Marlene Conway Diels saw a growing need for collaboration with all stakeholders. By creating relationships and maintaining sustainable projects, DDNC aims to leverage resources to directly increase diverse peoples' access, entry and advancement in Canada to fill current and future highly skilled employment gaps. According to Conway Diels, "DDNC has established a learning management system to facilitate access to virtual skills development and DEI training globally. We are thrilled to be collaborating with Women And Drones, P3 Tech and the Vertical Flight Society on this important initiative."

The Industry DEI Benchmark

The survey was conducted as a self-selecting survey tool targeting a variety of UAS and AAM businesses and sectors across the US. Approximately 1,082 individuals responded to the survey during the six-week period it was open, between Aug. 6 and Sept. 17, 2021. VFS, as part of a larger educational partnership with Women And Drones, sponsored \$1,200 in gift cards, in support of a random drawing for the survey to encourage participation.

Data collected shows a lack of industry diversity. When asked to “indicate the percentage ranges of leadership positions among the following diverse groups you employ in your UAS/AAM or UAS/AAM-related business or organization,” the White racial group represented 71-85% of individuals occupying such roles, according to respondents. The good news is that an almost equal percentage (81%) expressed moderate to extreme interest in increasing DEI in their companies.

A summary of the survey results can be found on the Women And Drones website: www.WomenAndDrones.com.

“The survey validated our suspicions that the UAS/AAM industry continues to lack diversity. What was perhaps more important was that respondents clearly told us they are ready for change and want to help make it happen. We received insights on the educational content that people believe will be useful and are excited to provide relevant programs later this year,” Conway Diels said.

Women to Watch

This DEI initiative is the latest of a series of related efforts by Women And Drones and VFS.

For the past five years, the Woman And Drones flagship “Women to Watch in UAS/AAM Global Awards” program has been elevating the entire UAS/AAM industry by recognizing those who are making a positive difference. Women And Drones recently held its milestone fifth anniversary 2021 Women To Watch Global Awards live at CES 2022 in Las Vegas in January, which was the first time the program was held at such a high-profile venue.

THE FOLLOWING INDIVIDUALS WERE RECOGNIZED DURING THE EVENT:

Bronwyn Morgan, Xeo Air

Recipient of the Iris Automation Entrepreneurship Award. Morgan is a Part 107 certified pilot, US Federal Aviation Administration (FAA) Safety Representative and FAA Drone Pro. She is the Founder of Xeo Air, an artificial intelligence-based drones on demand, data analytics and autonomy platform for mission management that connects clients in telecom, catastrophic response, oil and gas, energy, construction and civil infrastructure.





Madison Jeffery, Swoop Aero

Recipient of the Skydio Public Safety/Service Award. Jeffery is based in Southern Malawi, where she manages Swoop Aero's flagship medical drone logistics network, which connects over 1.5 million people with essential medical supplies.

Karen Dimeo, AERODiMEO, LLC

Recipient of the Sabrewing Aircraft Leadership Award. As CEO, DiMEO advises her clients on issues related to UAS and advanced emerging technologies in the commercial aerospace ecosystem. DiMEO has 30 years of experience in the aviation industry, in both government and industry leadership positions.



April Lanotte, STEM lead for NASA's Aeronautics Research Mission Directorate

Recipient of the Unmanned Safety Institute Education Award. In her current position with NASA, Lanotte works on making aerospace science more accessible to all teachers and students and works with engineers and subject matter experts on ways to add more STEM opportunities to their missions.



THE INITIATIVE ALSO RECOGNIZED OUTSTANDING TEAMS:

Toni Drummond, CEO of Global Aerial Management Group

Recipient of the Volatus Aerospace Innovation Team Award. Global Aerial Management Group, which operates a multitude of turboprop and jet aircraft, is 100% women-owned and operated. The company's UAS business is expanding and specializes in drone sanitizing, and disinfecting of both indoor and outdoor arenas, stadiums, schools, and other large spaces.





Pharns Genece, CEO of USOG

Recipient of the FoxFury Team Spotlight Award. The Unmanned Systems Operations Group (USOG) is a leading-edge provider of medical logistics solutions utilizing UAS. The diverse and inclusive team of employees is led by Genece, who has 18 years of experience as a highly trained flight nurse with the US Air Force for medevac missions.

Michael Healander, CEO Airspace Link, Inc.

Recipient of the Women And Drones Diversity Exemplar Award. Airspace Link builds the digital infrastructure required to support drone use of all types, ensuring they are safe, legal, and fully benefitting the community — 60% of the company's leadership team is female.



The winners of these life-changing awards run the gamut from entrepreneurs to innovators and educators to diverse leading teams. Nominations for 2022 winners can be submitted on the Woman And Drones website beginning this spring.

DiversiFlite

VFS has led a series of panels and publications about workforce over the past two years, raising DEI as an increasingly important and urgent aspect of the vertical workforce (see the VFS Commentary, "Workforce: Winning the War for Talent," Vertiflite, May/June 2021). The first VFS panel on workforce was held as part of the Society's virtual 8th Annual eVTOL Symposium in January 2021.

Since then, VFS has participated in a number of panels on workforce and diversity over the past year. In May, the Canadian Advanced Air Mobility (CAAM) held a virtual panel discussion, "Women in Advanced Air Mobility: Big ideas to build a new industry." Keynote speakers were Women And Drones' Rossmark and Wisk Aero's Anna Kominik (a member of the VFS Board of Directors). VFS Executive Director Mike Hirschberg was the only male of the 22 invited speakers and highlighted the issues faced in the industry, urging the existing vertical flight workforce to "get comfortable with being uncomfortable" if we want the industry to change for the better.

The panel was also the official unveiling of the VFS DiversiFlite initiative. First announced last summer (originally as "DiversiFLY" — see the VFS Commentary, "Workforce: Diversity Wins," Vertiflite, July/Aug 2021), DiversiFlite has gathered momentum in the ensuing months.

VFS launched its DiversiFlite podcast series in January, which is now featured on the Society's YouTube channel (@VTOLsociety), as well as other social media platforms: Twitter, Instagram and TikTok (all as @DiversiFlite). The podcast will explore DEI in vertical flight and connect underrepresented talent directly to AAM and eVTOL industry leaders.

At the panel, VFS also announced its new DiversiFlite Scholars program (www.vtol.org/scholars), which seeks to provide opportunities for university students in underrepresented ethnic groups and have an interest in vertical flight. The program selects engineering students at any US-recognized Minority Serving Institution (MSI) and provides an all-expenses-paid trip to the Society's 78th Annual Forum & Technology Display being held May 10–12 this year in Ft. Worth, Texas.

While each of these steps is modest, VFS hopes that they will add up to attracting and retaining top talent in vertical flight.

Of course, DEI isn't just about race, ethnicity and gender. Inclusion is about welcoming all people, but it's also about leaders holding "bad apples" accountable for intentionally or unintentionally blocking certain groups from reaching their potential.

For this year's 39th Annual Student Design Competition, sponsored by Bell, VFS partnered with the UK charitable organization Aerobility. This year, university students are challenged with designing electric air taxis that accommodate passengers with reduced mobility. It's hoped that this exercise will help both tomorrow's and today's engineering workforce realize the benefits of thinking broadly about including everyone in their designs and customer base as well as their workforce.

An Alliance for Change

The TVF Workforce And Diversity panel and the DEI Survey gift card sponsorship were both part of a larger educational partnership between VFS and Women And Drones. Forged in Fall 2021, the alliance focuses on growing the vertical flight workforce and increasing inclusion, diversity, equity and accessibility (IDEA).

In addition to supporting each other's panels, podcasts and publications, the two organizations are planning a diversity training workshop later this year. Details are still being developed, so stay tuned!

About the Authors:

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AFRICA



Women and Drones Africa - Fireside Chat News

We have had a lot of fun with the Fireside Chats since we started in February 2021 and more so since we reported on our progress in the last article in Vertical Space.

The Fireside Chats have been hosted in the office, at convention centres, private game reserves and in the care while on 'duty'!

We have also collaborated with others and hosted Women and Drones Africa focused events or been invited to take part at other events, including:

1 FIRST DRONE CONFERENCE

in Zimbabwe (2021) where we had dedicated Women and Drones Africa session and Fireside Chat with Kim James.

2 SPACE CAMP

The GFPA Space Camp (March 2022) where Refilwe Ledwaba, the founder of Girls Fly Programme in Africa, chatted to us about her programme and the importance of encouraging girls into the aviation industry.

3 PANEL

The Drone Conference Panel (May 2022).

These 'live' Fireside Shows always bring an extra energy and excitement to the Fireside Chat especially when the event audience take part. The value of the connections being made or the knowledge there are more women in the industry than perceived at these live Fireside Shows for all those present cannot be understated.

We've also managed to keep the Fireside Chat going while undergoing 'loadshedding' in South Africa. [1] Sometimes this has required employing inventive measures for the host and Special Guests but we have a saying here in South Africa – you can always make a plan!

We are seeing both a band of loyal regulars as well as new faces join us for each Fireside Chat.

One of the most noticeable features of the Fireside Chats is the willingness of the Special Guests and audience to share information and offer help. While there is a competitive environment in the drone industry, the willingness to support each other clearly reaps more benefits, as we have seen in the Fireside Chats alone. The feedback recorded in the chats for each session typically conveys the appreciation of the audience as well as their excitement about what they can do with their new careers as inspired by the Special Guest.

Another noticeable feature and benefit of the Fireside Chats has been the networking that has taken place, whether it is passing on a contact for someone to pursue or even providing employment or training opportunities. Added to the fact that we're able to travel again and many are attending or presenting at conferences it is wonderful to hear someone who has tuned into the FC greeting another attendee they've finally been able to meet in person after chatting via the FC.

We continue to have moving and inspiring career paths presented by some of our special guests which have been especially beneficial to our audience that has recently become involved in the drone industry.

We have also had presentations on different types of drone applications including marine/ coastline management in the Caribbean and dealing with elephant/human conflict in East Africa. We have also gained insights into the growth and maturing of the industry as well as the many challenges still to be faced at multiple levels – from the pilots, organisations, business owners, manufacturers and regulators – as directly experienced by our Special Guests and some of our audience who comment during the Fireside Chat.

Finally, a special shout out has to go to Fiona Lake in Australia who got up at 0130hrs in the morning to join us as a Special Guest to talk about her experiences in the Australian drone industry!

IMPORTANT UPDATE ON THE FIRESIDE CHAT.

As the pandemic and associated lockdowns have receded and people are becoming busy again we have decided to transition to hosting the Fireside Chat once a month.

From June 2022 we will be hosting the Fireside Chat on the first Thursday of each month at 1730hours South African Standard Time.

The format for each Fireside Chat will continue as before with special guests from the African and global industry joining us to share their experiences, career paths and insights.

In addition, we will be sending out and posting links on our Women and Drones Africa [LinkedIn](#) page of previous [Fireside Chats](#) for your information, enjoyment and revision. Your host is Kim James (Aerial Works, South Africa).

See you on the first Thursday of each month at 1730hrs (South African Standard Time).

In the meantime, watch out for posts and links on the Women and Drones Africa LinkedIn page. Spread the word and see you at the next Fireside Chat!

[1] Loadshedding is where our electricity is turned off for specified periods for each day to ease the demand on the national grid as and when needed.



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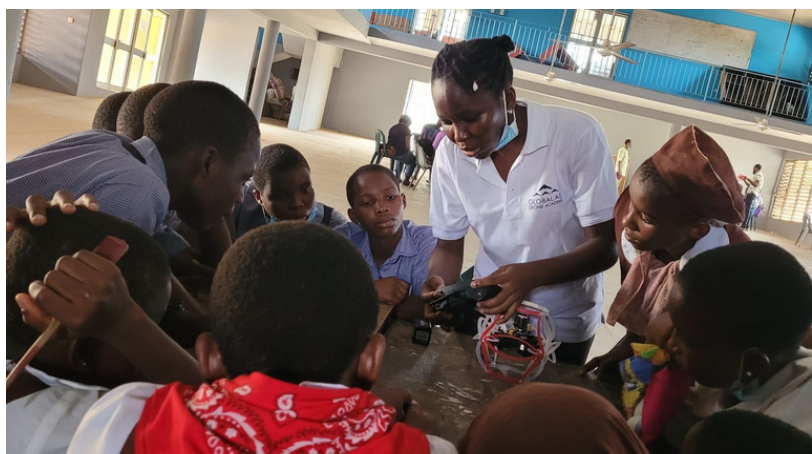
U.S. DRONE SOCCER: MORE THAN AN E-SPORT



By Dr. Renee -Welch Phd.

Drone soccer is a combination of drone flying and playing soccer, with a side of STREAM. STREAM education is an approach to learning that uses science, technology, Reading, engineering, Aviation, and mathematics as access points for dispensing curriculum for sixth to 12th graders on how to build, program, and fly drones. U.S. Drone Soccer emphasizes teamwork and critical thinking, and in the 21st century it makes sense to educate our children with flexible skills to innovate, collaborate and problem solve.

www.dronesoccer.us



According to Lina Pineros, Strategy and Operations at US Drone Soccer headquarters says, "US Drone Soccer has developed a program to engage students in an exciting team sport, while also having hands-on experiences and gaining real life professional skills. What has been a surprise is how much the students have learned and grown on and off the field. The students are showing levels of professionalism and responsibility that we were not anticipating. We are very pleased by the outcome and can't wait to see what the future holds for these students when they face different situations in the workforce."

U.S. Drone Soccer also expands opportunities in careers for under-served districts, girls, and populations that have been historically excluded from aviation. It also provides insights into career pathways in the UAS industry for today's modern learner and workforce, engaging learners from middle school students to workforce development participants. Its products and training programs were developed to meet the specific needs of today's technical education programs and explosive job growth.

I recently signed on as a partner to bring drone soccer to Las Vegas and I'm ecstatic. Based on my recent participation in Science Expo, stimulating students to learn more about aviation using the sport of drone soccer as an is an exciting way to provide awareness, exposure, and engagement. I see this eSport providing opportunity to expose, engage and inspire students through this interdisciplinary approach, and better preparing students for future career opportunities. Affectionately known as the Commissioner of the Las Vegas U.S. Drone Soccer League, it is my passion and mission to expose young co-ed students from underserved communities to this exhilarating, innovative educational program. I am currently recruiting partners, sponsors, and teams to join me and others across the states in launching this thrilling aerial sport and STREAM program.

Contact Chief Grantologist, Renee Welch, at info@dronegrantology.com. Drone Grantology provides grants development, strategy, and consultation services to help streamline the grant process for stakeholders in the unmanned aircraft systems (UAS) industry. [Drone Grantology LLC](#)

OHIO UAS CENTER LEADS THE WAY IN INNOVATION FOR THE UAS/AAM INDUSTRY

BY ALICIA ADAMS

With more than 34 state departments of transportation using drones in their daily operations such as inspecting infrastructure, monitoring crowds, and delivering supplies to disaster victims, local governments have wholeheartedly embraced the technology. States have also expressed increasing interest in using UASs (uncrewed aircraft systems) to relieve traffic congestion by utilizing them for product delivery. With this anticipated increase in air traffic, the state governments face the challenge of finding a way to cohesively manage aerial traffic activity. One state, in particular, has positioned itself to become the leader in developing airspace management and innovation: Ohio.



Ohio recognized in 2013 that drones would quickly transform state operations and eventually integrate into almost every sector of the economy. They formed the Ohio UAS Center which performs and manages uncrewed flight operations for the Ohio Department of Transportation. Drones are deployed daily to help with difficult or dangerous tasks such as bridge inspections, traffic and roadway monitoring, debris obstruction and spills, and facilitate search and rescue operations. “It’s ultimately about safety,” said Luke Stedke, the managing director of communications and policy at DriveOhio, a state organization that serves as a point of command for Ohio’s smart mobility initiatives including UASs. “Drones can be used in situations that are potentially dangerous to our crews, such as bridge inspections on busy highways.”

The Ohio UAS Center, located at the Springfield-Beckley Municipal Airport in Springfield, Ohio, also serves as a research facility for airspace management systems, AAM (advanced air mobility) testing, and a hub for collaborative partnerships between government, research, and private industry partners to develop the infrastructure and innovation needed to fully realize the entire UAV/AAM ecosystem. Supporting this research is Ohio UAS Center's SkyVision, a low-altitude, ground-based detect-and-avoid radar system that allows BVLOS (beyond visual line of sight) operations in Class E and G airspace for unmanned and experimental aircraft.

In September 2021, the Department of Defense approved a \$6 million dollar Defense Community Infrastructure grant to help fund the National Advanced Air Mobility Center of Excellence (NAAMCE) at Springfield-Beckley which will support the research and work of manufacturers and operators of AAM and eVTOL (electric vertical take-off and landing) vehicles.

The Center is located roughly 30 miles east^[1] ^[2] of Huffman Prairie where aviation pioneers Wilbur and Orrville Wright tested and perfected the first reliable, controllable airplane. That fact is not lost on Stedke. "The Ohio UAS Center will serve as the state's one-stop-shop for uncrewed aircraft operations and advanced aviation technologies," Stedke said. "I truly believe that the Ohio UAS Center is going to be the next Huffman Prairie."



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Image requirements: 300 dpi minimum. Image formats: JPG, JPEG, PNG – all high resolution

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Dates for Submission/Deadline

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By Angi English
Location: Skogafoss, Iceland
Equipment: DJI Phantom 4
Technique: I used three high dynamic range
photos taken at different apertures layered to
capture all the available light in the scene.



