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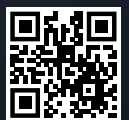


FOLLOW THE STARS: How Representation in Media Led Me to Hollywood

MAKING IT AS A SONGWRITER:
In an Ever-Changing Age

DISRUPTION BY DESIGN:
Entrepreneurs Are Paving
a New Road to Space

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STAR TREK: DISCOVERY SCIENCE CONSULTANT (SEASONS 3 & 4)
DR ERIN MACDONALD (ILLUSTRATION: LAURA DEGLOPPER)

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EDITOR'S NOTE

During the Chinese Civil War, the parents of Jimmy Chin,

Academy Award-winning filmmaker of *Free Solo*, fled to Taiwan and eventually settled in Minnesota. In terms of international adventure, Chin followed in his parents' footsteps, moving into the back of his car and parking outside Yosemite National Park to dedicate himself to the sport of rock climbing full-time. Now in his 40s, he's not only one of the greatest adventurers on Earth, but the biggest name in adventure storytelling.

The innovative tenor saxophonist John Coltrane caught his inspiration to pursue a career in jazz when he saw Charlie Parker, the co-inventor of bebop, perform in June 1945, but three months later, Coltrane joined the U.S. Navy. In the military, 'Trane's talent was recognized, and he soon became the first African-American musician to play in the Melody Masters, the base swing band at Pearl Harbor, HI, and he later pushed American music to new limits.

The Canadian writer Emily St. John Mandel, author of the world-famous novel *Station Eleven*, (which won the Arthur C. Clarke award in 2015, was a finalist for the National Book Award, and was adapted this year for streaming television on HBOMax) never formally studied writing. She left high school at age 18 to enter into The School of Toronto Dance Theatre, but

she wrote daily in a diary.

For me, a novelist, climber, and musician living in Boulder, it's daring personalities like these (and the stories of their circuitous routes to success) that most inspire me while I work toward my own artistic achievement. Each of us needs our heroes, our exemplars to emulate until we can find our own way of doing things. In this spirit, I'm excited to introduce to you the contributors to this edition of *Celebrate! Innovation*.

Dr. Tony Paustian quotes Isaac Asimov in his column about billionaire engineers who are disrupting the space industry—breaking the rules to break the mold, in other words: "A person willing to fly in the face of reason, authority, and common sense must be a person of considerable self-assurance. Since he occurs only rarely, he must seem eccentric . . . to the rest of us."

In this edition, you'll discover the wandering routes of Nashville singer/songwriter George Ducas, who took to music knowing full well the abysmal odds of success, and Dr. Erin Macdonald, inspired to pursue astrophysics and later storytelling by the sci-fi characters who looked like her. The lives of adventurers, musicians, and storytellers like these not only light the fire of my imagination,

but remind me that well-harnessed eccentricity almost always leads to successful innovation.

So dare to be strange. Dare to explore. Dare to trust that life never takes us in a straight line.



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DUCAS IN ACTION IN HIS HOME STATE OF TEXAS.



BY GEORGE DUCAS

MAKING IT AS A SONGWRITER

In an Ever-Changing Age

As a fifth grader, I had to write the classic one-page essay about what I wanted to do when I grew up. I don't remember writing it, but years later, my mother dug it out of her memorabilia and showed it to me. In fifth-grader handwriting, I expressed that I wanted to write a song and bring it to life in a recording studio. Just a couple of years later, my mother gave me my first guitar for Christmas. I took two lessons from a friend of hers and quit. As a nine-year-old, it was more difficult than I wanted it to be.



DUCAS PERFORMING LIVE IN DES MOINES DURING ONE OF HIS MANY 2021 TOUR DATES.

A year later, I picked up that guitar and those notes from my lessons and started teaching myself, complementing those instructions with a steady diet of country and rock music. I started listening closely to the music that inspired me and even tried to write my own songs, emulating artists who had also inspired me. My first song as a twelve-year-old was titled “Women and Whiskey,” two subjects I of course knew absolutely nothing about. But I leaned heavily on my early musical hero, Willie Nelson.

Years later, after graduating college and spending a year at a job in the “real world,” I stumbled onto a well-known industry book called “This Business Of Music” and a light bulb came on. I didn’t remember my elementary school essay, but I realized that what I had been doing was actually

a profession for the hard-working and fortunate few.

I filled up a Ryder truck—or maybe a U-Haul; I don’t remember—with what little I owned and headed straight to Nashville. Soon after moving to town, I heard an old adage, which went something like, “Write a hundred songs, and throw them away. Now, you’re actually becoming a songwriter.” Meaning, the first time (or many times) you attempt to do something, you’ll probably fail. And that’s okay. Success isn’t a straight line. Those who achieve it only do so through perseverance, trial and error, work ethic, and improvement. And even improvement can always be improved. You can always strive to be better.

I arrived in Nashville with probably about ten songs. Sure enough, none of them have ever been recorded, by me or anyone else. But I also arrived with a youthful confidence and a determination to go “all-in” with my efforts. I didn’t want to be slowed down by a real job as a waiter or a pizza delivery guy. I was going to write songs and perform wherever I could around town to pay the rent. (Fortunately, rent was low.) I shared a house with four or five other guys, all of whom were waiters or bartenders. I went knocking on doors, quite literally, and found a couple of bars that would let me perform regularly every Friday and Saturday night. Sometimes Thursdays.

Those bars were invaluable in ways I didn’t realize at the time. They allowed me to hone my craft and see what worked for me stylistically, but most important, they gave

me the flexibility and time I needed during the daylight hours to immerse myself in Nashville's deeply talented songwriting community. Of course, I wanted to be a performer, but I also wanted to be a real artist, and to me that meant writing my own material in my own style, not just singing someone else's songs (as was and still is the case more often than many people realize).

Learning to write songs is one thing—studying and observing the unwritten rules of songwriting—but heading in a purposeful creative direction within the songwriting framework is the “next level” in that writing process. It's something, I'd say, that comes close to entrepreneurship and product creation. It requires both passion and vision, and the ability to execute both. In my own career, I had to figure out what I had to say, how I wanted to say it, and what I wanted it to sound like. Who was I, and who did I want to be in terms of being a songwriter and an artist? What topics would I be both willing and able to explore, and what messages would I be willing and able to convey? In my opinion, a key ingredient to a recording artist's believability is his or her ability to be genuine, not unlike an entrepreneur's quest to create a product that not only fills a need for people but also enhances their lives and/or connects with them. Yep, I'm a recording artist and a songwriter, and people like me are all entrepreneurs and collaborators.

In my line of work, I realized early on how critical connections and collaboration are to both the creative process and commercial success. First, before any success can be achieved, something marketable has to be created, and to be successful, it had better be compelling because the competition is tremendous. There's an adage I'd like to take credit for, after twenty-plus years in the business, and that is “The world doesn't need another mediocre song. We don't need average-to-okay music. The world only has time for great songs.” As we all know, the same can be said for products. Sure, the early entries to a new market



“ONE OF THE MOST REWARDING ASPECTS OF BEING A SONGWRITER IS HAVING THE CHANCE TO LET THOSE SONGS LIVE AND BREATHE AND COME TO LIFE EVERY NIGHT OUT ON THE ROAD.” - GEORGE DUCAS

have an advantage, but still, if the product isn't compelling or executed properly, someone or something else will come along and claim that space in any potential marketplace. That said, for many, including myself, connecting and collaborating with other songwriters remains a key ingredient to creating compelling songs. Partnering

with those who share and have the ability to execute and refine ideas is paramount in the same way that those in other businesses take on partners who can add value to creating, distributing, or marketing a final product.



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DUCAS PERFORMING AT THE LEGENDARY GRUENE HALL IN TEXAS.

For recording artists, the collaboration doesn't stop with song creation. That's just the beginning. After writing those first hundred songs (you know, to prove you're actually a songwriter, learn the rules, and

begin to find yourself), then writing more and paring those down to the best ten to twelve songs to constitute your first album (mine was a ten-song album), you need to find the right producer who will help

bring those songs to life in the recording studio. I fortunately found mine, a guitar player and producer named Richard Bennett, whose previous work included such greats as Marty Stuart, Steve Earle,

and Emmylou Harris. Even after the album is completed—that is, recorded, mixed, and mastered—the collaboration continues. Whether it's a major corporation like Capitol Records, who released my first two studio albums, or an independent label, a record label offers the ability to market the final product to give it a chance in the very crowded marketplace that constitutes the music business. Connecting with that partner and collaborating with them to ensure a successful product rollout is absolutely critical.

With Capitol Records as my partner, I was fortunate to have had a string of hits and billboard-charting songs during my first two solo albums. Now, as an independent recording artist in the digital age, the game has changed. With streaming now dominating the retail music space, both terrestrial radio and traditional record sales are a bygone afterthought. Streaming services have created an easier entry to the market for independent artists than previously, when corporate-owned record labels and their bean counters played

the role of market gatekeeper. Artists can easily get their music onto streaming services, such as Spotify, Apple Music, Amazon Music, and YouTube. But most of those independent artists will languish in anonymity. Again, as in other businesses, unless the product is compelling in every way, it won't compete.

Certainly, the music business isn't the best or easiest industry in which to make millions. In fact, it's not a stretch to say it's among the very worst. Many find it glamorous, but it's a hard way to even make a living. It was hard even in its heyday, maybe the '60s through the '90s, unless you were at the top of the food chain where the spoils were rich, as they say. The top of the food chain still remains prosperous, and though this business has been kinder to others, it's been kind enough to me throughout my career, and I'm grateful for that. Even so, it's taken true passion, vision, and being in it for the right reasons to build a lifelong career. Those reasons have definitely helped me maintain that honest passion and vision I had when

George Ducas is a country singer and Grammy nominated song-writer. He has released four albums and countless songs written for other artists including Garth Brooks, the Eli Young Band, Trisha Yearwood, Sara Evans, Radney Foster, and many others. Ducas' debut album on Capitol Records yielded four Billboard charting songs, including "Teardrops" and the Top 10 smash "Lipstick Promises." Ducas wrote and performed "Party with Your Boots On" to be used specifically as the theme song for the famed Houston Rodeo. For ciLive! 13, Ducas will debut music created especially for the event!



PERFORMING LIVE:
THURSDAY, MARCH 10, AT 1:30PM.

I wrote that classic "What Do I Want To Do When I Grow Up?" one-page essay back in fifth grade.



DUCAS TURNING UP THE VOLUME AT THE HARD ROCK CASINO IN TULSA, OKLAHOMA.



DUCAS LIVE AND IN ACTION AT WOOLY'S IN DES MOINES, IOWA.



DUCAS LIVE AND IN ACTION AT WOOLY'S IN DES MOINES, IOWA.



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ERIN MACDONALD SPEAKING AT STAR TREK: THE CRUISE 2020



BY ERIN MACDONALD, PH.D.

FOLLOW THE STARS:

Representation in Media Led Me to Hollywood

Shortly after arriving home from my school day, with my backpack still on, I peeked over each shoulder to make sure the room was clear, then pressed the EJECT button on the family VCR. With the videotape in hand, I quickly stole my way downstairs to my sanctuary and popped it into my own VHS player, one that wasn't connected to the home cable. That familiar, haunting synth melody began—BUM-baba-bum-baba-bum-baba-bum—as a large “X” illuminated the screen, and I settled in to watch my clandestinely recorded episode of The X-Files. While I was old enough to watch the show by then, my parents had once prohibited it, and I didn't want to interrupt my years-long routine of sneaking away to watch my favorite duo, Special Agents Fox Mulder and Dana Scully, solve mysteries together.

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My teenage life was many things—the International Baccalaureate program, the Science Olympiad, dance company, robotics club—all which kept me busy and focused on the present. One thing lacking, however, was a sense of who I wanted to be. My parents were excellent role models, but I didn't necessarily think what they did was exciting, and I didn't have social media to introduce me to other professions. Generally, I felt lost. Scully, however, kept drawing me in. My little red headed self found comfort in watching a woman who looked like me don a lab coat and destroy aliens and conspiracies with science. She was everything I wanted to be. I investigated joining the FBI (but I wasn't interested in busting criminals) or becoming a medical doctor (ruled out by a serious injury I'd suffered at five years old), but I was thrilled to learn that Dana Scully had a background in physics. She'd studied relativity and Einstein's twin paradox in particular.

The little kid in me, obsessed with space and dinosaurs, never really went away. Media continued to stoke my interest, and this revelation about Scully made me realize I could go to college and study space. I could even get a degree and become an expert in it! Suddenly, I had a post-high school plan.

My only other career aspiration was fueled by a lifelong obsession with television and film, in case you haven't figured that out already. As a child, the first thing I watched was *I Love Lucy*—really. I knew all the trivia and collected all the memorabilia, and that was how I first figured out how to record television shows for posterity and review. With all that information about how the show was made, the details about the set, and the off-camera politics, I developed a fascination for behind-the-scenes content.

My interest in the production of TV and film drove me to yet another franchise, this one about dinosaurs and a theme park. (Oh, to grow up in the '90s!) *Jurassic Park* was the first VHS Special Edition Set I bought that came with an *extra* tape, which explored the groundbreaking CGI



MACDONALD (AGE 12) AT AN I LOVE LUCY EXHIBIT

and visual effects. I was particularly drawn to a powerful woman who drove the production forward: Kathleen Kennedy. Between Scully and Kennedy, let's just say I was wearing pantsuits at far too young an age.

Looking back, what I really loved about all these women, and what drew me to them at such a young age, was their power and leadership. The story of Lucille Ball running Desilu Productions, Dana Scully keeping Mulder in line and maintaining a strong political relationship with FBI executives, and Kathleen Kennedy ensuring a smooth production have all played a role in where I am today.

I began my university career without a clear picture of what I wanted to be, but I had in mind these images of women leading the world, telling stories, and breaking glass ceilings, and I knew I loved film and space. Of course, since Scully had majored in physics, that drove me (as did some nudging from the parental units) to pursue the same major. I set upon

a mathematics degree as well, partially inspired by the expertise of Jurassic Park's chaotician Dr. Ian Malcolm. (I was already partially interested in it myself.)

As an undergraduate at the University of Colorado Boulder, I was fortunate to gain a lot of research experience. My first job was in particle physics, but it didn't spark my interest or inspire me. I found a young astronomy professor who was willing to take on a new student for a research project, and together we were able to secure funding through the university to make it my part-time job. This research project involved combing through radio data from the Arecibo Observatory in Puerto Rico and conducting follow-up observations at the Green Bank Telescope in West Virginia.

While a career as an observational astronomer is an adventure in its own right (I recommend the book *The Last Stargazers* by Emily Levesque for wonderful anecdotes), the biggest highlight for me was my first arrival at the observatory. A radio telescope the size of a football field stood outside, illuminated only by blinking red lights. (Any other electronics would interfere with the data.) A small window allowed us to see out to the field from our insulated room. When I first hit "Enter" on my observing script and heard the chu-CHUNK! of the telescope moving into position, a vision of Dr. Ellie Arroway, the protagonist from *Contact*, flashed through my head. I was doing what she did!

It's important to note that even though Dr. Arroway was a wonderful character in her own right who provided inspiration to many women, I never personally connected with her. When it comes to representation in media, it's vital to understand that not every woman or young girl will see herself in a "token" representation—like, say, a single woman in a story about scientists. Although I never related to Dr. Arroway personally, that didn't minimize that awesome moment I ran a radio telescope for the first time.



MACDONALD (AGE 14) DRESSED AS DANA SCULLY



MACDONALD WITH HER VOYAGER TATTOO

Now it's time we get to the true star (pun intended) of this story. The *Star Trek* universe didn't really enter my life until I was in college. Funny enough, there happens to be a large intersection of aspiring physicists and *Star Trek* fans out there! My exposure to the franchise began with *Star Trek: The Next Generation* references at various college parties. See, with physics students, parties appear almost the same as any—Solo cups, beer pong, loud conversation—but instead of the standard drinking games, we played *Star Trek* drinking games. While keeping an eye out for the “Picard tug” or the “Riker maneuver,” I took in some of the most classic episodes and began to see the appeal.

I began renting and borrowing *Star Trek* DVDs, guided by myriad fellow students into what to watch first, and watched mostly the original series and *The Next Generation*. I fell hard for Leonard Nimoy as Spock and subsequently immersed myself in the adventures of the original Enterprise. The 2009 film *Star Trek*, which

rebooted the series, came out the night of my graduation. We did the obligatory celebrations and adventures, then dressed up in homemade uniforms and headed out for the midnight IMAX release. That was my first exposure to “Trekkies” and *Star Trek* fandom, and I fell in love. Though I was relatively new to the community, I felt like I had a place and a family.

Only three weeks (and one *Star Trek* tattoo with my best friends) later, I packed up my belongings and moved to Scotland to attend graduate school at the University of Glasgow. Given my background in radio astronomy and extensive research experience, Professor Graham Woan brought me on as a Ph.D. student to research potential gravitational wave signals from neutron stars, which typically emit in the radio spectrum. Though gravitational waves hadn't been detected yet, the opportunity and challenge of discovering something new drew me in.

High on my newly discovered adoration for *Star Trek* and with no friends or family nearby, I began delving beyond the original series and *The Next Generation* into the world of '90s *Star Trek*. While I'd spent the decade fighting aliens with Mulder and Scully, Trekkies had spent it fighting the Dominion War on *Deep Space Nine* and finding a way home in *Voyager*. Once I began *Voyager*, I knew I was in for the long haul. It was there that I was introduced to the eminent Captain Kathryn Janeway of the Federation Starship USS Voyager.

Like the Voyager, I was stranded far from home, and as the crew turned to their captain, I looked to her for inspiration and guidance. Janeway was everything I wanted to be and the best mentor I could have asked for. Her ability to lead the ship, practically and emotionally, fully encapsulated the type of leader that I wanted to be. Anytime (and there were many times) I wanted to quit or felt unqualified to continue my Ph.D. program, I would turn on *Voyager* and watch this incredible woman steadfastly manage every challenge the galaxy threw at them. I then felt like I could handle it; I had to at least finish it for captain. After all, I wouldn't be able to command my own starship if I didn't first finish my studies at the academy. The acknowledgement in my final dissertation reads:

To Captain Kathryn Janeway. I cannot describe the level of inspiration she provided me right when I was on the verge of giving up.

Once I graduated, however, I found myself in a bit of a pickle. See, Starfleet doesn't exist in this “real world,” and for that reason, I was lost again. I had witnessed the realities of an academic career, and given that at no point had I seen myself as a tenured professor, I wasn't sure the struggles would be worth it. I was encouraged to complete one postdoctoral research contract to gain some distance from thesis writing and assess my life outside of that fog. I am grateful for this time because it allowed me to figure out

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MACDONALD SPEAKING AT AT&T SHAPE ABOUT "THE SCULLY EFFECT" WITH GEENA DAVIS AND MAYIM BIALIK



MACDONALD AND FELLOW SCIENCE CONSULTANT PROFESSOR MOHAMED NOOR AT *STAR TREK: THE CRUISE 2020* (CREDIT: STTC)

what I did—and importantly, did not—enjoy about the career and explore other options.

During graduate school, I began attending and speaking at fan conventions, particularly DragonCon. I would give talks on the physics involved in sci-fi

franchises like *Star Trek* and *Star Wars*, and even popular video games like *Mass Effect*. Merging my passions with science education was a perfect combination for me. The thought of leaving academia was beginning to weigh on me, but at my core,

I knew I really loved teaching and being on stage in front of a crowd. To give me some non-academic breathing room, I began taking acting classes for adults and started voice acting for fan projects. Finally, I had started to find my own interests and carve my own path, and I realized that storytelling was dearest to my heart. But what to do with my Ph.D. in astrophysics?

After my postdoctoral job, I moved back to the United States and began teaching at local community colleges in Colorado, as well as the Denver Museum of Nature and Science as an educator/performer. Every day, I would don a space suit and perform experiments on the “surface of Mars” inside a diorama and answer space questions from kids. I loved the variety of this work, and it provided invaluable training for my continuing passion in science communication. Unfortunately, education in this country doesn’t pay nearly as much as it should, and I had a hefty student loan debt to pay. While working 4 a.m. shifts at Starbucks just so I could have medical benefits, I began searching for jobs in aerospace engineering.

My career in aerospace is neither here nor there. It was a great experience for me, and the first time I donned a security badge and walked into a meeting wearing a pantsuit that was appropriate for the circumstances, I finally got my “Dana Scully” moment. This was the job, however, that allowed me to move to Los Angeles. I was continuing to do these pop culture conventions and voice acting, and I realized that if I wanted a career in storytelling, LA was going to be key.

In 2017, I packed up my life and moved to California. I got a job working as a contractor out of Los Angeles Air Force Base and began to work on my voice acting more seriously. I also reached out to friends I had met at these conventions and got work as a science consultant on novels and a few television shows. Through friends of friends, I was able to connect with CBS executives, and on the

recommendation of my now-popular convention talks, dubbed “Physics in *Star Trek*,” I was invited to speak at what was then the official *Star Trek* convention—*Star Trek: Las Vegas* (STLV).

After STLV, the opportunities with *Star Trek* came fast and furious. It should come as no surprise that *Star Trek* fans have always demonstrated a passion for science, which has been the backbone of the series since the Gene Roddenberry days in the 1960s, so I began speaking at official franchise events and producing content for the website. Early in 2019, someone connected me to Michelle Paradise, the new showrunner for *Star Trek: Discovery*. They were looking for scientists to help with background content for season three and reached out to me and my friend, Professor Mohamed Noor from Duke University. Professor Noor and I had actually met each other previously through conventions, and both of us being asked to consult on Discovery was a purely delightful coincidence.

Later that year, CBS had five *Star Trek* shows in development and early production, and I was offered the position of science consultant for the entire franchise. This would include attending fan events, producing online content, and helping with any show that wanted to use me, to whatever extent. I say this very clinically, but it’s hard to describe the immense honor I have for the ability to do this job. I deeply honor the *Star Trek* legacy, and as a fan myself, I’m so privileged to have a small voice in shaping these stories that will live on for generations to come.

Two moments in this adventure made it all come together. The first happened before I started with *Star Trek*, but after I’d become a regular at conventions across the United States and had moved to Los Angeles. I was speaking at Denver Pop Culture Con, and who else was on the guest list but Captain Kathryn Janeway herself: Kate Mulgrew! I packed up my Ph.D. thesis and

hoped beyond hope that my schedule would align so I could get a signature. Thankfully, I was able to stand in line with the rest of the attendees, clutching my thesis so tightly, I cut off the circulation to my fingers. I watched as person after person, fan after fan, approached with photographs, action figures, and all kinds of collectibles for her to sign. She was there in the flesh, breathing the same air.

Once it was my turn, feeling slightly lightheaded, I opened my rather large dissertation in front of her and spat out my rehearsed ten-second elevator pitch. “Hi, my name is Erin. Captain Janeway was a huge help for me. This is my Ph.D. thesis in astrophysics, and can you please sign where I dedicated it to her?” (At least, I’m pretty sure that’s what I said. I may have blacked out a little.) She seemed almost as shocked as I was to have this presented to her, and she took a moment to think of what to say. I told her she’d see me again because I had purchased a photograph with her, to which she nodded and said, “Good.” During the photography session, which, if you haven’t done one, is basically a two-second cattle-call moment, I stepped in and said “I’m the astrophysicist.” She nodded, clasped my hands, and said, “I’m really proud of you. Keep doing wonderful things.” We took our photo, and I collapsed outside the booth in a puddle of emotional tears.

But wait, it gets better. Not three years later, I was working for the *Star Trek* franchise, and I had a meeting at Nickelodeon Studios. I was supposed to learn about the show I knew only as “the Nickelodeon *Star Trek* show for kids.” A few weeks prior, I had just gotten my tattoo of the USS Voyager and had shown it to my colleagues at CBS. I entered Nickelodeon (a nice Hollywood moment) and met Kevin and Dan Hageman, the brothers who are show-running *Star Trek: Prodigy*. They said, “We hear you have a Voyager tattoo. You’re gonna want to sit down.” And it was there that they told me

Erin Macdonald PH.D. works as a technical consultant for the entire *Star Trek* franchise—all five current shows! She is a recurring writer for the popular YouTube channel *Extra Credits* and wrote and narrated the audible original *The Science of Sci-Fi* which was a top 10 bestseller in March 2020. Erin received her Ph.D. in astrophysics at 25 from the University of Glasgow in Scotland researching general relativity and gravitational waves. After that she moved into public education at museums and colleges before consulting for the U.S. Department of Defense and, what is now, the U.S. Space Force.



PRESENTING:
(IN PERSON OR VIA E360TV)
THURSDAY, MARCH 10, AT 10:30AM.

Kate Mulgrew had just signed on to come back as Captain Kathryn Janeway.

After our meeting, I sat light-headed in my car as it all washed over me. I was going to help write lines for my hero, my mentor. And not just for the actress, but for the character herself! It suddenly hit me: This was it. This is what I was meant to do. I may not be able to be an inspiration or mentor as a “woman in STEM,” but where my heart truly lies is in that storytelling. That little red-headed girl who idolized these red-headed women on television had finally found her path to creating characters that the next generation will look up to .

Lucille Ball famously pushed to get *Star Trek* made, and here I am as the first woman science consultant for the franchise, continuing the legacy of storytelling. I look back to that eight-year-old me who loved space, consumed hours and hours of Nick-at-Nite, and knew every episode of *I Love Lucy*, and sit amazed at where I am now. Without these women—Lucille Ball, Kathleen Kennedy, Dana Scully, and Captain Janeway—I wouldn’t have been inspired to carve my own path and break my own ceilings. Representation matters, for all.



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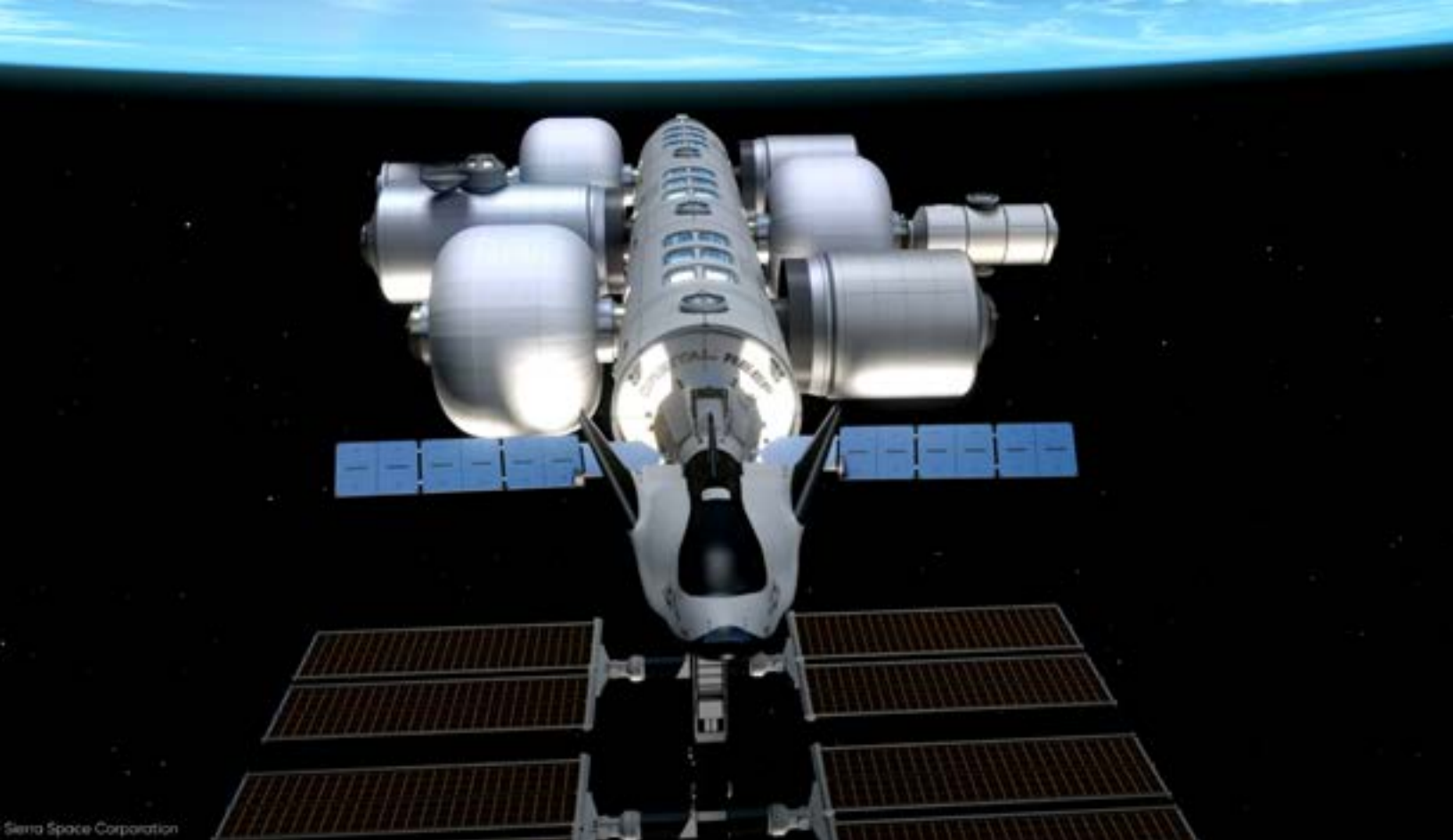
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BY DR. ANTHONY PAUSTIAN

DISRUPTION BY DESIGN:

Entrepreneurs Are Paving a New Road to Space

The silence was deafening. Almon Strowger's telephone hadn't rung in days, but he knew people were still dying. One of only two undertakers in Kansas City during the late 1800s, Strowger had a problem. The wife of his primary competitor served as the telephone operator and worked the switchboard at the local telephone exchange. When callers requested an undertaker or even Strowger by name, she deliberately directed the calls to her husband instead.

This article first appeared in *adAstra* for the National Space Society

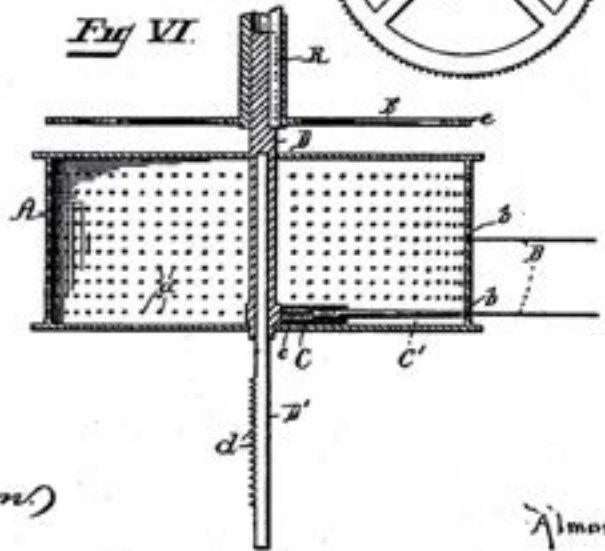
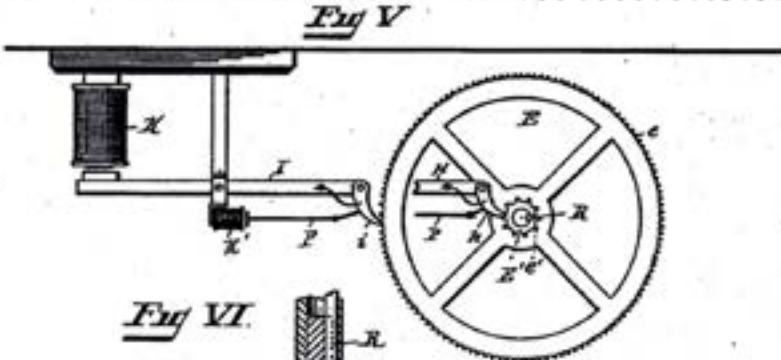
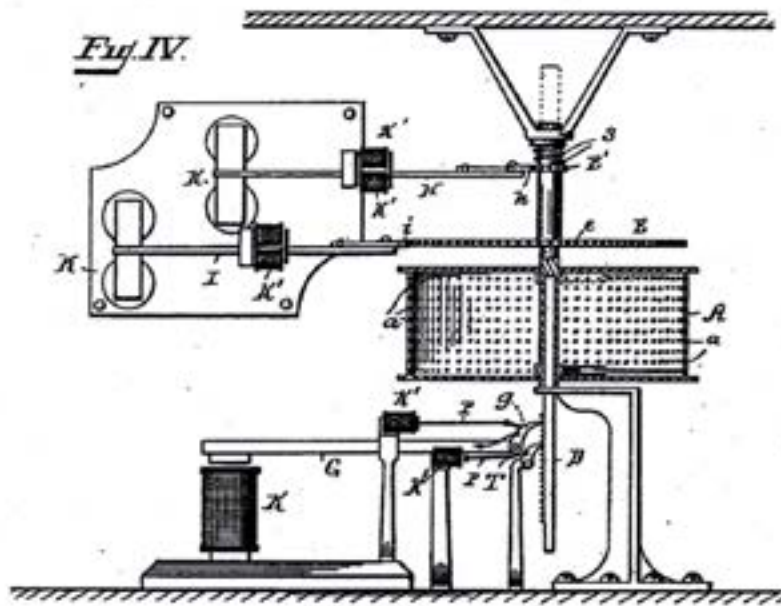
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3 Sheets—Sheet 3.

A. B. STROWGER.
AUTOMATIC TELEPHONE EXCHANGE.

No. 447,918.

Patented Mar. 10, 1891.



Witnesses
R. A. Balderson
A. B. Strowger

Inventor:
Almon B. Strowger

Strowger spent years complaining to the telephone company, but this failed to solve the problem. Undeterred and knowing little about the technology behind the telephone system and infrastructure, he was nonetheless inspired to solve the problem himself. The result was the invention of the first automated telephone switch, which allowed callers to direct-dial without having to go through a local operator. His inspiration led to a creative solution and resulted in the redesign of the entire telephone industry.

Countless examples illustrate how people outside a particular establishment can become inspired to solve a problem, often with little to no expertise or background in the field itself. John Dunlop, a veterinarian, invented the first pneumatic tire in 1887 to provide a softer ride for his son's tricycle. Leopold Godowsky, Jr. and Leopold Mannes, both musicians, invented Kodachrome film in 1916 because they felt cheated after seeing the film *Our Navy*, which was advertised as a color film but had extremely poor color quality. Hedy Lamarr, a popular actress during the 1940s, and George Antheil, a composer, developed a secret communication system known as "spread spectrum" technology to help combat the Nazis during World War II. Spread spectrum technology went on to provide the foundation for today's cellular phone technology and other wireless communications.

In 1985, psychologist Robert Sternberg and his colleagues at Yale conducted a study in which they asked people about the characteristics of highly creative individuals. A common thread ran through most of the answers—the idea that creative people tend to reject accepted, conventional ways of thinking and instead support ideas perceived as fresh and new. By choosing to think differently, these creative people also understand and accept the risks of failing in order to ultimately succeed.



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Thinking differently combined with the willingness to take risks often results in a change or disruption of the status quo. In the early 1990s, Harvard Business School professor Clayton Christensen coined the term “disruptive innovation” as an innovation that creates new markets and value networks that displace established market leaders and existing alliances. Compared to established companies and organizations, which tend to drive what’s called “sustaining innovations” that try to stay relevant and meet market needs through proven, incremental modifications and improvements, disruptors are often underrated, and their ideas are viewed as low-market solutions—until they’re not. By taking root in the bottom of the market and building on lower costs, higher accessibility, or other real or perceived advantages, the company or product becomes more appealing than the competition.

For example, video streaming completely caught the entertainment industry off guard. While video stores and cable and satellite providers were continuously improving their products in predictable, incremental ways, Netflix, viewed as a low-cost, low-market video rental house, became the largest subscription provider in the U.S. and completely disrupted the Hollywood ecosystem. Video stores have all but vanished and cable and satellite providers are trying to hang on to an ever-shrinking slice of a pie that’s quickly being consumed by the likes of Disney, Apple, Amazon, Sling, YouTube, and other streaming services.

In a 1959 essay, author Isaac Asimov wrote, “A person willing to fly in the face of reason, authority, and common sense must be a person of considerable self-assurance. Since he occurs only rarely, he must seem eccentric (in at least that respect) to the rest of us.”



PHOTO CREDIT: MARK USCIAK (USED WITH PERMISSION)



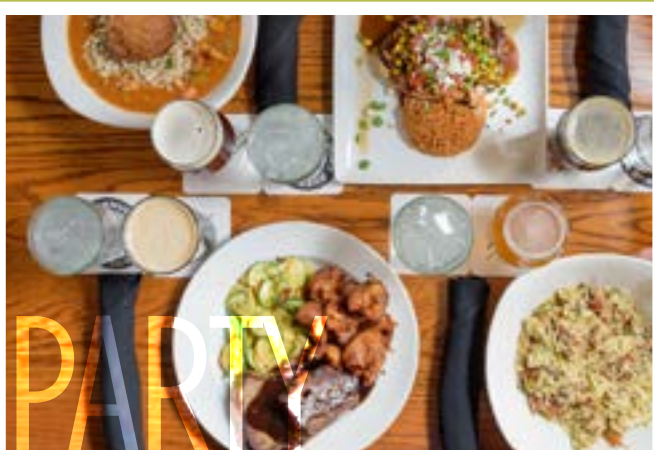
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11:00a-12:00a	11:00a-12:30a	10:00a-12:30a	10:00a-12:00a

Enter the space billionaires.

By joining the rapidly developing commercial space race, billionaire-backed companies such as Jeff Bezos's Blue Origin, Elon Musk's SpaceX, and Sir Richard Branson's Virgin Galactic have flown in the face of reason and common sense. NASA's Apollo and shuttle programs showed just how complicated, expensive, and risky spaceflight can be, and when Blue Origin, SpaceX, and Virgin Galactic were all founded within a few years of each other, many thought they all shared the same collective pipe dream. However, since their respective beginnings 20 years ago, SpaceX has had multiple successes while lowering costs across the board, and Blue Origin and Virgin may follow suit. SpaceX in particular has managed to free up more of NASA's budget for other areas of space exploration and research.

NASA now has contracts with more than 300 publicly traded companies and the global space industry could produce revenues of more than one trillion dollars by 2040. With companies like Relativity Space, currently at work 3D printing entire rockets; Rocket Lab, whose Electron rocket uses unique engines powered by battery-charged electric motors; or Axiom Space, which is building the first private space station; opportunities for disruption in the NewSpace business continue to grow.

The most creative, innovative people are also the most successful in propelling ideas forward. Google is one of the largest technology companies in the world not because it created a new, disruptive technology, but because its founders thought they could offer something that was a little better than what was already on the market. In that same vein, just as people watched *Star Trek* and went on to actually design and innovate many of the ideas the show presented (such as cellular flip phones, video communication, and talking computers), today's commercial

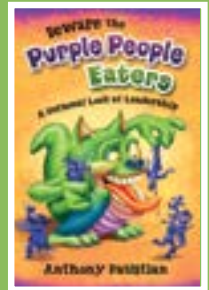
space visionaries and leaders watched both the Apollo and shuttle programs identifying concepts ripe for improvement.

During the Apollo years, NASA knew it was unsustainable to continue using expendable rockets to achieve its goals, which was one motivation for the space shuttle. However, it was the outsiders who seized on the financial necessity of reusable spacecraft and embraced the creation of designs that were both cost-effective and safe. Meanwhile, NASA's SLS rocket, designed for the Artemis lunar landing program, is still a single-use booster and could easily be viewed as simply a "sustaining innovation." While improving on old ideas and building on new ones, the commercial space sector is now changing the way people think about spaceflight and continues to disrupt what was once the sole domain of governments and nations.

Disruption takes time, however, and doesn't usually change markets quickly. It can take years, and sometimes decades, for new ideas and approaches to take hold. While NewSpace companies appear to many to have achieved quick success, these successes were built on almost two decades of setbacks and failures. Rockets exploded, software failed, and components malfunctioned. So when one sees SpaceX launch a bunch of private citizens with no real experience into space (funded by yet another billionaire), remember that this journey comes on the shoulders of people who have taken risks, overcome setbacks, and weathered ridicule to achieve disruptions in a business that is only about 60 years old.

As more visionaries and companies enter the NewSpace industry and build bigger and more efficient spacecraft and support systems, they will change the traditional look and feel of spaceflight as we know it today. Government-sponsored monopolistic contracts will continue

Dr. Anthony Paustian is the provost of the DMACC West Des Moines Campus and the award-winning author of four books. His most recent book, *A Quarter Million Steps*, has won seven international and national literary awards for best book in the areas of business, leadership, management, motivation, success and coaching. Dr. Paustian is the Vice President of Marketing for the National Space Society and a regular contributor to its magazine, *Ad Astra*.



dmacc.edu/west
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to erode, launch prices will continue to plunge, and the future of space travel and settlement—most certainly shaped and designed by disruptors—will look very different in the years to come.

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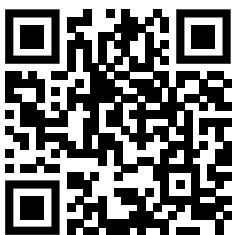
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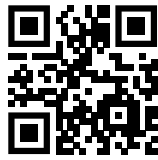
GEORGE DUCAS

COUNTRY SINGER AND
GRAMMY-NOMINATED SONGWRITER

THURSDAY, MARCH 10 | 1:30PM

George Ducas is a country singer and Grammy-nominated songwriter. He has released four albums and countless songs written for other artists including Garth Brooks, the Eli Young Band, Trisha Yearwood, Sara Evans, Radney Foster, and many others. Ducas' debut album on Capitol Records yielded four Billboard charting songs, including "Teardrops" and the Top 10 smash "Lipstick Promises." Ducas wrote and performed "Party with Your Boots On" to be used specifically as the theme song for the famed Houston Rodeo. For ciLive! 13, Ducas will debut music created especially for the event!





ROD PYLE

**AUTHOR, JOURNALIST, FILMMAKER, AND
EDITOR-IN-CHIEF FOR AD ASTRA**

Rod Pyle is an author, journalist, filmmaker, and Editor-in-Chief for *Ad Astra* magazine. He has written 15 books on space history, exploration, and development. Rod has also produced, directed, and written programming for History Channel's *Modern Marvels*; the History Channel documentary *Beyond the War of the Worlds*, and numerous titles for Discovery Communications. He worked in visual effects on *Star Trek: Deep Space Nine* as well as various TV pilots. Rod is featured regularly on national media as a space expert.



GERRY GRIFFIN

APOLLO PROGRAM FLIGHT DIRECTOR

Gerry Griffin is the former Director of NASA's Johnson Space Center in Houston. During NASA's Apollo Program, Gerry was a flight director in Mission Control for ALL of the Apollo manned missions. He was also Lead Flight Director for three lunar landing missions: Apollo 12, 15, and 17 and led a team of flight controllers responsible for the safe return of the Apollo 13 astronauts. Gerry was a technical advisor for the movies *Apollo 13*, *Contact* (in which he also acted) and *Deep Impact*.



ANDY ALDRIN

**SPACE ENTREPRENEUR AND SON OF APOLLO 11
MOONWALKER, BUZZ ALDRIN**

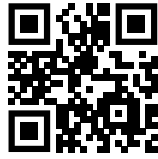
Andy Aldrin is the son of famed Apollo 11 Moonwalker Buzz Aldrin and a leader in the aerospace industry focusing on the intersection of policy, business, and academia. He founded the International Space University Center for Space Entrepreneurship at Florida Tech where he was also Director of the Aldrin Space Institute. Andy's experience also includes leadership positions at Moon Express, an emerging NewSpace company; Boeing; the RAND Corporation; and the Institute for Defense Analyses.

FUTURE OF SPACE PANEL

GRIFFIN/ALDRIN/PYLE

THURSDAY, MARCH 10 | 12:30PM





JAZZY ELLIS

HOLLYWOOD STUNT ACTOR

WEDNESDAY, MARCH 9 | 1:30PM

Jazzy Ellis is a SAG Award-winning stunt actor with over 75 film & TV credits. These include Marvel's *Avengers: Infinity War* and *Avengers: Endgame*; HBO's *The Immortal Life of Henrietta Lacks*; AMC's *The Walking Dead*; and CW's *The Vampire Diaries* to name a few. This Princeton alum was a high school math and special education teacher, radio show host, pageant queen, professional dancer, and researcher in the Amazon jungle. Jazzy uses her stories of triumph over adversity to inspire ambitious people of all ages, all walks of life, and in all industries to courageously reach their "impossible" goals.

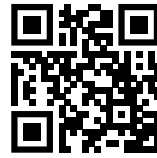


JASON FEIFER

EDITOR-IN-CHIEF OF
ENTREPRENEUR MAGAZINE

THURSDAY, MARCH 10 | 9:00AM

Jason Feifer is the editor-in-chief of *Entrepreneur* magazine, host of two podcasts (*Build For Tomorrow* and *Problem Solvers*), and is known as "the guy who gets you excited for the future!" His goal is to help you become more resilient and adaptable in a world of constant change—so you can seize new opportunities before anyone else does! Jason has worked as an editor at *Men's Health*, *Fast Company*, *Maxim*, and *Boston* magazine, and has written about business and technology for the *Washington Post*, *Slate*, *New York*, and others. His book *Build for Tomorrow, Not for Yesterday*, will be published by Penguin Random House in September 2022.



DR. ERIN MACDONALD

ASTROPHYSICIST AND TECHNICAL
CONSULTANT FOR *STAR TREK*

THURSDAY, MARCH 10 | 10:00AM

Dr. Erin Macdonald works as a technical consultant for the entire *Star Trek* franchise—all five current shows! She is a recurring writer for the popular YouTube channel *Extra Credits* and wrote and narrated the audible original *The Science of Sci-Fi*, which was a top 10 bestseller in March 2020. Erin received her Ph.D. in astrophysics at 25 from the University of Glasgow in Scotland, researching general relativity and gravitational waves. After that, she moved into public education at museums and colleges before consulting for the U.S. Department of Defense and, what is now, the U.S. Space Force.



JOHN DE LANCIE

ACTOR, DIRECTOR, COMEDIAN

THURSDAY, MARCH 10 | 11:00AM

John de Lancie is an American actor, director and comedian, best known for his role as Q in numerous *Star Trek* shows, beginning with *Star Trek: The Next Generation*, in 1987. Q is one of the few characters appearing in multiple *Star Trek* series. de Lancie has appeared in other well-known TV programs, including *Breaking Bad*, *The West Wing*, *MacGyver*, *Law & Order*, *Torchwood*, *Touched by an Angel*, and more. His film credits include *The Hand that Rocks the Cradle*, *Get Smart*, *Again!*, *The Fisher King*, and others. Known for his quite deep, resonant voice, de Lancie has lent his voice to various film projects and video games. De Lancie will reprise the role of Q in *Star Trek: Picard* in 2022.



JENNIFER ADLER

UNDERWATER PHOTOJOURNALIST

WEDNESDAY, MARCH 9 | 11:00AM

Jennifer Adler is a conservation photographer and underwater photojournalist. Her work is informed by her scientific background, and she uses her imagery to communicate science and conservation. She specializes in underwater photography and is a trained free diver and cave diver. An ongoing theme in her work is the connection between people and water in a changing climate. Assignments for The Nature Conservancy, National Geographic, and the International Women's Media Foundation have taken her all over the world. National Geographic magazine featured her work to teach kids about freshwater through underwater photography and the first 360-degree virtual tour in Florida's underwater caves.

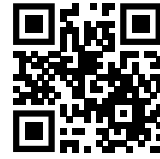


ALEXANDER ROSENBERG

ARTIST, EDUCATOR, WRITER,
AND GLASSBLOWER

WEDNESDAY, MARCH 9 | 12:30PM

Alexander Rosenberg is a Philadelphia-based artist, educator, writer...and glassblower. In 2018, he was cast on the Netflix Series, *Blown Away* that turned up the heat in glassblowing challenges and pushed him to creative extremes. He has a Master of Science in Visual Studies from MIT and has been an instructor at The University of the Arts in Philadelphia. He was named the 2020 Stephen Proctor fellow at The Australian National University School of Art in Canberra and a recipient of the 2012 International Glass Prize.

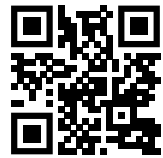


BRYAN SEELY

CYBER SECURITY EXPERT

WEDNESDAY, MARCH 9 | 9:00AM

Bryan Seely is a world-famous cyber security expert and ethical hacker. He is the only person to **ever** wiretap the United States Secret Service and FBI. Instead of being sent to a maximum security prison, the Secret Service called him a hero and praised his courage and integrity for telling them **before** he got caught. Bryan wrote the book *Cyber Fraud: The Web of Lies*, was featured on *The Lead* with Jake Tapper, and attracted the attention of *Shark Tank* star Texas billionaire Mark Cuban. He once appeared on the front page of *Wired.com*, *CNN Money*, *CNET*, *Forbes*, and *the Washington Post*—**all in the same day**.



DR. TALITHIA WILLIAMS

HOST OF PBS SERIES *NOVA WONDERS*

WEDNESDAY, MARCH 9 | 10:00AM

Dr. Talithia Williams is a host of the PBS series, *NOVA Wonders*, which explores the biggest questions on the frontiers of science. Known for her popular TED Talk, *Own Your Body's Data*, she takes sophisticated numerical concepts and makes them understandable. Dr. Williams has held appointments at NASA's Jet Propulsion Laboratory, NASA's Johnson Space Center, and the National Security Agency. She authored the book, *Power in Numbers: The Rebel Women of Mathematics*, and partnered with the World Health Organization to develop a model to predict cataract surgical rates for countries in Africa.

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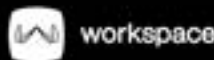


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WEDNESDAY, MARCH 9, 2022

9:00AM BRYAN SEELY
Cybersecurity Expert

10:00AM DR. TALITHIA WILLIAMS
Host of PBS Series *NOVA Wonders*

11:00AM JENNIFER ADLER
Underwater Photojournalist

NOON INTERMISSION

12:30PM ALEXANDER ROSENBERG
Artist, Educator, Writer, and Glassblower

1:30PM JAZZY ELLIS
Hollywood Stunt Actor

THURSDAY, MARCH 10, 2022

9:00AM JASON FEIFER
Editor-in-Chief of *Entrepreneur Magazine*

10:00AM DR. ERIN MACDONALD
Astrophysicist and Technical Consultant
for *Star Trek*

11:00AM JOHN DE LANCIE
Actor, Director, Comedian

NOON INTERMISSION

12:30PM FUTURE OF SPACE PANEL
GERRY GRIFFIN: Apollo Program
Flight Director
ANDY ALDRIN: Space Entrepreneur and son
of Apollo 11 Moonwalker Buzz Aldrin
ROD PYLE: Author, Journalist, Filmmaker,
and Editor-in-Chief for *Ad Astra*

**1:30PM GEORGE DUCAS
CONCERT/RECEPTION**
Country Singer and
Grammy-Nominated Songwriter

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