

Let's Go!

AEROSPACE

JAN | FEB | MAR 2023 — ISSUE NO. 1

Boeing Core +

Core Plus Aerospace
Connects Students to
In-Demand Careers

Minds-i Education

Dream Jobs — Savage Robotics

10 Ways to Participate
in Space **P.26**

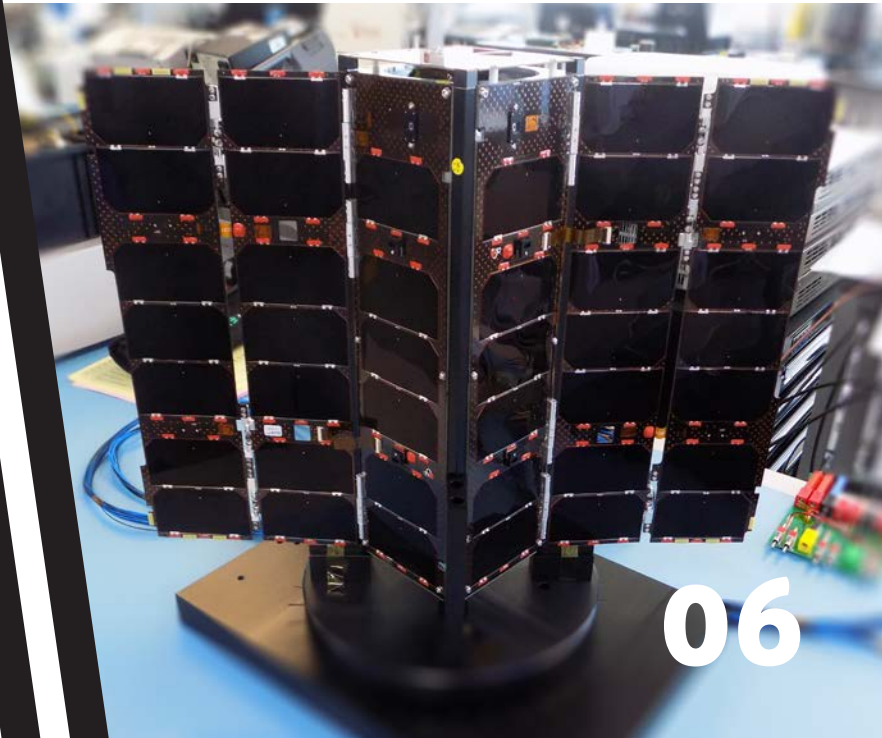
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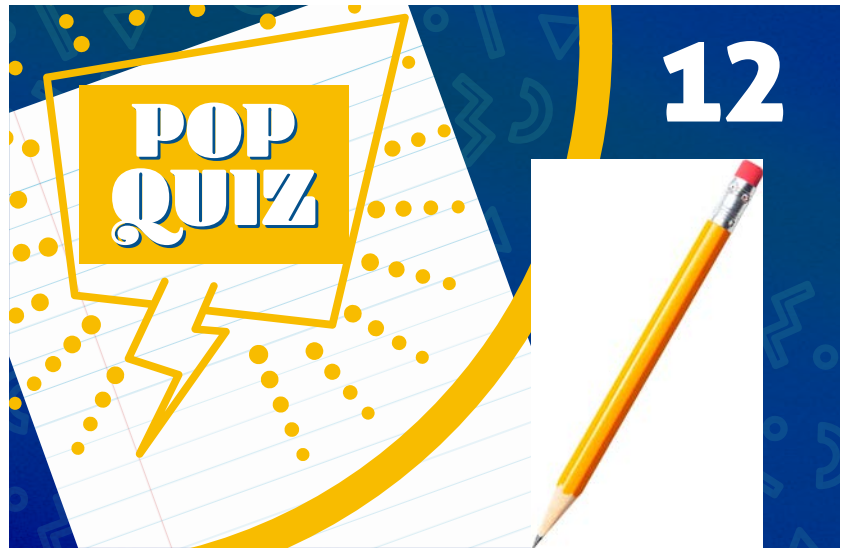
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203 N. Washington St.
Suite #200W
Spokane, WA 99201

509-995-9958

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PUBLISHER

DEAN CAMERON
DEAN@TOPDRAWERMEDIA.COM

CREATIVE DIRECTOR &
EDITORIAL DESIGN

REBECCA LLOYD
REBECCA@TOPDRAWERMEDIA.COM

COPY EDITOR &
PROOFREADER

ANN CONTOIS
ANN.CONTOIS@GMAIL.COM

CONTRIBUTING WRITERS:

JENNIFER FERRERO
KIRA LLOYD
TIA RIVERA
LISA RICH
DEAN CAMERON

PHOTOGRAPHY

The Boeing Company

FINANCE &
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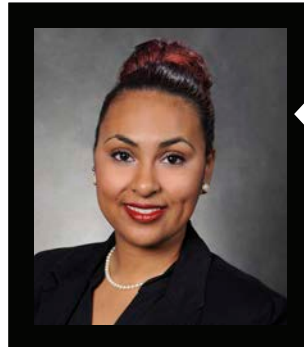
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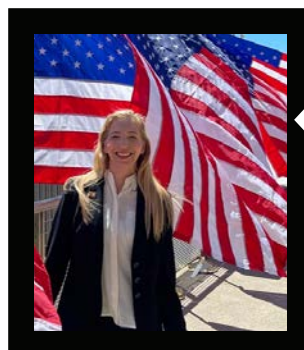
CONTRIBUTORS

JENNIFER FERRERO has been writing for the Northwest aerospace manufacturing industry for over 10 years. She is a long-time communications and public relations consultant and freelance writer, operating Ferrero Agency among other business development and consulting roles.



TIA RIVERA leads the Workforce Development team supporting Boeing Commercial Aircraft Manufacturing and Safety. In this role, she oversees manufacturing pipeline engagement between academia, the military, and Boeing.

KIRA LLOYD is currently an eighth grade student at Lincoln Middle School in Pullman, Washington. She is an avid reader and writer; in her spare time she enjoys playing the viola, hanging out with friends and attending her local youth group



LISA RICH is the founder and COO of Xplore Inc. She is photographed here on August 12, 2022 at the Chabot Space and Science Center, featuring remarks by U.S. Vice President Kamala Harris, Chair of the National Space Council.

DEAN CAMERON is CEO of Top Drawer Media, publishers of *Northwest Aerospace News*. He has been an aerospace marketing professional for the past 32 years with experience in engineering design, as well as numerous manufacturing disciplines.



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STEM STUDENTS LAUNCH

A BREADBOX INTO SPACE

Students at the North Idaho STEM Charter Academy have launched an educational mission satellite into space and are learning communication and leadership skills in the process.

By Jennifer Ferrero



Students in the Project DaVinci Cubesat program at North Idaho STEM Charter Academy want to go to space. The students have launched a satellite into space via a Rocket Labs program (with NASA) called Venture Class Launch Service, which is impressive enough. But the ideas about good business held by these students is better than most teens. The small group of eight to twelfth graders met in a courtyard recently to track their breadbox-sized satellite flying overhead at 17,000 miles per hour.

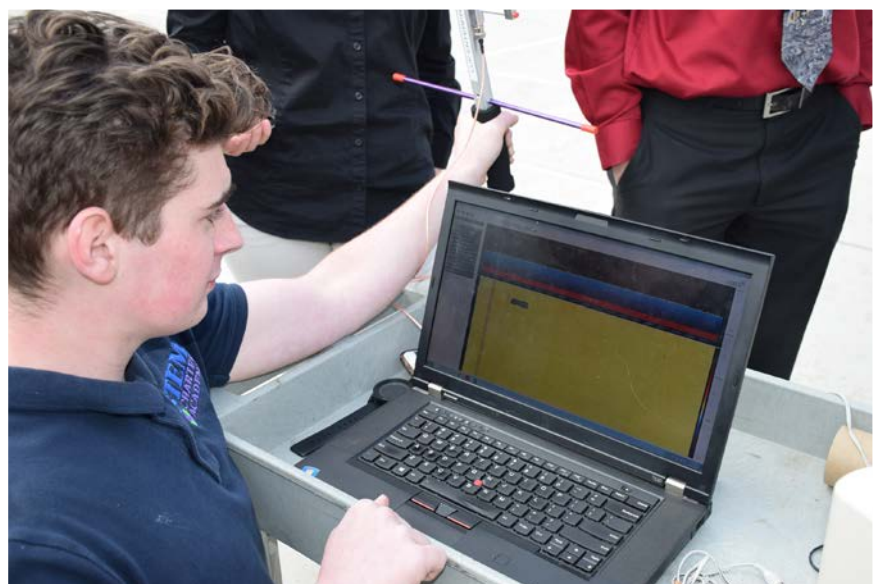
Firm handshakes, direct eye contact, and being able to clearly define their names is how these students have been trained by their teachers. Each one knows their role on the team and how to tell others what they are doing.

These skills come in handy with the opportunities this project has afforded. Some of the students have been asked to speak at national astronomical conferences and other related events! Students have job titles like space ambassador and educational lead, development lead, and spacecraft systems lead, and they have regular “team” phone calls directly with NASA.

Beth Brubaker and David Moon serve as educational leads for Project DaVinci Cubesat at the school. As instructors, they work together to foster the students in this program. Moon cites that he enjoys, “watching the kids grow and get out of their comfort zone.” He reflected on the shy and quiet students who bloomed with the program, “Now they are speaking in front of hundreds at conferences.”

Could that be you?

The program is in the small town of Rathdrum, Idaho. A town known for a cute city park, and several homestyle restaurants, good when your parents don’t want to cook.



In 2015, teacher, David Moon received a tip that they could apply for an opportunity to participate in a new kind of satellite launch program; their school could use it as a student educational program. They applied — along with the support of community members like Ross Welburn, a retired engineer and patent holder, and Burt Rutan, aeronautical engineer — and were accepted into the program along with nine other groups nationwide.

Other schools and universities around the U.S. are involved, such as: West Virginia University, New Mexico Tech, the University of Florida; military installations like the U.S. Naval Academy, Langley Research Center; and commercial partnerships with NASA such as the NASA Independent Verification and Validation Program.

The North Idaho STEM Charter Academy was the only high school issued into this round and had an initial launch scheduled for 2017. Delays occurred and they completed launch in December 2018 on a new style of research-based rocket by Rocket Labs, from a point in the South Pacific.

The rocket is much smaller than those launching missions to the International Space Station. It is called “Electron” and is Rocket Labs’ first 3D printed engine that operates with oxygen and kerosene. It is 56 feet tall (17 meters), as opposed to the Delta Heavy rocket standing at 236 feet tall (72 meters), and carries a payload of 330-495 pounds (150-225 kg). The rocket is supported by the private sector and accepts research payloads from educational and commercial organizations.

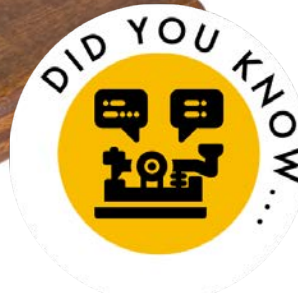
The breadbox

An exploratory video of the program via NASA Kennedy’s YouTube.com page called “NASA’s ELaNa-19: Small Satellite, Big Dreams,” illustrates that the “Educational Launch of Nano Satellites (ELaNa) are compact satellites that pack a lot of science into the size of a slice of bread.” They are revolutionizing space research,” a spokesperson said. “Instead of having a launch for a primary mission every two to five years, the goal is to develop launches in a regular cadence for regular access to orbit.”



DaVinci is designed to connect with students around the world while broadcasting education-related messages using Morse code.

“The concept is like the Ovaltine messages of yesteryear where listeners would receive and decode messages on the weekly broadcast,” says Jessica Millard, student project coordinator, DaVinci. The message at the time of this writing was, “Thank you NASA.”



Invented by Samuel Morse in 1836, Morse Code is a method for sending and receiving text messages using short and long beeps. Conventionally, a short beep is called a dot and a long one is a dash (also known, respectively, as a dit and a dah).

Other satellites in the payload (the items packed into the Cubesat/breadbox satellite) are doing the following:

1. Using robotic arms to grab on to a host satellite and review the satellite for repairs by taking photos
2. Monitoring space weather over earth's poles and demonstrate a simulation and test platform for future Cubesat missions
3. Test materials to shield space craft against radiation
4. Collection of data on earth's magnetic field
5. Using lasers instead of radio waves to navigate in deep space
6. Testing a 250-meter solar sail ribbon
7. Reviewing plasma fluctuations in space

A variety of students at North Idaho STEM Charter Academy participated in this project throughout its mission. Some students, like you, may start as early as eighth grade and stay on the program throughout high school, while others may join for a year or two due to other clubs and programs they are involved with in high school.

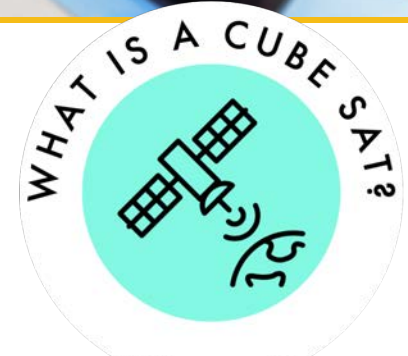
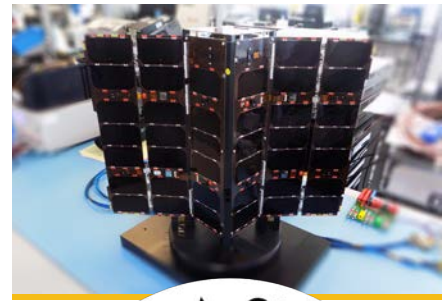
They have set up job titles and descriptions and the students are responsible for their roles. Justin Kugler has been with the team for three years and graduated in May 2019. "I started as the spacecraft systems lead; it was my job to know what was going on with satellite development, our communication team, and manufacturing partners. I have moved on to co-heading the student function of the team." Justin attends Embry-Riddle Aeronautical University to pursue aeronautical science.

Student Samantha Schroeder is a co-lead on ground communications. "I'm the one working with the ground station and tracking the satellite." She was a freshman and hoped to gain skills from hands-on learning with the DaVinci Program.

Madelyn Zilm is another student who said, "Our main goal is 'Lighting up minds around the world.'" She is responsible for social media planning — communication with mentors, teachers, and space ambassadors. She said they don't communicate with the other nine partners directly, but they do hear from them on the regular NASA calls.

A freshman by the name of Basquiat Nelson was the logistics and ground stations lead, "I take care of logistics for business cards, shirts, and tracking the satellite." He liked attending local events and informing people about the DaVinci program. He felt their school was chosen for being hardworking, and said, "Even with postponements we kept pushing forward."

Long term they want to start taking photos with the satellite, which hasn't been available to-date.



A CubeSat (U-class spacecraft) is a type of miniaturized satellite for space research that is made up of multiples of 10 cm × 10 cm × 11.35 cm (about 4 × 4 × 4.5 inches) cubic units. CubeSats have a mass of no more than 1.33 kilograms (2.9 pounds) per unit, and often use commercial off-the-shelf (COTS) components for their electronics and structure. CubeSats are commonly put in orbit by deployers on the International Space Station or launched as secondary payloads on a launch vehicle. Over 1000 CubeSats have been launched as of January 2019. Over 900 have been successfully deployed in orbit and over 80 have been destroyed in launch failures. (Reference: Wikipedia, 2019)

The students in the program were more than astute; they seem to be inherently curious. They planned to continue to run the program for about two more years until the satellite "enters the atmosphere and burns up in space," said Justin Kugler.

While the brunt of focus is on satellite management and fulfilling their mission of connecting with students around the world from space, these students are picking up communication and leadership skills that will solidly take them into the future, whether terrestrial or within the realm of space travel.

WHEN OPPORTUNITY KNOCKS

By Kira Lloyd, age 12

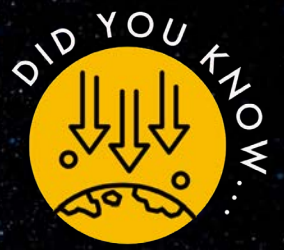


Most people have considered being an astronaut at least once in their lives, probably when they were little. Many young people are asked what they want to do when they grow up, and a trend among younger kids is being an astronaut, firefighter, or pilot. As most get older, they realize how becoming an astronaut isn't as simple as they thought, but it's still cool to imagine yourself floating around in space, or walking on the moon. That's where the idea for "Inspiration4" came from.

A few months ago, I watched a documentary with my family about a different sort of space crew. Inspiration4 is a team of astronauts made entirely of civilians. The organization was the first to ever have an all-civilian crew go up into space. Each person represented one part of their mission: leadership, generosity, hope, and prosperity.

The four people picked to fulfill these roles were Jared Issacman, the "founder and CEO" of Shift4payments, and the "leader" of the space crew. The second person was Hayley Arceneaux; she is a medical officer and physician's assistant at St. Jude Children's Hospital, and she came to represent the "hope" on this trip. Our third person fills the role of "generosity," and that man is Chris Sembroski. He is a mission specialist and Air Force veteran. And last, but certainly not least, Dr. Sian Proctor comes in to demonstrate "prosperity." She had wanted to go to space for years and was over the moon when she finally got the chance. Before becoming an astronaut, she was already a geoscientist, explorer, and artist.

After all of the chairs had been filled, the crew was taken to Mount Rainier to undergo flight training. The first thing they did to prepare for this incredible escapade into space was to hike up a mountain. The long, uncomfortable trek was used to get the crew "comfortable with being uncomfortable." (In the words of Jared Issacman) After hiking to an elevation of 10,000-feet, they came back down to get ready for their next bit of their training. In order to do this, the crew would make "centrifuge runs" at the National Aerospace Training and Research Center in Southampton. During this training, each individual would take turns getting into the centrifuge chamber to undergo a simulation that represents feeling up to four to six "g's" — similar to what the crew would end up feeling during their actual flight.



Normal humans can withstand no more than 9 g's, and even that for only a few seconds.



Photo Credit: Inspiration4.com

A “g” is when an aircraft accelerates so much that you end up feeling however many times the normal gravitational force. Each crew member would have to undergo this training to prepare them physically, otherwise, there was a chance they would black out during the flight. The process was designed to significantly reduce the chances of this happening.

All of the training was vigorous, but the crew, of course, was determined. They also spent more than 60 hours training away from the SpaceX program, to learn each assignment for when they took off. Each person had a role to play, and if any were not done well, it could cause problems for the whole crew.

To top off all of this other training, there was also the fitness regimen. All of the astronauts had to get ready to experience the demanding conditions of space, and to do that they had to undergo lots of physical exercise.

Most astronauts have about two years of training to prepare for their mission, but the Inspiration4 crew only got about four months to do all this, which is so crazy if you think about it. After all their training, the astronauts got their space suits fitted and tested. Soon after, in September of 2021, the crew got ready for liftoff. Getting on the ship was exciting for everyone, but it was also nerve-wracking. The whole team was ready and knew what they were doing, but there was always the chance that something could happen with the ship.

But here the crew was, in their spaceship SpaceX Dragon, when the countdown started. The liftoff was a success! Next the crew had to get into orbit. This is where all the hours they put into studying their roles came in, and they were able to get the craft out of the atmosphere and into space.

After the whole mission was over, the expedition was able to raise over \$240 million for the St. Jude hospital! After the completion of the mission a question presented itself to the world — if someone came up to you and asked if you wanted to represent one of these chairs going on a mission into space, would you do it?



POP QUIZ

Quiz your friends, your teachers, your parents!

HOW MANY COMMERCIAL AIRCRAFT FLIGHTS ARE THERE PER DAY AROUND THE WORLD?



Answer: Some 100,000 flights take off and land every day across the world.



DID YOU KNOW...



The fuselage of a 737 can fit through the engine housing of a 777.



HOW MANY PARTS MAKE A 747?



Answer: There are six million parts on one 747. For example - 40,000 rivets are on each wing alone!



MINDS-i EDUCATION

Savage Robotics System

is a Friday Way
to Think About
Your Future

By Jennifer Ferrero



In a big box-shaped manufacturing building in Liberty Lake, Washington, there is a small corner dedicated to Willy Wonka learning tools for the future. It is command central for one of the country's leading-edge drone/robotics educational programs — Minds-i. Started in 2005 by Altek President Mike Marzetta, and his wife, Christy, Minds-i seeks to excite students about STEM-related careers through a variety of robotic and drone curriculums, education labs, and kits.

To create Minds-i's educational system, Mike combined his childhood fascination with remote-controlled cars, models, and LEGO bricks with his professional background in automation, technology, and manufacturing. Mike's office sets the stage with rows of action heroes and toys lining the shelves. The class materials come with documented Common Core Math and Next Generation Science guides to fit with education standards, which your parents will like.

The company's patented "quick-lock" construction system allows users to connect/disconnect pieces together easily, while allowing for rotating arms, levers, and suspension systems. Connectors and small beams of varying sizes can be formed into frames, chassis, or foundations that can be static, robotic, or motorized. The Minds-I component technology improves on the traditional Lego-style and erector set systems to foster more creativity for the young minds to explore.

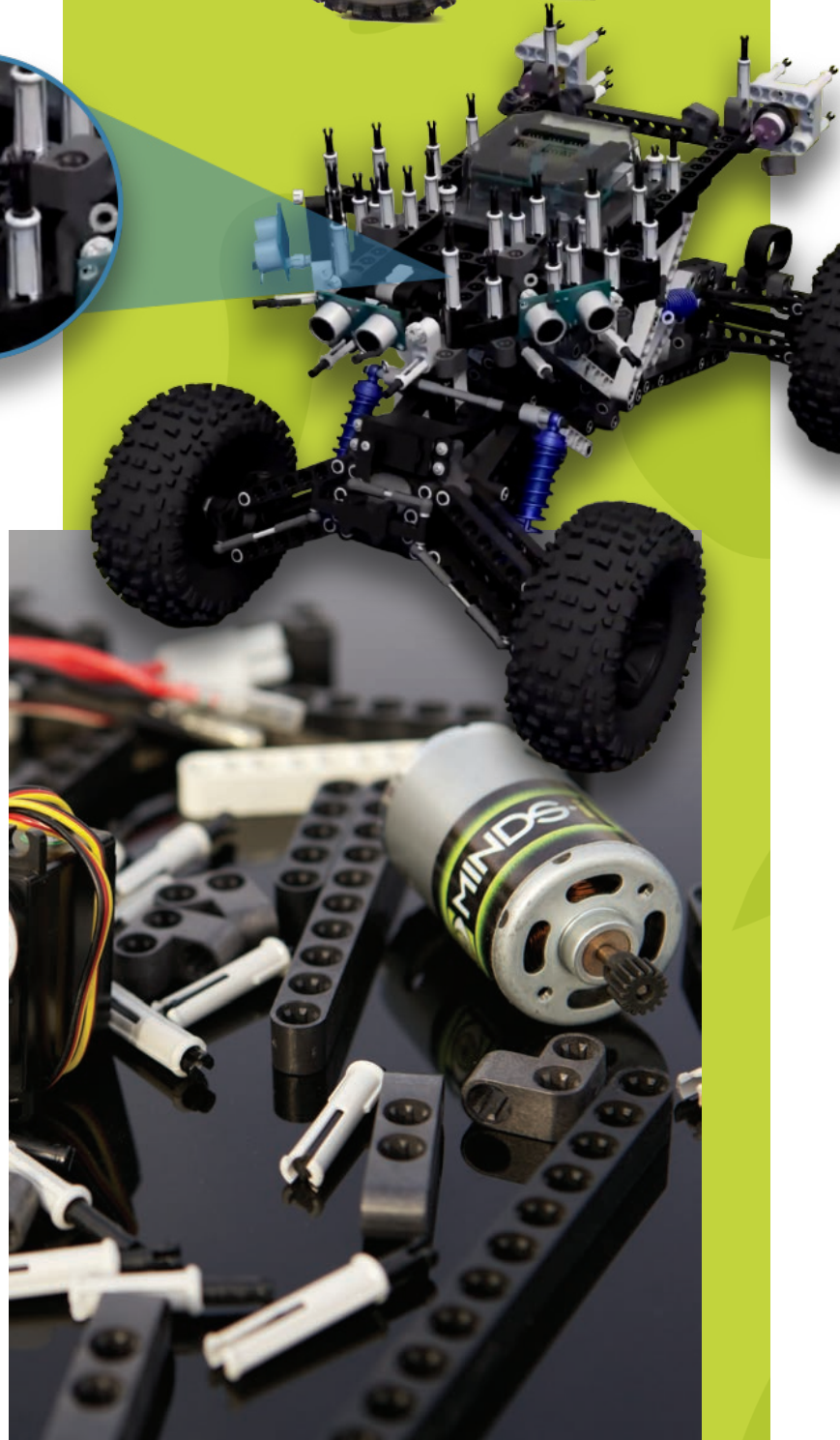
"One of the things that sets us apart is that our products are designed to not only be easy to build and durable enough for indoor or outdoor use, Marzetta explained, "but they can easily be modified so a student can truly think and design something out-of-the-box."



Marzetta is an out-of-the-box thinker in his own right, who first conceived the idea for Minds-i after participating in an industry roundtable meeting where adults were seeking solutions to the workforce shortage in manufacturing fields. He pondered how to get students, like you, involved in science, technology, engineering and math (STEM) at an early age.

“Robotics seemed to be the best tool to start with for kids because it’s kind of a conglomerate of a lot of technology skills — coding, mechanical engineering, electrical engineering, physics, and computer science are all embedded in it. If you look under all those technologies, there’s deep science and deep math; principles of gravity — all the things that make sensors and satellites work — but with an added “sizzle” factor that makes it fun. With an understanding of these concepts, students can go into aerospace, coding, software development, PCB board manufacturing, or other technical fields.”

After looking at the STEM curriculum options on the market, he noticed there wasn’t great content between grade school kids and high school robotics programs. He also saw the need to provide education that had real-world, practical applications. Minds-i developed its first robot kit, a kewl-looking six-wheeled rover, which had independent suspension and power to all wheels and could crawl deftly over football-size obstacles. It was an instant hit and became the base for the development of an ever-growing number of curriculums and products that utilize C++ programming and technologically advanced open-source robots.





As Marzetta describes, “Kids get really excited about being able to do some fun stuff with our machines. Instead of being confined to driving a robot on a gym floor, we’re able to add obstacles and challenges that simulate real-world situations and require students to use more advanced problem-solving skills.”

Early sketches for Minds-i products included land, marine, and flying designs. Evolving from the land-based rovers, the company now includes drones in their product offerings and is developing the technology for an unmanned aerial vehicle (UAV) capable of vertical take-off and landing (VTOL).

“With the rapid developments in urban air mobility, we are working to create products that incorporate the same sorts of designs and features,” Marzetta said. “Currently there are no aerospace curriculums that include learning tools that actually fly.”



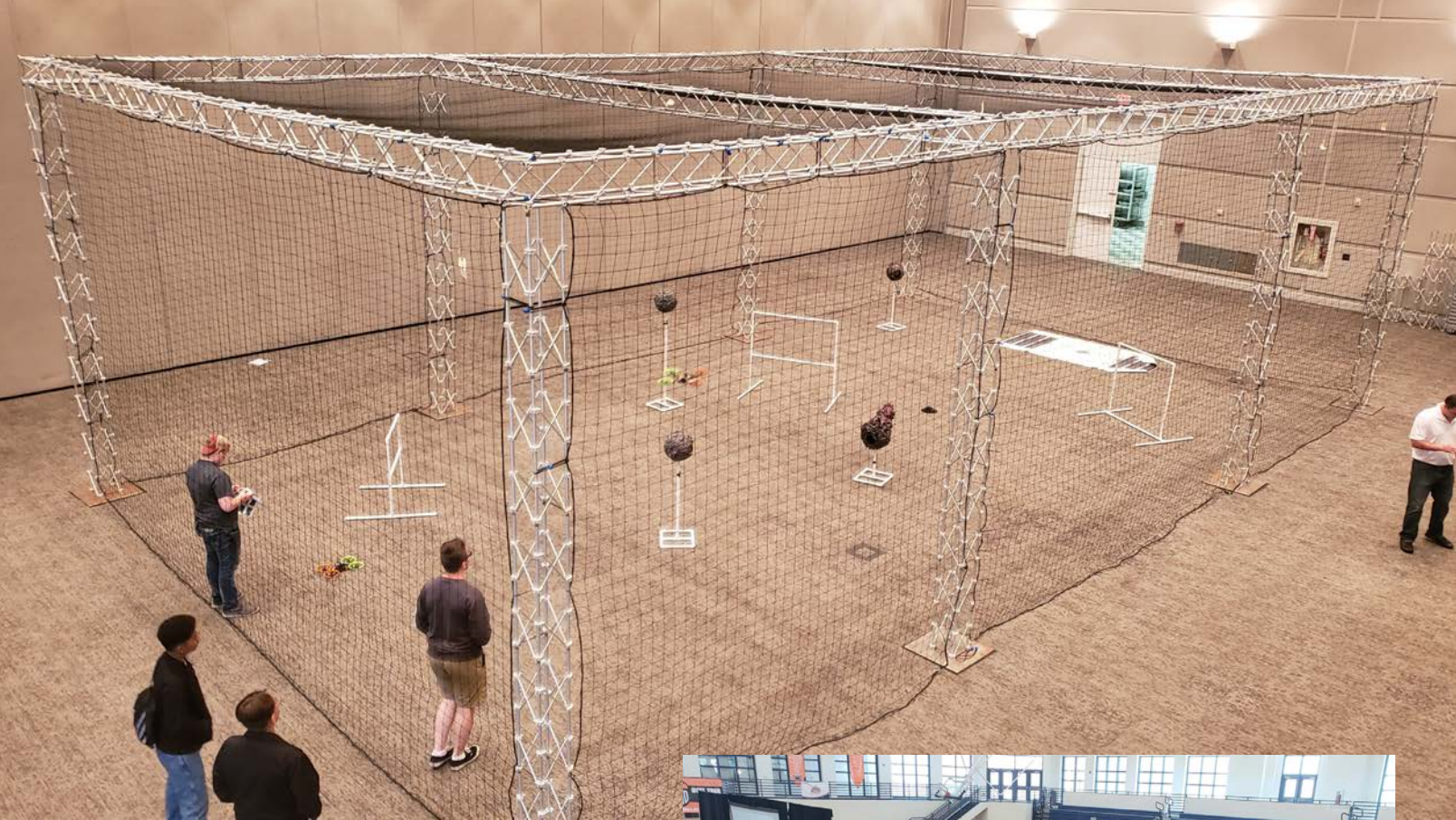
The company has a leg up on competition in this area because its parts are lightweight but durable, creating a favorable strength-to-weight ratio needed for flight. In addition, being housed in an aerospace manufacturing facility gives the Minds-i team the ability to tap into Altek's experience and expertise as the company manufactures Minds-i component parts in-house.

During product development, the company is focused on making sure that safety is the number one priority. While their rovers and drones are durable enough to have higher powered motors capable of moving at high speeds, Minds-i remains aware of keeping students safe from injuries related to high speed propellers or super-charged motors. Safety is ensured by thoroughly testing all products before releasing them for sale.

Minds-i products are distributed on the West Coast by Klein Education, but there are distributors nationwide. Their website lists stuff for catapults, robotic foundations, UAV drones, and UAV drone gimbal rigs. Kits include 4x4 robots and super rovers as well as competition kits for UAV drones and integrated robotics. Accessory parts such as motors, rack and pinion steering packages, and multirotor flight controllers are also available to allow for customization and a wider range of uses for the kits.

As technology pushes forward with smart cars, drone delivery vehicles, and other urban air mobility options, Minds-i has a complete Federal Aviation Administration Part 107 Prep Course available, designed to help students prepare for the 107 UAV Certification test.





In addition to its educational offerings, Minds-i has incorporated competition kits and drone cages that challenge students to test their drones in timed real-world simulations.

According to the company's website, "MINDS-i Robotics competitions are designed to embody today's challenges into an invigorating team-based experience. Students apply their skills, leverage their creativity, and measure their achievements in a fun and exhilarating environment."



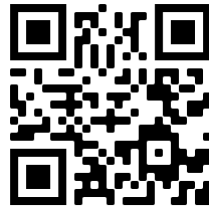
Their website, www.mindsieducation.com lists upcoming competitions that you can participate in. Teams of students design, build, and program an UAV (Unmanned Aerial Vehicle) ahead of time. They then pilot their drone through a series of obstacles (star gates and worm holes) and perform tasks such as picking up and moving an item (asteroid sample) to a designated area (space station). The tasks are timed and teams are scored on their design and the performance of the UAV. Minds-i competitions are local, state and national in collaboration with Skills USA.

Beyond science, technology, engineering and math lessons, Minds-i competitions and labs incorporate communications, small group collaboration, and 21st century critical thinking skills into their programming. These soft skills help prepare students for success in college and on the job.

With a focus on fun and learning dope real world applications for technology, Minds-i is well positioned to help you find your aerospace or manufacturing job of the future.

WATCH HOW IT'S MADE!

WATCH A PANTHER
MAGICALLY TRANSFORM
FROM A BLOCK OF
ALUMINUM



GROUND CONTROL TO
MAJOR TOM — MUSIC
VIDEO FROM SPACE!



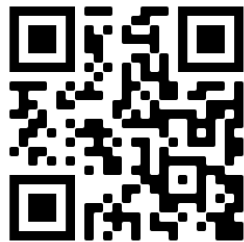
**WATCH AN
AIRPLANE BEING
MADE AT BOEING**



**MAKING A
COMPOSITE PART
IN THIN AIR! —
CF3D TECHNOLOGY**



SPACE CAMP!



**CHECK
IT OUT!**





CORE PLUS AEROSPACE CONNECTS STUDENTS TO IN-DEMAND CAREERS

By: Tia Rivera

Moyaak Chuol noticed a new opportunity called Core Plus Aerospace while registering for classes his junior year of high school. He was immediately interested because he thought the new class focused on space. When he learned from a friend that it centered on hands-on learning, he was still excited to sign up. He didn't know it at the time, but the opportunity would change the trajectory of his career.

Core Plus Aerospace is an innovative program that provides students with the training they need to step into in-demand careers and fill critical skills gaps in the U.S. manufacturing sector — a win for students like you, and the aerospace industry. The program is offered to high school juniors and seniors and takes place at high schools and skills centers across Washington State. Its two-year curriculum was developed by Boeing and focuses on general manufacturing in its first year and allows participants to specialize the next year. Students learn foundational manufacturing skills, such as blueprint reading, machining, precision measurement, and shop safety.



In recent years Boeing has hosted Core Plus Aerospace students as summer interns in its Everett and Renton factories. Through group activities, job shadowing, manufacturing training, and skills development, interns can prepare for college, the military or entry-level manufacturing jobs. As the need for skilled labor continues to grow, programs like Core Plus Aerospace give students the tools and experience they need to succeed right away in the workforce.

While it's hard to think about a career when you are in middle school or high school, it is more important than ever. Many students, like you, may end up going to a four-year college because you are not yet certain of what you want to do with your life. For many the traditional college path is effective, with those students finding work after college in engineering, medicine, social work and many other fields.

Others get a high school diploma and go straight to work. For those who desire to quickly enter the workforce after high school, many find that going straight into manufacturing is the best way to both find a great career right away and make good money – all with less time going to school.

For those eager to enter the workforce, but still considering further education down the line, there are exciting programs available at companies like Boeing. If you chose to work for Boeing after high school and later decide that you want to go to college, the company will actually help pay for the costs of continued education through the company's Learning Together Program while you continue to work and earn a paycheck from Boeing.

Whatever it is you may be currently thinking for your post-high school plans, it's important for you to know that there is a great need and high demand for people to go into manufacturing careers.





According to a new study conducted by Deloitte and the Manufacturing Institute, the manufacturing skills gap in the United States could lead to more than two million unfilled jobs by 2030. The study also found that the amount of unfilled manufacturing positions could result in approximately \$1 trillion in lost revenue.

While you may be less concerned about what will happen in the manufacturing sector if more people don't go into this field, everyone will see an impact, including in everyday experiences like what we can and can't buy at the store.

Large retailers like Amazon and Walmart rely on products manufactured from people all over the world. Also, if you like flying on a plane to go on vacation, or you want to drive places, things like planes and cars must also be made by someone.

Programs like Core Plus Aerospace help students discover new career paths and provide them training opportunities to make sure they have the skills necessary to fill these critical jobs.



Job training isn't the only aspect of the Core Plus Aerospace program to increase readiness for students. It also opens doors through personal connections. Now a Core Plus graduate, Moyaak Chuol credits the program and his shop teacher, Mr. Creed Nelson, for providing valuable networking opportunities.

"My class had someone new come in almost every week and they would not only help us join their company or college, but they would give us life advice that would help us later on in our careers," Chuol said. "This program is really great because of all those connections. If a student knows they want to do a hands-on kind of job but has no idea how to build those skills... this program will help with that."

The National Association of Manufacturers (NAM) cites that one of the biggest challenges facing manufacturing today is finding the right talent. Compared to data from 2018, manufacturing companies report that it is now 36 percent harder to find workers despite the unemployment rate nearly doubling the supply of potential employees. The problem extends from filling entry-level production positions to finding, hiring, and retaining skilled workers for specific jobs.

Core Plus Aerospace serves as a bridge that connects potential workers with eager employers. Chuol explains, “The key is that [students] are graduating with options and we have the freedom to choose what we want to do next.”

Boeing, which sponsors Core Plus Aerospace, designed the program classes based on the needs within its own workforce. Students who participate in Core Plus Aerospace are trained and evaluated by skilled professionals, many from Boeing. This helps students with networking and career preparation, as well as exposure to potential employers. Chuol is one of hundreds of Core Plus Aerospace graduates who earned a full-time position at Boeing after graduation.

“I’ve been with the company for three years now,” Chuol said. “Basically my job is to ensure that a work area is safe to work in. The other part is storage, and here in Moses Lake, we have about 170 airplanes we have to maintain.”



Tia Rivera is the manufacturing workforce development manager at Boeing. She leads the Workforce Development team supporting Boeing Commercial Aircraft Manufacturing and Safety.



1,000

Core Plus Aerospace graduates hired by Boeing since 2015

\$96K*

Average annual compensation for manufacturing workers in WA state

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Core Plus Aerospace delivers in-demand skills and a head start toward internships, apprenticeships, and college programs that can launch exciting careers in advanced manufacturing.

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TOP

10

WAYS TO PARTICIPATE IN SPACE

By Lisa Rich

The space industry is exciting and evolving right beneath our feet! If you know where to look – and have the right list of resources, you can actively participate in all kinds of cool space activities. While you might already be a space fan, being a space participant takes things to a whole new level. What you learn about space will expand your imagination, open new doors and could very well shape your future studies and career. Dive into this list to discover, learn and share the great things space has store for you.

1. Bookmark these websites for news you can use:

Space Channel:

<https://spacechannel.com>

NASA Watch:

<https://nasawatch.com/>

SPACEFLIGHT NOW:

<https://spaceflightnow.com/>

Universe Today:

<https://www.universetoday.com/>

Watch a space launch live:

SpaceX: <https://www.spacex.com/>

ULA: <https://www.youtube.com/united-launchalliance>

Blue Origin: <https://www.blueorigin.com/new-shepard/>

3. Learn more about space from these educators and media influencers:

The Astronaut Wrangler, Christina Korp:

<https://christinakorp.com/>

Sarah Cruddas:

<https://sarahcruddas.com/>

Everyday Astronaut:

<https://everydayastronaut.com/>

Launch Pad Astronomy:

<https://www.youtube.com/c/Christian-Ready/featured>

Emily Calandrelli, The Space Gal and host of Emily's Wonder Lab on NETFLIX:

<https://www.thespacegal.com/>



4.

Read a book:

By Sarah Cruddas:

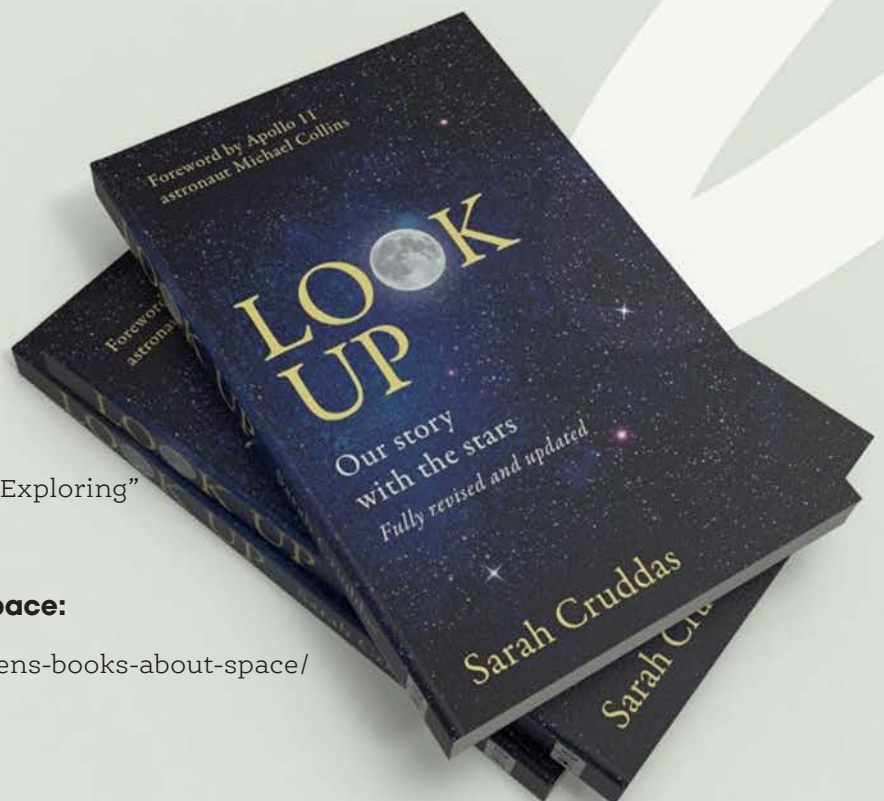
1. “Look Up: Our Story With the Stars”
2. “The Space Race: Journey to the Moon and Beyond”

By The Space Gal:

1. “Stay Curious and Keep Exploring”
2. “Reach for the Stars”

List of the best books on Space:

<https://bookriot.com/childrens-books-about-space/>



5.



5. Watch a favorite space movie:

The Martian

Contact

Wall-E

Apollo 13

2010



6.

Join a club:

Club For the Future: <https://clubforfuture.org>

Planetary Society: <https://www.planetary.org/>



Astronomy - Space DIY: Get a telescope.

1. **Washington Astronomy Clubs:** <https://www.go-astronomy.com/astro-clubs-state.php?State=WA>
2. **Oregon Astronomy Clubs:** <https://lovethenightsky.com/astronomy-clubs-in-oregon/>

8. Go to a museum:

1. **Museum of Flight:** <https://www.museumofflight.org/>
2. **Best in U.S.:** <https://we3travel.com/best-space-museums-and-space-centers-in-the-u-s-for-kids/>



Space around the world.

List of major space agencies in other countries:

ASA - Australian Space Agency: <https://www.industry.gov.au>

ASI - Italian Space Agency: https://en.wikipedia.org/wiki/Italian_Space_Agency

CNES - French Space Agency: <https://cnes.fr/en>

CSA - Canadian Space Agency: https://en.wikipedia.org/wiki/Canadian_Space_Agency

DLR - German Space Agency: https://www.dlr.de/EN/Home/home_node.html

ESA - European Space Agency: <https://www.esa.int>

ISRO - Indian Space Agency: <http://www.isro.gov.in/>

JAXA - Japan's Space Agency: <https://global.jaxa.jp>

KARI - Korea Aerospace Research Institute: <https://www.kari.re.kr/eng.do>

SANSA - South African National Space Agency: https://en.wikipedia.org/wiki/South_African_National_Space_Agency

UAESA - United Arab Emirates Space Agency: <https://space.gov.ae> (NOTE: While website loads, be sure to select English)

UKSA - United Kingdom Space Agency: <https://www.gov.uk/government/organisations/uk-space-agency>

UNOOSA - United Nations Office for Outer Space Affairs: <https://www.unoosa.org>

10. Go to Space Camp! **Space Camp:** <https://www.spacecamp.com>



The control panel features a keyboard and several touchscreens. The top touchscreen displays flight data, including 'FLAPS', 'THRUST', 'TO', 'CG 141N', 'SFE 3.50', 'NAV/PAS', 'DATA LINK', and 'NO COM'. The bottom touchscreen displays navigation information, including 'TAKOFF REF', '21 JUN 16', '22:33:08 Z', '133°', '077°', 'YAMPS', '329°', 'PAE', '198°', 'KTSAP', '142°', 'ASOGE', and 'RTE 2 LEGS'. The keyboard has various function keys, including 'EXEC', 'PREV PAGE', 'NEXT PAGE', 'INIT REF', 'FIX', 'NAV RAD', 'RTE', 'LEGS', 'DEP ARR', 'HOLD', 'DFST', 'ALTN', 'VNAV', 'FMC COMM', and 'PROG'. A 'SPEED BRAKE' lever is visible on the left side of the control panel.

FLAP



777X TOUCH-SCREEN TECHNOLOGY

A Boeing Test & Evaluation production pilot demonstrates 777X touch-screen technology in a Boeing test environment. Touch screens will be part of the 777X flight deck in forward displays, a first in the commercial aviation industry.



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AVIATION
ARTWORK!



"If Only I Could Fly" | Artwork by aviation artist Rick Herter | See more at www.rickherterart.com