



The ALUMNIUS

SPECIAL NASA EDITION

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Special Edition

Tennessee Tech honors alumni who have contributed to space exploration

On April 9, Tennessee Tech's Crawford Alumni Center hosted a NASA Celebration to honor the many alumni who have contributed to space exploration.

More than 200 Tech graduates in engineering, mathematics, computer science, biology, chemistry, geology, sociology and business have worked for NASA, and hundreds of other graduates have worked for NASA contractors.

"The connection between Tennessee Tech and space exploration goes way back," said Tennessee Tech President Phil Oldham. "President Kennedy was right when he declared that we're not going to the moon because it's easy. We are going because it's hard. I am proud that so many Tech alumni answered that call to do something

remarkable. It took hundreds of thousands of individuals doing their part to make it possible. Those are great lessons for us today as well: Take on challenges, do things not because they are easy but because they are hard and do it together. That tradition continues at Tennessee Tech."

Joseph C. Slater, dean of Tech's College of Engineering, served as a NASA fellow and has long had a passion for space exploration and aerospace engineering. Slater opened the NASA Celebration by welcoming the NASA alumni in attendance.

"Today is a day to celebrate NASA, to celebrate space exploration, ingenuity, taking a risk, finding a solution — in short, making something work," said Slater. "Today we celebrate our

alumni who have worked for NASA. I cannot thank our NASA alumni enough for endeavoring to do something never done before, for taking a risk and for making Tech proud. We thank you, and we honor you."

Lieutenant General Don Rodgers, '57 electrical engineering, and Dr. June Scobee Rodgers served as the event's keynote speakers.

In 1986, General Don Rodgers was nominated by President Ronald Reagan for assignment as the Army's assistant chief of staff for Information Management, and he served as director of Information Systems for Command, Control, Communications and Computers. As the commander of the largest military organization of its kind in the world, General Rodgers led a workforce of 50,000 personnel in more than a dozen overseas nations and throughout the United States.

General Rodgers reflected on his time at Tech and says he remembers it like it was yesterday.

"In 1957, the campus consisted of the quadrangle, a shop where we took two or three of our classes and the heating plant where we had thermodynamics," he said. "It was a pretty small campus. Now, I can't even find my way around! Tech has meant everything to me. It changed my life — overnight. I daresay I wouldn't have had my career or my family without Tech."

Dr. June Scobee Rodgers is the widow of Challenger Space Shuttle Commander Richard "Dick" Scobee. She founded Challenger Center for Space Science Education to foster a new generation of "star challengers" — young people who will reach for the stars no matter their circumstances. Each year, Challenger Learning Centers engage hundreds of thousands of students and tens of thousands of teachers in dynamic, hands-on exploration and discovery opportunities that strengthen their knowledge in science, technology, engineering and math. Dr. Rodgers is also the author of *Silver Linings: My Life Before and After Challenger 7*.

Dr. Rodgers grew up in poverty with a mother who struggled with mental illness. When she was nine, she read Norman Vincent Peale's *The Power of Positive Thinking*, and it changed how she viewed her circumstances.



Jerry Gannod, Clay Robertson, Leigh Anne McMahan, Leon Davis and Earl Price at the NASA Celebration during Wings Up Weekend, Saturday, April 9, 2022.



Keynote speaker, Dr. June Scobee Rodgers, addresses the audience at the NASA Celebration, April 9, 2022.

“I coined a motto for myself called the ABCs,” she said. “The ‘A’ stood for attitude. Accept your problems for challenges. ‘B’ was for belief — believe in a power greater than yourself. ‘C’ was courage — courage and confidence to make a commitment and work through it. And lo and behold, when I was looking at Tech’s website, I saw a very similar motto — Tennessee Tech’s motto: Bold, Fearless and Confident.”

Dr. Rodgers also recounted the day of the Challenger disaster, captured in a Netflix documentary titled *Challenger: The Final Flight*.

“You all know the story of that flight,” she said. “Seven great people — all so interesting. When the world lost the Challenger Shuttle, I lost my husband and six great friends.”

But Dr. Rodgers and the families found ways to honor their loved ones. Today, there are 47 Challenger Centers around the world, with 47 flight directors who lead each one and work with students to help them discover more about their world and about space.

“There’s still so much more to inspire, to challenge, to boldly go into the unknown,” she said. “Bold, fearless and confident — you have the motto. Go for it, but share. When you learn all of these great things, share them. Create the dreams for others.”

In addition to the Rodgers, more than a dozen Tech alumni, faculty and administrators shared their NASA stories at the celebration.

Tennessee Tech President Emeritus Bob Bell came to Tech in 1976 as a department chair, became dean of the College of Business and ultimately served as Tech’s president from 2000 to 2012. But his first job was actually at Kennedy

Space Center. Bell grew up in Cocoa, Florida, just south of KSC, and says space is in his blood even today.

Bell worked summer jobs at KSC while he was a student at the University of Florida in '66, '67 and '68, first as a mail carrier in the KSC headquarters building and later as a data courier on Launch Complex 39 (the Apollo launch complex) in the Launch Control Center.

“Those were some of the most formative and wonderful experiences of my life, and I have such respect for all who worked with NASA and NASA contractors over the years,” said Bell.

Jerry Gannod, chair of Tech’s Department of Computer Science and Harry C. Stonecipher Distinguished Professor, worked at NASA’s Jet Propulsion Laboratory as a NASA Research Fellow from 1994-97 and as a NASA Faculty Fellow in 1999. He was a member of the Software Assurance team and focused on formal validation of ground-based systems and space interferometry systems, including many NASA telescopes.

“I learned a lot of valuable lessons at JPL about humility, reflection and problem-solving,” said Gannod. “And what I hope for us today, as a growing department that serves a lot of different industries and students from all over the region, is that those lessons are the same lessons our students will learn. I hope students learn to bring together a team of not just computer scientists — but engineers and other scientists as well — to solve problems.”

Throughout his 36-year career with NASA, Leon Davis, '69 electrical engineering, worked on a total of 130 flight missions at Kennedy Space

Center including Apollo 11 through 17, Skylab 1 through 3, five Shuttle test flight missions and 114 other Space Shuttle launch missions.

“My high school mascot is a gray eagle,” said Davis. “Tennessee Tech’s mascot was a golden eagle. Flying with the eagles in school enabled me to fly with eagles in my life’s work.”

Davis’s first assignment was the Lunar Module Eagle, the spacecraft that served as the lunar lander of Apollo 11 and the first mission to land humans on the moon. Davis worked specifically on the alarm panel that provided the caution and warning alarms during the moon landing.

Larry Crabtree, '66 electrical engineering, worked for NASA for nearly four decades. He retired in 2005 after 38 years of work on projects like the High Energy Astronomical Observatory (HEAO), Space Platform, Long Duration Exposure Facility (LDEF), Skylab, International Space Station and Space Telescope, just to name a few.

Crabtree says he feels fortunate to have been a Marshall Space Flight Center employee during some of the most exciting times in space exploration and credits Tech for providing an affordable education.

“My mother was widowed, and I was responsible for all of my school expenses,” he said. “The electrical engineering program at Tech was an extremely demanding one, but it prepared me for the challenges I would face while working at NASA.”

After graduating from Tech in 1967 with a degree in electrical engineering, Jim Carlock accepted a position with Lockheed Missiles and Space in Sunnyvale, California, and spent the first 20 years of his career working with photo reconnaissance satellites.

In 1987, Carlock became program manager for the Hubble Space Telescope and vividly remembers the day it launched on April 24, 1990. Carlock has a one-fiftieth scale replica of Hubble proudly displayed on a bookshelf in his home; the real telescope is about the size of a school bus.

Bob Gaffin, '66 electrical engineering, remembers the day he started his job at Marshall Space Flight Center: June 13, 1966. He also remembers the day he was selected to be part of a 13-member team that would run the solids design program.

“Marshall had always been a liquid testing and design area, but then they decided that boosters were the way to go for the shuttle,” said Gaffin. “We looked at each other and said, ‘What in the world is a solid booster?’”

Like many of his fellow NASA alumni, Gaffin experienced the highs and lows that came with space exploration. After the Challenger disaster, he was brought in to assist the O-ring redesign and reassessment group.

“That was probably one of the worst times of my life,” said Gaffin. “I didn’t sleep well at night. I got to find out a lot of things that I didn’t know that were involved in that design. But sometimes things like that come our way.”

Despite that dark period, Gaffin says he is grateful for a career that allowed him to work with fellow alumni.

“I worked with a few Tennessee Tech graduates, and I can honestly say that I could really spot those Tech grads from their integrity, honesty and academics,” he said. “And I could always depend upon those guys to help me. It’s a great feeling to be a part of that family.”

Leigh Anne Beers McMahan, '88 electrical engineering, says her NASA story started when

she was six years old and her first-grade class watched the launch of Apollo 17 together. She learned that her uncle worked for NASA as an electrical engineer and decided that was what she wanted to do.

McMahon recalls that as a child, she told her mother, “I’m going to be an electrical engineer, and I’m going to go work for NASA. But...what is an electrical engineer?”

McMahon says that with a lot of help from her parents, teachers and Tech professors, she graduated with a degree in electrical engineering and accepted a position at Marshall Space Flight Center. She was hired three years after the loss of the Challenger Shuttle, and NASA had just returned to flight.

“It was a time of new beginnings,” she said.

Throughout her 33-year career, McMahon has helped train the astronauts that repaired the Hubble Space Telescope and built hardware that is orbiting on the International Space Station today.

“I’ve gotten the chance to do some really amazing things and work with amazing people,” she said. “Tech was the perfect place for me. It was a wonderful place to learn and grow in a family environment that cared about me as a student. I’m proud to be a Tech alum.”

Denny Holt, '67 mathematics, also remembers following space exploration as a child. He was 12 years old when Sputnik launched and remembers when his high school played John Glenn’s flight on the intercom all day.

“No one taught a class,” he recalled. “We all sat in our homerooms and listened to the flight from beginning to end.”

Holt reported to work at the Manned Spacecraft Center (now Johnson Space Center) in Houston just eight days after graduating from Tech. He worked on many of the Apollo missions and has mission badges from Apollo 11-16.

Holt became close friends with Glynn Lunney, a NASA employee since its creation in 1958 and a flight director during the Gemini and Apollo programs. Lunney was on duty during historic events such as the Apollo 11 lunar ascent and the pivotal hours of the Apollo 13 crisis, and many say his decision-making under pressure helped save the Apollo 13 mission. In his book titled *Highways in Space*, Lunney wrote the following note to Holt:

“Denny, we were really brilliant to come along at this time in history — to have had ringside seats for some of the big times in U.S. space history. And looking back, it has always been the people that come to mind.”

Clay Robertson, '90 electrical engineering, says his love of space began when he was in seventh grade.

“It was April 12, 1981, and I sat glued to the television to see the launch of STS-1,” Robertson said. “The thought that I could be a part of something like that was beyond my wildest dreams. Little did I know that a mere six years removed from that event, I would be a fifth-quarter college student contemplating a cooperative education job, and I would get a call that would change my life. The call came from Don Foster, Tech’s co-op coordinator, asking if I would be interested in going to Cape Canaveral. Here I am, 34 years later. I owe this university a debt of gratitude for giving me the opportunity to fulfill my dreams.”

Robertson began his career as an operations engineer at Kennedy Space Center where he was assigned to the orbiter Discovery. He later joined the team responsible for the orbiter’s

power distribution and spot-checked repairs for Columbia during an overhaul known as the Orbiter Maintenance Down Period.

“I simply could not believe that I was that same little kid — the one who saw the vehicle launch on that April morning — and now I’m getting to work on this vehicle,” he said.

On Feb. 1, 2003, Robertson experienced a different side to space exploration when he was asked to assist with the Columbia recovery efforts. Robertson helped recover debris, first from the air in helicopters and later on the ground leading a crew of approximately 40 firefighters from across the nation.

“This was very sobering, as the very vehicle that I had witnessed rise to orbit as a seventh grader was now no more than hunks of twisted metal and fragments of tile,” he said. “It was hard to comprehend.”

While many Tech alumni dreamed of working for NASA since they were children, Earl Price, '61 engineering science, pictured a different career.

“I didn’t read a book or see a movie or see somebody fly or hear an inspirational talk that motivated me to be an engineer,” said Price. “I grew up on a rural farm in Middle Tennessee, and I thought my future belonged in agriculture. I didn’t know anything else. I never dreamed of becoming an engineer or working for NASA. But it happened, and I give 99% of the credit to Tennessee Tech.”

Price heard a radio advertisement encouraging young people interested in math and science to major in engineering, so he chose to major in engineering science at Tech. During his senior year, several companies came to campus to interview graduating seniors.

“And then this organization, fairly new to my ears in 1961, called NASA came to campus,” he said.

Price graduated from Tech on June 2, got married on June 10 and reported to NASA Langley Research Center on June 13. Price spent five years at NASA and 34 years at Arnold Engineering Development Center.

“I came to Tech ill-prepared,” Price recalled. “I took all the math that my high school offered, but I was not prepared for college mathematics. I spent a year in remedial math courses. Tech allowed me to do that. I’ve always been so thankful that they did that for me — that they allowed me to take the courses I needed to get on track.”

When Walter Keith Crawford, '62 electrical engineering, attended the NASA Celebration, he proudly wore a special lapel pin. Crawford worked on the Apollo Communications System and, prior to leaving NASA in 1970, was awarded the Manned Flight Achievement Award, also known as the Silver Snoopy. Of all the Space Flight Awareness Awards, the Silver Snoopy best symbolizes the intent and spirit of Space Flight Awareness and is awarded for outstanding performance contributing to flight safety and mission success. Fewer than one percent of the aerospace program workforce receives it annually.

Rachel Denton Killebrew, '64 mathematics, recalls being plucked from a Tech mathematics class because NASA was looking for students majoring in math and German.

“I quickly realized why they were looking for German majors,” she explained. “The German team would get so excited about what they were saying, they would launch into speaking German!”



Walter Keith Crawford displays his Silver Snoopy pin and vintage Astronaut Snoopy doll at the NASA Celebration reception, Friday, April 8, 2022.

Killebrew was hired to develop the checkout and launch computer programs for the Apollo and Saturn missions at Kennedy Space Center, and she remembers launch days well.

“We would try to be very quiet and reserved, and then at the last minute we’d all start screaming, ‘Go, go, go!’”

Killebrew says she always enjoys meeting others with the same passion and career path.

“I am so glad to have a chance to talk to other space people,” she said. “When I pull out my NASA scrapbooks, everybody runs! But I know you all love it like I do, and I appreciate all of you who worked in that industry. I couldn’t have asked for a better job, and it would never have happened if they hadn’t come to get me out of class that day. I owe Tech my entire career.”

Tommy Westergard, '01 electrical engineering, praised the contributions of NASA alumni who came before him.

“I’ve always said that we stood on the shoulders of great ones, and you guys are those great ones,” he said. “Thank you for what you’ve contributed to the space program, because we wouldn’t be where we are today without you.”

Westergard currently works for Boeing, has been in the human spaceflight business for 21 years and worked on the initial software requirements for Boeing’s Commercial Crew Program space capsule, the CST-100 Starliner.

And who will soon fly that Starliner? A Tennessee Tech graduate, of course.

Astronaut Barry Wilmore, '85 electrical engineering, '94 M.S., and '12 honorary doctorate, knows firsthand what happens when thousands of NASA employees — some of the greatest minds on earth — come together: They send men and women into space. Wilmore is currently training to fly the Starliner, which Boeing hopes to launch later this year.

Clay Robertson says one of his favorite NASA quotes was spoken by astronaut Chris Ferguson as he sat in the commander seat of Atlantis



Dr. Joseph Slater, dean of the College of Engineering, emceeds the NASA Celebration, April 9, 2022.

on July 8, 2011, right before the launch of the program's final flight. In many ways, Ferguson's quote sums up the contributions of Tech alumni — and so many others — to spaceflight.

Ferguson said, "The shuttle is always going to be a great reflection of what a great nation can do when it dares to be bold and commits to follow through. We are not ending the journey today. We are completing a chapter of a journey that will never end. The thousands of men and women who gave their hearts, souls and lives to the cause of space exploration have, in fact, rewritten history. Let's light this fire one more time and witness what this great nation can do at its best."

Whether alumni found NASA or NASA recruited them, Tennessee Tech alumni credit their college education for preparing them for a career many only dream about.

"One thing has been repeated by many Tech alumni, and that's the gratitude they direct towards Tennessee Tech, the president, the provost and the faculty," said Dean Joseph Slater. "We are grateful for that, but we are also humbled. For many graduates, this gratitude is directed towards James Seay Brown, Wallace Prescott, Everett Derryberry — those people who created the environment that allowed alumni to grow, thrive and develop into the people they are. They inspire us and remind us that what we are doing is creating the next great generation."

A letter from the editor

On a Saturday night in April 2021, my Crawford Alumni Center colleagues, Brooke Fleenor and Kathleen Lordo, and I were busy texting one another in a three-way chat. We weren't discussing the latest Netflix series or how to make cookies when your KitchenAid mixer dies. We were planning an event for alumni who worked for NASA. (Because what else do you do in the middle of a pandemic if not text your co-workers and dream about the day you can have in-person alumni events again?) We didn't know exactly what this event would look like, but we knew one thing for certain: Hundreds of Tennessee Tech alumni have had amazing careers at NASA, and we should record their stories for future generations.

So, what inspired this text conversation? On April 9, 2021, the Tennessee Tech Alumni Association honored Ray Sells and Leon Davis at the annual Evening of Excellence awards ceremony. Both gentlemen referenced NASA careers in their acceptance speeches, and I was in awe. They didn't know it at the time, but their speeches would become the inspiration for the NASA Celebration and this newsletter.

When I was a child, my favorite week in school was space week. I've seen Apollo 13 numerous times, but I still get chills when Tom Hanks says, "Houston, we have a problem." I love alien movies (even though most of them scare me), and I'll watch a space documentary over a reality show any day. I was fascinated by the Netflix documentary *Challenger: The Final Flight*, and I tried not to embarrass myself too much when I met Dr. June Scobee Rodgers. (I fangirled a bit; hopefully she didn't notice.) I'm better at English than math and science, so I knew becoming an astronaut was not my journey. But I've always been fascinated by space exploration, and as I listened to Mr. Sells and Mr. Davis's speeches, I just kept thinking, "I want to know more."

I started asking alumni about their NASA experiences. Leigh Anne McMahon told me about working with fellow Tech EE grads at Marshall Space Flight Center in Huntsville. Walter Keith Crawford showed me his Silver Snoopy pin. Eugene Wilmore shared what it's like to be the proud dad of an astronaut. They were all so excited to tell their stories, but what impressed me most was how they credited Tech for helping them find a career they were passionate about and ensuring they received the

education required to work for NASA. Exactly one year after Mr. Sells and Mr. Davis gave their speeches, on April 9, 2022, the Crawford Alumni Center hosted Tech's first-ever NASA Celebration, and we recorded more than 40 NASA stories that evolved into this newsletter.

Long before I worked for the Crawford Alumni Center, on May 31, 2008, I crossed an item off my bucket list: I saw the Space Shuttle Discovery launch from Kennedy Space Center. I was one year out of graduate school and had no idea what my career path would be. Now, thanks to Tech, I've met the women and men who made that

2008 launch — and so many others — possible. I've met the project manager for the Hubble Space Telescope. I've met an astronaut. I'm grateful to know them, and I'm proud to share an alma mater with them. They credit Tennessee Tech for an amazing career.

So do I.

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Discovery launches from Kennedy Space Center, May 31, 2008. (Photo credit NASA)

Astronaut crew trainer credits Tennessee Tech for academic and social education



A woman lowers two astronauts into the Neutral Buoyancy Laboratory at Johnson Space Center. (Photo credit NASA)

Stephanie Moran, '88 sociology, says NASA was her second home.

Moran calls herself a NASA brat; her father was the director of the Weightless Environmental Training Facility (WETF) at Johnson Space Center in Houston, Texas, and Moran says she was practically raised in that facility. Moran's father was one of the top SCUBA diving instructors in the country, and NASA was in the process of developing astronaut training exercises and needed someone to direct the WETF. When NASA learned about his SCUBA expertise, they transferred Moran's father from administration to underwater training. The WETF, Moran explains, is the pool where astronauts train.

"But don't call it a pool if you are on site!" she warned. "It is a training facility."

The WETF, later replaced by the Neutral Buoyancy Laboratory (NBL), is where astronauts participate in weightless training for upcoming missions. This includes training on stowage, Extra Vehicular Activity (EVA), testing on board, satellite recovery, repair, launch, rescue and more, with an emphasis on experiments for the construction of the International Space Station (ISS) and early launches. This is the closest astronauts-in-training can get to zero gravity without leaving Earth. Moran's father directed the WETF during the Gemini, Mercury, Apollo, Space Shuttle and ISS days, and Moran said she grew up around astronauts in the '70s and '80s.

Moran says she originally planned to stay in Texas for college but is glad she chose Tennessee Tech.

"The professors and all the staff were wonderful — truly kind, caring and helpful," she said. "I loved the Tech community. I still do."

Moran started out as an engineering major at Tech but later changed her major to sociology.

After graduating from Tech, Moran moved back to Texas and accepted a job with NASA as an astronaut crew trainer. For 10 years, she focused

on EVA tool design and training, and she would dive with astronauts in the WETF to perform testing on prototypes underwater, simulating weightlessness. She also trained in the KC-135 (often referred to as the "vomit comet") and did thermal vacuum testing.

"I gained great engineering knowledge and social understanding through my majors at Tech, and I know those were key contributors to my success at NASA for 10 years," said Moran. "My jobs at NASA were a continuous barrage of quick management, training, coordination, understanding and decision-making in real time. Ergonomics, torque, suit compatibility and stowage were paramount. Design, redesign, test, redesign, writing procedures, tweaking, rewriting — that was my regular week. There is no leeway when you have people's lives on the line."

Moran says the proudest moment of her life happened during a repair mission for the Intelsat satellite. Intelsat orbit was in decline, so Moran and other members of the team had to reconfigure and attach another booster rocket to the satellite to regain the correct speed for the optimal orbital position. Otherwise, says Moran, the satellite would come back to Earth.

"We had tested thermal, stress, suit impact, configuration, vibration and of course EVA tools and underwater training," she recalled. "Unfortunately, what we tested on the ground didn't work in orbit, so we had to redo a year of testing and training in one day."

Moran says three tries of grappling (i.e. grabbing the satellite) didn't work. They weren't sure if the astronaut suit gloves could handle the friction of grabbing and steadying the satellite, so suit technicians had to conduct stress tests in a matter of hours, including studies on the strain and impact on foot restraints. Engineering departments also had to determine if the Shuttle could handle the torque and stress.

"If the suit tears, you have lost someone," Moran explained. "The Shuttle can only hold the satellite for so long, and the Shuttle is only equipped to stay in orbit for so long. Talk about time sensitive!"

Moran credits her Tech engineering and sociology education with preparing her to aid in such a critical mission.

"If I didn't have the engineering background and the ability to communicate with people of various backgrounds and nationalities, my contribution to the mission would not have been such a success," she said. "We were working around the clock, 24/7, with agencies across the globe. I was honored to be a part of one of many examples where an entire team of stress, acoustic and trajectory experts and engineers and medical teams united and obtained mission success for one of the greatest scientific institutions in America."

Moran also worked on regenerative life support systems which focused on recycling water (including human waste), growing gardens for food and air exchange.

"It was a really nasty job," said Moran. "Why I had to collect tee tee in a business suit from the men's bathroom and haul it in my car to the lab is beyond me. Why I was the test subject to drink the filtered water is also beyond me. It's actually funny in hindsight."

Today, Moran serves as an environmental lawyer and says Tech prepared her for a NASA career and beyond.

"I credit Tech for a great, well-rounded, academic, social and psychological education," she said. "Not only did Tech prepare me for NASA, but it also prepared me for law school, legal practice and insight into sociology and people skills. I even taught environmental law at Tennessee Tech for two years, so I feel like I've come full circle."

In his own words: Astronaut Barry Wilmore relives first Space Shuttle launch



Capt. Barry Wilmore tells the story of his first time in space after a Tennessee Tech Board of Trustees meeting, March 10, 2022.

I still remember the day my son, Barry Wilmore, was selected by NASA to be an astronaut. He has made two successful flights to the International Space Station — the last one in 2015, which lasted six months. As his father, I was never apprehensive about his going into space. This was something he had wanted to do for a long time and something he trained for. His mother and I had faith that the Lord would watch over him and keep him safe. He is in training now for his third voyage to the ISS — as the Commander — and I have no doubt that all will go as planned for this one also.

Eugene Wilmore, '58 industrial management

The years I'd spent preparing for spaceflight were many, but there I was, finally strapped in to the Space Shuttle Atlantis, preparing to leave the planet for the first time.

The count finally reached 10-9-8-7-6-5-4-3-2-1-Launch!! As the g-force instantaneously increased from 1 to 1.8, we lifted from launch pad 39B. After a year of crew-specific training, the crew of STS-129, with me in the pilot seat, began our trek to the International Space Station (ISS).

Passing about 8,000 feet, we “popped” straight up through a cloud which, for a moment, turned bright orange as the orange glow from the fire streaking from the solid rocket boosters reflected off it. The sky gradually changed from the beautiful blue we all love on those bright sunny days and got darker...and darker...and darker...and darker...until it was the blackest black one could imagine.

Two minutes into the flight the solid rocket boosters — their propellant fully spent — separated with a BANG! Orange blasts streaked across my front window as the separation motors fired to propel the boosters away from the remaining shuttle and External Tank (ET) configuration. The ET, of course, contained the fuel to propel us on the remainder of the journey to space.

The Space Shuttle initially launched at a heads-down attitude relative to the earth, and at Mach 13, rolled to heads up. As we reached that speed and the shuttle began to roll I looked out the side window and, from approximately 180,000 feet, I could see the top of the clouds and all the way up the east coast of the United States as far as Virginia. As it continued to roll, I watched as more and more coastline came into view until I could see all the way to the southern tip of Florida. WOW (or something to that effect) flowed through my mind.

We eventually reached main engine cutoff (or MECO) and, with another shudder, the three Space Shuttle Main Engines (SSME), each producing 400,000 pounds of thrust, simultaneously shut down — and we were in space.

Several other LOUD bangs, and we separated from the ET. The ET contained the propellant for the three SSMEs, liquid hydrogen at negative 423 degrees Fahrenheit and liquid oxygen at about negative 290 degrees Fahrenheit. This super-cooled mixture created condensation on the outside of the external tank, and as the pyros fired for the ET to separate from the shuttle, several thousand droplets of water separated from the ET and were visible for hours outside the forward windows.

Imagine, if you can, your first moment in space and thousands of water droplets are being illuminated by the sun, giving them the appearance of glistening diamonds. Simultaneously, the forward reaction control system (RCS) jets, at 840 pounds of thrust each, are booming right at my feet as they fire to maintain the desired attitude. The blackest black sky, thousands of glistening diamonds, orange booming blasts just outside the window right in front of me...and my thought as I sat there experiencing all of this and weightlessness for the first time was, “Why me Lord? Why ME?”

Possibly the most humbling moment of my life.

Barry Wilmore, '85 electrical engineering, '94 M.S., '12 honorary doctorate of engineering

Through my sister (Leanna Robertson Garrick, '86 business management), I met Barry Wilmore while here at Tech. Years later, following a fantastic Navy career, he had been chosen as a NASA astronaut, and we had become friends. He was assigned to the crew of Atlantis on STS-129, and I requested that he fly my Tennessee Tech engineer's ring. Among all his training for his flight, he reached out to me and told me to send my ring to Houston. He knew how much it meant to me and actually took the ring out and let it float on the flight deck of Atlantis and took pictures. I wear a different ring today; that one is at home in a display case.

Clay Robertson, '90 electrical engineering



Capt. Barry Wilmore photographs Clay Robertson's engineer's ring as it floats in front of the window of the Space Shuttle Atlantis.



Tech alumni advance space exploration at NASA Marshall Space Flight Center

At NASA Marshall Space Flight Center in Huntsville, Alabama, there is a team of scientists, engineers, computer programmers and business professionals who solve complex technical problems, advance technologies and develop science instruments and complex space systems. And within that team are approximately 80 Tennessee Tech alumni who are advancing the mission of space exploration.

Three Tech alumni and MSFC electrical engineers — Leigh Anne McMahon, John West and DeLisa Wilkerson — say they are grateful for the education they received that prepared them for challenging yet rewarding careers.

Leigh Anne McMahon, '88 electrical engineering, has worked at MSFC for 33 years. She is currently the associate engineering director of technical management and leads efforts in ensuring research and technology development and strategic partnerships within engineering are well-integrated with center and agency objectives.

“I enjoy working at NASA, and specifically at Marshall, because of the mission we are working, for the opportunities that I’ve had to grow and develop and especially because of the community,” said McMahon. “I knew I wanted to become an electrical engineer for NASA from a very young age, inspired by the Apollo and Skylab missions. Now, I get to support the building of rockets and various types of landers and habitats that will enable us to explore the universe and learn more about everything around us. MSFC has been a great place for me to stretch and challenge myself to be the best engineer/leader/innovator I can be. There’s a

sense of purpose and a feeling we are all in this together that results in a positive community spirit.”

John West, '89 electrical engineering, retired in December 2021 after a 30-plus-year career with NASA. He retired as the division chief for the Engineering Directorate’s Avionics Division. Prior to that, he was the assistant division manager of the Electrical and Optical Subsystem Design Division where he worked with electronics vendors to design, build and test the many electronics boxes that operate and control the NASA Space Launch System rocket. These engineers also design, fabricate, integrate and test electronics for hardware and experiments that will be on the International Space Station.

“I enjoyed the environment of working with teams to create items that will operate in the space environment,” said West. “Most of the hardware we develop is one of a kind, so each project brings new and interesting challenges.”

DeLisa Wilkerson, '87 electrical engineering, is a stages avionics and software element discipline lead engineer in the Avionics Systems Integration Branch where she manages, coordinates and provides engineering expertise for the design, development, analyses, test, integration, implementation and evaluation of avionics and software for Space Launch System Stage Avionics.

“I support Space Launch Systems Stages Avionics — the ‘brains’ of the rocket — which includes interactions with various disciplines from engineering level subject matter experts to Program Management, working with both MSFC and SLS contractors,” said Wilkerson. “The SLS

Avionics work takes place at MSFC, Michoud Assembly Facility, Stennis Space Center, Kennedy Space Center and Boeing and contractor facilities. There is so much exciting work going on at MSFC. You can work multiple projects at many different levels. If you have an idea to improve access to space or space science, the MSFC management is very supportive. The people here are very dedicated and are always willing to pitch in and get the job done.”

McMahon, West and Wilkerson say one of their favorite things about working at MSFC is the sense of community. They also say that within the MSFC community is a smaller subcommunity of Tech alumni.

“The electrical engineering undergraduate program at Tech was a challenging one that prepared me for a good career at MSFC,” said West. “The individuals I know here who graduated from Tech have had successful careers at NASA. Having been through the program myself, I know the quality of education my fellow alumni received, and know I can rely upon them to do what is necessary on the job.”

Wilkerson says she takes great pride in her electrical engineering degree from Tech.

When I started work at MSFC, I felt confident that I had the training to do what I needed to do,” she said. “When you know someone is from Tennessee Tech, it gives you that common background. Everyone I have met has been proud of being a Tech graduate. A few years ago, I had within my branch three generations of Tech graduates — myself ('80s), another engineer ('90s) and an intern (2019).”

McMahon added, “Because Tech is a smaller school, it is always a treat to run into fellow alumni, especially when it comes to those who were at Tech while I was there. We can share stories of professors we had in common and classes we took together and how they helped shape our approach to engineering and our attitudes about our work. Tech was the right environment for me, and that made all the difference. It helped me build a strong foundation for how I thought about work — and how I wanted to do work — for the rest of my life. Tech taught me a lot about myself and the kind of engineer I wanted to be. That has served me well ever since.”

This story was originally published on April 28, 2020, as part of the Tech Took Us There series. Tech Took Us There features outstanding Tech alumni who credit their career success to the education they received at Tennessee Tech. For more Tech Took Us There stories, visit tntech.edu/univadv/cac/techttookusthere.php



Approximately 80 Tennessee Tech alumni work at Marshall Space Flight Center in Huntsville, AL. (Photo credit NASA)

Thank you to everyone who took the time to share a story with us. We are in awe of how far you've gone — literally to the moon and back — since graduating from Tennessee Tech.

- Robert R. Bell, Tennessee Tech President Emeritus
- Carlos L. Bowden on behalf of Donald R. Bowden, '56 mechanical engineering
- James "Jasper" Brock, '69 electrical engineering
- Jody M. Brooks, '92 electrical engineering
- Bob Brown, '58 engineering chemistry
- Charles E. Button, '64 industrial technology
- James C. Carlock, '67 electrical engineering
- Sharon Carter, '86 electrical engineering
- Jimmy H. Celsor, '61 mathematics
- Carol Childs, '66 mathematics
- Larry Crabtree, '66 electrical engineering
- Walter Keith Crawford, Jr., '62 electrical engineering
- Virgil Leon Davis, '69 electrical engineering
- Laurie Folden, '81 industrial engineering
- Bob Gaffin, '66 electrical engineering
- Jerry Gannod, Chair, Tennessee Tech Department of Computer Science
- Roger L. Haggard, '73 electrical engineering
- Denny Holt, '67 mathematics
- Ron Hudson, '72 business management
- Rusty Hunt, '84 electrical engineering
- Rachel Elkins Killebrew, '64 mathematics
- Colt Jackson, '12 engineering technology
- Gerald E. Lanz, '84 mechanical engineering
- Terry M. Luttrell, '75 electrical engineering
- Leigh Anne McMahon, '88 electrical engineering
- Clinton C. Moore III, '86 mechanical engineering and '88 M.S.
- Stephanie A. Moran, '88 sociology
- Corey J. Morris, '15 biology
- Bill Neely, '68 mechanical engineering
- Earl A. Price, Jr., '61 engineering science
- Shawn E. Reagan, '91 electrical engineering
- Clay Robertson, '90 electrical engineering
- Norman F. Robinson III, '95 mathematics
- Roger Ryburn, '59 mechanical engineering
- Carolyn Thomas, '63 mathematics
- Bryan K. Walls, '84 electrical engineering and '87 M.S.
- Tommy Westergard, '01 electrical engineering
- Jay Whiteford, '81 electrical engineering
- Barry E. Wilmore, '85 electrical engineering, '94 M.S., '12 honorary doctorate of engineering
- Eugene Wilmore, '58 industrial management



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We are sad it's the last page too, but there is so much more to read and do!

Visit us at tntech.edu/NASAccelebration for additional alumni stories and fun space-themed activities for kids, compliments of the Oakley STEM Center!

We at the Crawford Alumni Center have had a blast meeting and learning about some of our amazing alumni and making this publication to share with you. If you enjoyed this special print edition of The Alumnus, please consider making a gift to the Crawford Alumni Center. The costs of printing and postage continue to increase, and we want as many alumni as possible to be able to receive publications like this one.

Gifts can be made online at tntech.edu/giving.

