MESSAGE FROM THE DEAN

DEAR FRIENDS OF THE COLLEGE OF ENGINEERING,

In this edition of the annual report, you’ll learn about the fascinating drone research we have going on, including new research that may help other university researchers. You’ll hear from alumni about one of the oldest computer science departments in the nation, read about how our students and researchers are changing the face of army tactical shelters, and see highlights from our SAE Formula team’s trip to Nebraska where they placed 13th in the competition.

You’ll also learn more about our new educational opportunities with the college, from our Executive Master in Computer Science, with focus in cybersecurity and data science, to our new materials science partnership with China. And you’ll read about a few of our alumni and what they’re doing now.

Of course, there are many more stories spanning our six departments throughout this publication. I’ve enjoyed seeing all that our students, faculty and staff have accomplished, and I know you will, too.

Costas Tsatsoulis
FACTS & FIGURES

21 Undergraduate and graduate programs offered at the College of Engineering

6,000+ College of Engineering alumni

18 Engineering student organizations

1,174 Undergraduate and graduate first-generation students

102 Faculty in the College of Engineering

2,567 Undergraduate degrees awarded since 2011

1,504 Master’s degrees awarded since 2011

171 Ph.D. degrees awarded since 2011

UNDERGRADUATE ENROLLMENT
3,050

1,132 Computer Science & Engineering
793 Mechanical & Energy Engineering
409 Engineering Technology
367 Electrical Engineering
218 Biomedical Engineering
100 Materials Science & Engineering
31 Undeclared

GRADUATE ENROLLMENT
586

378 Masters
208 Ph.D.
82 Materials Science & Engineering
81 Electrical Engineering
70 Mechanical & Energy Engineering
55 Engineering Technology
10 Biomedical Engineering

IN THE NEWS:

Veterans, UNT Engineers Build Future Army Tech
Story by Brian Scott for NBC 5
Feb 23, 2017 (more on this on page 26)

Geniuses Wanted: NASA Challenges Coders to Speed Up Its Supercomputer
Story by Jacey Fortin for NY Times,
May 8, 2017

When Disaster Strikes, Flying Cell Towers Could Aid Search and Rescue
Story by Kamesh Namuduri for IEEE Spectrum,
August 29, 2017 (more on this on page 18)

IN THE MEDIA:

115 Media Hits

45 Internal Hits (within the University of North Texas)

70 External Hits (outside the University of North Texas)

36,600,000+ people reached and $445,000+ in equivalent advertising value (EAV)

UNDERGRADUATE STUDENT DIVERSITY

White 44%
Other 1%
American Indian 2%
Asian/Pacific Islander 8%
Non-Res 10%
African-American 12%
Hispanic 23%
Undeclared 1%
UNT PRFESSOR HELPING VISUALLY IMPAIRED STUDENTS LEARN COMPUTER SCIENCE

BY TANYA O’NEIL

When you use a computer, you typically read an article, watch a video or access information from a graph. These may seem like simple tasks, but for a person who is visually impaired, these tasks can be challenging.

One University of North Texas professor knows these challenges all too well. Stephanie Ludi works in the Department of Computer Science and Engineering. She also is visually impaired.

“As an undergraduate, I had the usual difficulties of learning about what computer science was,” said Ludi. “However, they were compounded with the extra issues of trying to follow lectures and labs due to not being able to see the board.”

Ludi turned her struggle into her strength. Using her understanding of what difficulties middle and high school students with visual impairments face when studying computer science, she created curriculum online for free so that they can be used by any student.

“With success, this partnership can be a model for other transfer programs with institutions in China and other countries in the world.”

This spring, the Department of Materials Science and Engineering partnered with Dalian Jiaotong University in China to establish a new international transfer program. The “1+3” program allows qualified students to complete one year of undergraduate study at DJTU and then transfer to UNT to finish the remaining three years of study needed to satisfy the university’s degree requirements. Students who complete the program will receive a bachelor’s degree in materials science and engineering from UNT, as well as a bachelor’s degree from DJTU.

“UNT partner signatories cited the promotion of international collaboration in higher education and recruitment of high-quality students for UNT in Asia, including China, where fast-growing, middle-class families are looking for high-quality education resources for their children,” said Jiacheng Dou, professor of materials science and engineering and program coordinator.

“This partnership, which is part of UNT’s Undergraduate Transfer Program that collaborates with established institutions in China, provides a pipeline of high-quality undergraduate students.”

The unique partnership also provides teaching opportunities at DJTU to UNT faculty from materials science and engineering and UNT International’s Intensive English Language Institute. Faculty will travel to China during winter and summer breaks to teach courses to students in the program, preparing them for UNT and the U.S. higher education system.

“The biggest advantage for students in this program is that they have the opportunity to obtain their college education in an accredited, top-tier research institution with instructors who are very active in research and many of whom are nationally and internationally known for their research in materials science and engineering,” Du said.

When you use a computer, you typically read an article, watch a video or access information from a graph. These may seem like simple tasks, but for a person who is visually impaired, these tasks can be challenging.

One University of North Texas professor knows these challenges all too well. Stephanie Ludi works in the Department of Computer Science and Engineering. She also is visually impaired.

“As an undergraduate, I had the usual difficulties of learning about what computer science was,” said Ludi. “However, they were compounded with the extra issues of trying to follow lectures and labs due to not being able to see the board.”

Ludi turned her struggle into her strength. Using her understanding of what difficulties middle and high school students with visual impairments face when studying computer science, she created curriculum online for free so that they can be used by any student.

“With success, this partnership can be a model for other transfer programs with institutions in China and other countries in the world.”

This spring, the Department of Materials Science and Engineering partnered with Dalian Jiaotong University in China to establish a new international transfer program. The “1+3” program allows qualified students to complete one year of undergraduate study at DJTU and then transfer to UNT to finish the remaining three years of study needed to satisfy the university’s degree requirements. Students who complete the program will receive a bachelor’s degree in materials science and engineering from UNT, as well as a bachelor’s degree from DJTU.

“This partnership signifies the promotion of education and recruitment of high-quality students for UNT in Asia, including China, where fast-growing, middle-class families are looking for high-quality education resources for their children,” said Jiacheng Dou, professor of materials science and engineering and program coordinator.

“This partnership, which is part of UNT’s Undergraduate Transfer Program that collaborates with established institutions in China, provides a pipeline of high-quality undergraduate students.”

The unique partnership also provides teaching opportunities at DJTU to UNT faculty from materials science and engineering and UNT International’s Intensive English Language Institute. Faculty will travel to China during winter and summer breaks to teach courses to students in the program, preparing them for UNT and the U.S. higher education system.

“The biggest advantage for students in this program is that they have the opportunity to obtain their college education in an accredited, top-tier research institution with instructors who are very active in research and many of whom are nationally and internationally known for their research in materials science and engineering,” Du said.

When you use a computer, you typically read an article, watch a video or access information from a graph. These may seem like simple tasks, but for a person who is visually impaired, these tasks can be challenging.

One University of North Texas professor knows these challenges all too well. Stephanie Ludi works in the Department of Computer Science and Engineering. She also is visually impaired.

“As an undergraduate, I had the usual difficulties of learning about what computer science was,” said Ludi. “However, they were compounded with the extra issues of trying to follow lectures and labs due to not being able to see the board.”

Ludi turned her struggle into her strength. Using her understanding of what difficulties middle and high school students with visual impairments face when studying computer science, she created curriculum online for free so that they can be used by any student.

“With success, this partnership can be a model for other transfer programs with institutions in China and other countries in the world.”

This spring, the Department of Materials Science and Engineering partnered with Dalian Jiaotong University in China to establish a new international transfer program. The “1+3” program allows qualified students to complete one year of undergraduate study at DJTU and then transfer to UNT to finish the remaining three years of study needed to satisfy the university’s degree requirements. Students who complete the program will receive a bachelor’s degree in materials science and engineering from UNT, as well as a bachelor’s degree from DJTU.

“This partnership signifies the promotion of education and recruitment of high-quality students for UNT in Asia, including China, where fast-growing, middle-class families are looking for high-quality education resources for their children,” said Jiacheng Dou, professor of materials science and engineering and program coordinator.

“This partnership, which is part of UNT’s Undergraduate Transfer Program that collaborates with established institutions in China, provides a pipeline of high-quality undergraduate students.”

The unique partnership also provides teaching opportunities at DJTU to UNT faculty from materials science and engineering and UNT International’s Intensive English Language Institute. Faculty will travel to China during winter and summer breaks to teach courses to students in the program, preparing them for UNT and the U.S. higher education system.

“The biggest advantage for students in this program is that they have the opportunity to obtain their college education in an accredited, top-tier research institution with instructors who are very active in research and many of whom are nationally and internationally known for their research in materials science and engineering,” Du said.
Can an online game help discover fast and effective algorithms that inspire architectural innovation and lead to opportunities for new designs to develop next-generation electronic devices? Gajendra Mehta, associate professor of electrical engineering, thinks so—and she, along with a team of students, has created a free online game called “UNTANGLED” to prove it.

“One of the grand challenges in the design of portable and wearable devices is to achieve optimal efficiency and flexibility in a tiny, low power package,” Mehta said. “We are harnessing human intelligence and intuition to create faster, better and more efficient algorithms.”

The newly released “UNTANGLEDIII,” the latest version of the “UNTANGLED” series, is a research project disguised as an addictive—and free—game. Gamers have to untangle a series of blocks initialized on a graph by placing them in a compact arrangement while adhering to specific constraints. This process mimics the challenge of efficiently organizing components within electronic devices. The new game has a community gameplay feature that allows players to build upon other players’ solutions.

“Although the game is presented to players abstractly, as connected elements in bold colors that must be untangled and arranged, it actually consists of real algorithms that players are mapping onto different chip architectures that could be manufactured on silicon,” Mehta said. “We find that players are very creative in quickly identifying compact arrangements of elements in our game. This is extremely exciting because we are not even close to this skill level in automatic algorithms for creating such layouts, and this limitation is holding back progress in highly customized chip design.”

By analyzing the players’ solutions collected from “UNTANGLEDIII,” Mehta and her team can develop algorithms that allow for rapid design space exploration, leading to opportunities for architecture designs that can be used in developing portable devices. These devices will be smaller, more powerful, and have longer battery life, which in turn can affect many areas, including health, safety and security and personal convenience and comfort.

“Our goal is to harness human intelligence to discover fast, efficient mapping algorithms for custom reconfigurable architectures. We’ve developed several algorithms from our research that have outperformed traditional algorithms,” Mehta said. “Now, we want to increase participation and widen the community of our players by promoting computational thinking among non-scientists and non-engineers. The vast amount of data that we collect from our players will be used to discover better and more efficient automated algorithms.”

She plans to continue to expand “UNTANGLED” to include a multiplayer game where users can collaborate and work on large and complex problems together in real time.

Mehta, who is a proponent of out-of-the-box approaches to research, began the “UNTANGLED” project in 2012 using a National Science Foundation grant. She received another NSF grant last year, which was used to develop the latest version of the research game. While she’s excited about the project’s implications, she has made it clear that the most important result is to provide a strong education.

“This project has given great research and educational opportunities to a large number of undergraduate and graduate students,” Mehta said. “That’s all I can ask for.”
As part of a new cooperative agreement established by the Army Research Laboratory, the Advanced Materials and Manufacturing Processes Institute will be working with three other universities to research new ways to keep soldiers safe.

“This is a large and significant award for UNT,” said Tom McCoy, Vice President for Research and Innovation at UNT. “It will have the potential of providing improved protection for the warfighter and it will enhance the research enterprise at UNT.”

While UNT will be working with Temple University, the University of Southern California and the University of Southern Mississippi on this project, UNT’s portion will be to explore new ways to improve protection against ballistic impacts.

“Protecting the soldiers is the number one goal,” said Rajiv Mishra, director of the institute and UNT Distinguished Research Professor of materials science and engineering. “All of the researchers involved in this project are asked by a common question: ‘How can we help better protect the soldier?’”

The researchers will examine both body armor and vehicle armor to understand how current materials fail so that they can make stronger and better armor materials.

“We can do fundamental testing that shows what happens when the armor gets hit,” said Mishra. “We have high-speed equipment that will show exactly what the impact is like. The high-speed camera catches things so fast that it can show everything that happens at the smallest and fastest stage.”

The early testing of the new armor material will be done inside the institute with seven UNT faculty members and several students working on the project. Once they create stronger and performing materials, these will be sent to the Army Research Laboratory for further testing. Students will also have the opportunity to travel to Army Research Laboratory and work with top researchers under this cooperative agreement.

“This is an incredible opportunity for our students, our faculty and our institute,” said Mishra. “We will be using materials science to protect our military.”

It’s hoped to miss the striking resemblance between Omar and Khaled Almahmoud, but their similarities don’t stop at the surface. Right now the brothers are both at the University of North Texas – both are working on doctoral degrees and both are studying mechanical and energy engineering.

“We aren’t just brothers. We are best friends,” said Omar. “We think the same way. He’s the one person who always understands me, even the silly jokes.”

“Sometimes we don’t even have to talk to understand each other,” said younger brother Khaled.

Omar was the first to come to UNT back in August 2015 after getting his undergraduate degree at the University of Jordan and his master’s degree in Los Angeles. All in mechanical engineering.

“It took me months of studying different programs to determine that UNT was the best fit for me,” he said. “It was the first in the country to do mechanical and energy engineering in one program and that grabbed my attention.”

When he got to UNT, Omar didn’t know anyone in Texas, but quickly found what he needed.

“I’ve found a lot of support here — the support I’ve been looking for,” said Omar. “I got in a department where all the professors are so helpful. When you talk to any of them about a problem, they will try to sit down and help you solve it. You really feel like they are concerned about you and truly care.”

Omar became such a fan of his program that he convinced his brother to enroll in it as well. Khaled even changed his line of study from electrical to mechanical and energy engineering to be part of it.

“My brother has always helped me,” he said. “Moving is not easy, but having your family member is a blessing.”

Khaled first pursued his studies in electrical engineering at German Jordanian University, then like his brother got a master’s degree in Los Angeles. He came to UNT in fall 2016 and the brothers were able to take classes together.

“We do lots of brainstorming,” said Khaled. “You can’t even imagine. Sometimes I come up with ideas for Omar, and sometimes he instigates ideas for me. We use each other’s backgrounds as a benefit. Most people don’t get that kind of advantage.”

Of course, having your brother in class can have some disadvantages.

“During one final exam, Khaled got mad because he thought I was sitting there and didn’t say a word,” he joked. “I knew it,” said Omar. “I couldn’t stop laughing and had to apologize to the professor.”

It’s not just Omar and Khaled who have a love for engineering. Their father was an engineer back in their home country of Jordan. The brothers say his dream was for all six of his kids to get their doctoral degrees. Their older brother is already a medical doctor. They also have a sister studying medicine, another sister studying computer science and a third sister who is an accountant.
ARTHRITIC KNEES WALK EASIER

AIMED AT HELPING THOSE WITH UNT STUDENT CREATES DEVICE

“Dr. Vaidyanathan’s father is elderly, so, we wanted to create one that is relatively cheap for production and increases the knee range of motion. We’re hoping to help with knee weakness, pain and knees that just don’t want to bend,” said Cao. “I’ve tried it out myself, and it really works. It’s very new, but we have high hopes that this could potentially increase range of motion.”

While Cao was studying mechanical engineering, she had an undergraduate degree in biomedical engineering who graduated in May 2017, found a mentor and inspiration in Vijay Vaidyanathan, the founding chair of UNT’s Department of Biomedical Engineering. While it may have been her dream job, Cao didn’t immediately accept it. It took a talk with her mentor to convince her she could really do it all.

According to Cao, this device could have an even bigger future.

ONE CUP OF COFFEE AT A TIME

The exoskeleton prototype was part of Cao’s thesis, which she defended in March, on top of going to school full-time and working full-time at Abbot Laboratories in Plano.

“I’m really happy where I am,” said Cao. “I’m working as a mechanical engineer in medical devices. It’s a dream job!”

While it may have been her dream job, Cao didn’t immediately accept it. It took a talk with her mentor to convince her she could really do it all.

“They called me last spring, and I first told them I couldn’t do it because I was a full-time student,” said Cao. “However, Dr. Vaidyanathan had great advice for me. He told me that I’m gaining my degree to work, and that this was an amazing opportunity. He also told me he knew it would be exhausting, but I could do it. So, I took it one cup of coffee at a time. I did it all because I am passionate, and I love this work.”

Prior to graduating in May, a University of North Texas graduate student took a step towards making exoskeletons available to help more people.

Typically exoskeletons, which are wearable mobile machines that allow for more limb movement, increased strength and endurance, are extremely expensive and mostly used in the military world. However, Jenn Cao, a student in UNT’s College of Engineering who graduated in May 2017, has created a working prototype aimed at helping those who struggle to walk because of osteoarthritis in their knees.

“We built a prototype, and it functions,” said Cao. “I’m really happy where I am,” said Cao. “I’m working as a mechanical engineer in medical devices. It’s a dream job!”

While it may have been her dream job, Cao didn’t immediately accept it. It took a talk with her mentor to convince her she could really do it all.

According to Cao, this device could have an even bigger future.

Glass reflection is the source of many problems and frustrations, but an assistant professor in the Department of Materials Science and Engineering has discovered a solution. Diana Berman has created a simple coating with the potential to have a major impact.

“This could help the everyday person in many ways,” said Berman. “For example, when you look at your shiny black sunglasses, it’s hard to read because of the light reflection. This could change that. It could also help when you’re driving. Think of how the sun’s glare on your car windshield can make visibility difficult at certain times of the day. This could help lessen that. It could even help with the glasses you wear.”

Berman works on this research in partnership with Argonne National Laboratory. She said they started out the project with a goal of helping make solar panels work better.

“Not all the sun’s light on solar panels is transmitted inside because of the glass reflection,” she said. “We are working to dramatically increase the capability of the light transmission and efficiency of solar panels by reducing the reflection. Traditionally, polymer-based nanoporous films are used as antireflective coatings. One of the problems is conventional polymers can’t withstand the intense UV light of the sun. Replacing the polymers with other non-sensitive to UV materials to design controlled nanoporous structures has been challenging so far. We’ve now made one. In fact, our ceramic antireflective coatings can work in up to 2,000 degrees.”

While improving solar panels is Berman’s first goal, she is excited to see how many products her coating can improve.

“This starts with solar, but goes beyond that,” she said. “It could work with windows, glasses — anything. It can design a specific material for any surface that needs an anti-reflective coating.”
Ram Dantu, Department of Computer Science and Engineering professor and director of the UNT Center for Information and Computer Security, was named a finalist in the Technology-Innovator category by Tech Titans, Texas’s largest technology trade association. The category recognizes people or groups responsible for creating breakthrough ideas, processes or products that have advanced their discipline or a whole.

“It is a real honor to be named a finalist and that UNT is competing with so many other technology giants,” Dantu said.

Dantu, who has 25 patents with nine more pending, was considered based on several pending, was considered based on breakthrough ideas, processes or products he has developed or endorsed. He is a co-founder of the National Science Foundation-supported group, The Engineer’s Aerie.

“I have a lot of students working with me developing so many wonderful technologies,” Dantu said. “Our research is based on NSF, made this possible.”

Tech Titans, Texas’s largest technology trade association, represents a quarter million employees through its 300 member companies. Its mission is to support the pursuit of technology at all levels, from innovation to legislation.

Within his department, Wasikowski says the department is able to provide opportunities for students in a variety of mechanical engineering fields, ranging from machine design, robotics and combustion science to manufacturing automation, HVAC, energy sustainability, aerospace and transportation. The students also get to work with organizations like Lockheed Martin, ASME, GE Transportation NASA and CCC Power, among others.

new innovative technologies, including a cellphone and smartphone software he’s developing that will enable bystanders to properly perform chest compressions on heart attack victims.

"After someone has a heart attack, the first five minutes are the most important — they determine if you will survive," Dantu said. "This software will not only teach you the correct process and rate for chest compressions, but will connect to the hospital so 9-1-1 center can provide patient information."

Dantu said the honor is not his alone. He credits his students for their hard work and the National Science Foundation for providing research funding.

"I have a lot of students working with me developing so many wonderful technologies," Dantu said. "They, along with the NSF, made this possible."

One group of students — Sarah Bundy, Brandon Laney, Byne Spears, Preston Stolfer, Blake Stewart and Phai Thach — selected a project sponsored by the Triumph Group. For the project, the students were asked to explore ways to improve their drilling and riveting process.

"One of the best options found was an automated drilling system run on a track that could be temporarily fixed on the panels, so we decided to verify the viability of the option by creating our own simplified version of this robotic drilling system and track," said Bundy, who focused on the project’s mechanical design.

Wasikowski, who created the code that tells the robot how to operate, said it was programmed to drill a set pattern of holes on a loop to demonstrate the robot’s repeatability. A program also was written to etch lettering into the metal so as to showcase the robot’s accuracy.

In addition to the practical experience gained from working on the project itself, students also are given the chance to network with industry engineers and, for some, are exposed to additional company tours and other opportunities the sponsoring organization offers.

"Working with Triumph was amazing — our mentor Don Surratt was incredibly helpful," said Stewart. "Don always made himself available to us for multiple hours every week. He also set up numerous factory tours to help us better understand the project requirements."

Bundy agrees. "Being on a sponsored project is excellent," she said. "I highly recommend to any students choosing a project to go for the sponsored ones. There is a lot to be learned from people who have been working in industry for a long time."

But the benefits aren’t one-sided. In fact, in today’s economy, companies are struggling with an aging workforce and are short-staffed in key technical areas, making it difficult for them to solve new and challenging engineering problems.

For Triumph and other sponsoring organizations, The Engineer’s Aerie helps the company find a solution to one of their long-standing projects by allowing students to tackle it under faculty and industry mentorship, freeing up company resources to focus on other strategic, high-value projects.

"The capstone process also provides sponsoring organizations an opportunity to evaluate and recruit students as openings arise. "Working with the students was great," said Don Surratt, Triumph Group. "They had tremendous enthusiasm and excitement toward the project and it provided me an opportunity to mentor them on aircraft bore drilling processes and methods. They each had an opportunity to actually drill test pieces and trail ideas in our existing classroom. As a 1987 UNT alumnus, it also provided me an opportunity to give back to the college and may help some student interest in the career of aeronautical and manufacturing with Triumph."

"We are very much about sponsoring a capstone project," said Thomas Flannerly, associate dean for corporate relations, at tomorrow's pace.  

"We are looking for students who are pushing the boundaries, and we want students who are pushing the boundaries, and we want people who are pushing the boundaries, and we want
The Materials Research Facility - A Shared Research Facility for Multidimensional Fabrication and Characterization (MRF) is a research center and service facility at the University of North Texas in Denton, Texas, that supports scientific research activities through its wide array of sophisticated characterization and processing instruments. UNT is among an elite group of public institutions nationwide that offer this complement of facilities.

In addition to UNT-affiliated researchers, MRF collaborates with other universities and industries. Researchers use the more than two dozen machines at MRF to fabricate and analyze materials from the macro to atomic level. Projects span numerous areas of expertise in disciplines such as engineering, materials science, physics, chemistry and biology and are at the cutting edge of cross-disciplinary analysis, characterization and synthesis.

To find out more about the Materials Research Facility and research opportunities, give us a call at 940.369.8106.

FEATURES

- A VIEW FROM ABOVE
- ARMY TACTICAL SHELTERS
- CSE 45th ANNIVERSARY
- FORMULA SAE
How the College of Engineering has taken flight in drone research.

KAYLA GREEN
TANYA O’NEIL
JULIE PAYNE
COURTNEY TAYLOR

Shengli Fu, Department of Electrical Engineering professor and chair, in 2015 received the Tech Titan of the Future award for his and Yan Wan’s, now at the University of Texas at Arlington, research in Wi-Fi drone technology. They had created a drone-carried Wi-Fi communication infrastructure that could be used to support emergency response missions when an emergency strikes and participated in the Smart Emergency Response System project for the SmartAmerica Challenge that earned Fu and Wan a trip to Washington D.C. to present their work at the White House.

A year later, they successfully demonstrated the use of the same technology in search and rescue missions with collaborators from Austin Fire Department, Mathworks, and Worcester Polytechnic Institute as part of the Global Cities Team Challenge.

“The drone-carried Wi-Fi system provides an attractive platform for students to gain hands-on learning experiences of various technologies including control, communication, mechanics and energy,” said Fu.

The drone-carried Wi-Fi communication infrastructure provides Wi-Fi and Internet access on the ground and creates on-demand emergency communication infrastructure that benefits first responders, control centers and survivors.

IN ITS 14 YEARS, UNT’S COLLEGE OF ENGINEERING HAS REALLY TAKEN FLIGHT – AND ESPECIALLY, IN ITS DRONE RESEARCH.
Even now, Fu continues to pursue with the City of Denton and other local communities to see and implement the technology. “By working with the City of Denton in disaster drills, we are able to test the system and train emergency personnel on how to use it. Doing so helps ensure that, should a real crisis arise, first responders will be able to communicate,” said Fu.

Connecting on a cellular level

Kamesh Namuduri, a professor in the same department, is tackling emergency response through the use of drone technology. With funding from the National Science Foundation, his research group focuses on using the drone to establish cellular service for first responders. This past May, he and his team conducted a successful field test of the first-of-its-kind Aerial Deployable Communication System in Waxahachie, Texas.

Namuduri had partnered with Greencall, a portable cellular base station. Greencall can transmit cellular signals at power levels ranging from 250 Milliwatts to 10 Watts. “By working with Greencall, we were able to test the cellular service over a wider range that could cover an entire city, such as Denton, during emergencies,” said Namuduri.

The device was attached to a drone and lifted up 400 feet in the air. Its cellular technology was then programmed to tune into the bandwidth allocated to the first responder community, proving that it can give them direct access to communication without the concern of overloaded or damaged cellular towers. “We want to provide connectivity where it is needed,” said Namuduri. “If there is a lot of activity in a certain area, but the first responders cannot communicate, then we want to go there.”

Namuduri also works with local cities in Texas to test his system. “We want to ensure that we can provide the best possible cellular service for first responders in a time of crisis,” he said.

Advancing drone technology for other researchers

Now, Fu is back at it with a new $1 million collaborative NSF grant he and the University of Texas at Arlington, Texas A&M University – Corpus Christi and the University of Puerto Rico at Mayagüez received. The three-year grant allows Fu to create an open-platform drone for testing by researchers in computer and information science and engineering. His plan is to provide researchers with information on assembly, calibration and flight instructions and build central processing units for the drones that would allow researchers to completely customize the usage through applications they develop.

“It will be a plug-and-play design that will allow researchers to access all technology that meets their needs via an app-like interface,” said Fu. “With the open platform, researchers will save time and money by tailoring an existing drone’s CPU to fit their needs – such as adding sensors or transmitters to send information back to the operators and any other equipment required to meet their specific requirements.”

He says the technology can be used for anything from emergency response to agriculture monitoring and environmental sensing. “We want the ability for multiple drones to handle one mission – drones that can work as a network so if one fails, the others can continue the task,” Fu said. “An example is environmental monitoring, where air quality tends to be noted by ground sensors due to the cost to elevate them. These drones would allow for elevation of sensors for real-time readings by multiple sources over a wider area, improving accuracy.”

Fu is planning to finalize his prototype in early 2018.

---

“In this field we are to be found in the September 2017 print issue of IEEE Spectrum as a network so if one fails, the others can continue the task.”
Changing Lives And Technology

For decades, the University of North Texas has helped lead the way in computer science. UNT’s program – one of the oldest in the nation – turned 45 this year, and alumni Willie Barber, Greg Thurman and Tyseanah Spell, together, tell the enduring story of UNT’s computer science program.

In 1977, Apple Computers released the first personal computer with color graphics, the first modem for home users hit stores and Willie Barber graduated from the University of North Texas with a master’s degree in Computer Science.

He was part of the very first class to graduate from that program. “It took me 10 years to get my master’s degree,” said Barber. “I was just so excited to have finally achieved that goal. At the time, I didn’t realize I was one of the first. We were pioneers.”

From the time he was a small child, Barber decided he was going to get his master’s degree. Both of his parents only had an eighth grade education, and he wanted to make them proud. He earned an undergraduate degree in mathematics in 1967, and was going to graduate school when he was drafted at the height of the Vietnam War. “I was close to that degree, but Uncle Sam said it was time to go,” he said.

Thanks to a summer spent working with computers, Barber was assigned a position as a programmer for the army in Germany. “I spent two years in the service. I had a good military complexion. I was a computer programmer, working in the office of the Deputy Chief of Staff,” Barber said. “I feel I was fortunate that both my brother and I served during Vietnam and both of us came home.”

He used his experience from the Army to continue working as a programmer, landing a job at Mobil Oil Corporation in Dallas. “I was on my way, but I realized I had not completed a master’s degree,” said Barber. “It was an unfinished personal achievement that haunted me every day.”

With a family to support, Barber and his friend Roy Rogers, another programmer at Mobil, decided to try out a new program at what was then called North Texas State. “Roy and I decided to try out this new computer science program. We communed from work in Denton daily. Sometimes we were even in the computer lab all night.”

While his friendship with Rogers grew, the nervousness of the school led to several other friendships and even a close relationship with his professor. “Everyone was so friendly,” said Barber. “Dr. Denis Conrady, especially; he was one of the kindest gentlemen I ever met. He invited me to his house to talk about my thesis while we sat in his backyard by his pool. It was an ideal time to be a student. It is really amazing to know that we were the first students in this program.”

After graduation, Barber saw his career flourish. He worked for numerous companies along the way and was part of an industry that was always evolving. “Computer science changes so fast, and you have to be flexible and change with it,” said Barber. “When
“I’m so blessed. If I retired today, I would feel like I accomplished everything I wanted. UNT played a big part in that.”

I started working with cards punched and binary fields. Now, one tiny chip can hold a massive amount of memory. We were the forerunners of it all.

At 72 years old, he is still working in the computer industry, currently as an IT Specialist for the Internal Revenue Service. Barber is also a father of four, a grandfather to seven and has been married to current UNT alumna Mary Barber for 47 years.

“What a deal to happen to me,” said Barber. “I had no idea that this is the life I would get to lead. It all just happened, and I’m so very happy. I’m proud to be able to be part of a great school in a great country that has afforded me so many opportunities.

More than 20 years after Barber graduated from UNT, Greg Thurman got his bachelor’s degree in computer science. By 1999, computers were common in homes, but a new technology was emerging.

“The internet wasn’t really around when I graduated,” said Thurman. “Now companies come out right at the end of my education. I remember a point when I didn’t know what the internet was, someone opened it up and showed me. I was like, ‘wow!’

That’s kind of an excitement for new technology that made Thurman love computer science. However, when he first got to UNT, he had no idea what that would be about.

I was undeclared for my first two years,” he said. “I was planning to go to law school, but I was also interested in business. By 1999 when I decided on computer science, by then the internet had become a huge phenomenon.

“Keep a list of goals,” said Spell. “Always keep on the job, but I know I’m in the right place.

I think we had one in 1994,” said Spell. “I think we had one in my house my entire life. Now, I remember my five social media accounts. In 1998, I had to lie about my age because I was too young to get one.”

While computers have always been a part of Spell’s life, it wasn’t until her senior year in high school that she realized she wanted to make a career out of working with them.

“I wanted to know why the computer was showing me what I was showing me,” said Spell. “I wanted to know the reasoning behind how everything worked, so I had to go into it.”

Spell was in the top 15 percent of her graduating class at West Side High School in Houston in 2012 and was automatically admitted to UNT. She says she always found school fairly easy, but one particular professor challenged her like no one ever had.

“Dr. Robin Porathgamipradit was the only person in my entire life to give me a C,” said Spell. “I had to take a different class with him and redeem myself. With Dr. Robins, I had to really study, I couldn’t just memorize. He pushed me so actually learn, to work harder.”

That hard work paid off. While attending a College of Engineering career fair, she got one but two job offers before she had even graduated with her undergraduate degree. She decided to accept a position with L3 Technologies in Rockville.

“I’m really using my degree in this job. I’m a software engineer, and UNT gave me the background I needed,” said Spell. “As a software engineer, and UNT gave me the background I needed, and help with updating them with the latest technology. Our biggest customer is the U.S. government, the military in particular. We work a lot with coding, always trying to make it easier and keep advancing what’s out there. I’m still learning on the job, but I know I’m in the right place.”

It’s not just the work that Spell says students should keep advancing, she worked hard to advance herself. While at UNT, she found joining organizations helped her broader her business and make friends.

“I learned so much in class,” said Spell. “But in those organizations I learned about leadership and resume and real life lessons.”

Spell was part of the Society of Black Engineers, the Society of Women Engineers and the NAACP. She was also a student tutor, helping students who struggled with math, physics and, of course, computer science.

While Spell is part of the latest generation of computer scientists, there are many more to come and she has advice for them.

“Keep a list of goals,” said Spell. “Always keep them around, update them and make them off as you go. Remind yourself of where you are going and the goals you want to achieve.”

To learn more about our Department of Computer Science and Engineering, find us on the web at: computerscience.engineering.unt.edu or give us a call at 940.565.2767.
The Army has granted two UNT research teams, along with their collaborators at Northeastern University and the University of Southern Mississippi, $2.6 million dollars aimed at making these shelters stronger, lighter, stackable and easier to transport.

For UNT’s part of the project, engineering professors and students from the Departments of Engineering Technology and Material Sciences and Engineering will be working together. The materials science team is studying the feasibility of using lighter weight components for tactical shelters made out of steel rather than the presently used aluminum. They are also looking at improving methods of joining the shelter components. The engineering technology team is testing ideas aimed at making the change from aluminum to steel regarding the structural performance.

“We are very excited about this project,” said Sundeep Mukherjee, associate professor of materials science. “It’s a great thing for us as a university and as researchers, but most importantly it’s great for our students. This is the kind of project that gets students excited about engineering. It’s real hands-on work.”

Two students in particular have a special connection to this project and a working knowledge of the Army that is invaluable to this research.

“It is exciting for me to be a part of this,” said Jeremy Artman, an engineering technology graduate student and Iraq War veteran. “Not only am I looking at this from the engineer’s parameters of cost and strength of the design, but also the safety and protection of the troops. When I was in the Army infantry, having faith in all our equipment was paramount. I trust myself to think of this from the soldier’s perspective. I also know setting up tactical can be quite tedious, and I believe the engineers at UNT can help alleviate this with our designs.”

Nathan Derrick, who is also an Army veteran, served for 10 years and did two tours in Iraq. He’s a graduate student in the Department of Engineering Technology, as well.

“Two students in particular have a special connection to this project and a working knowledge of the Army that is invaluable to this research.

“This is the kind of project that gets students excited about engineering. It’s real hands-on work.”

“For about the past 30 years, the U.S. Army has used the same tactical shelters for their soldiers. Now, the University of North Texas is part of a collaboration with a goal of making the next generation of those shelters, and two Army veterans who are College of Engineering students are key in making it happen.
where student teams’ formula cars are tested on acceleration, skid pad, autocross, endurance and efficiency. This year’s ranking was the highest ever the team had received, surpassing University of Texas at Austin, Southern Methodist University, University of Washington, Auburn University and Faculdade de Engenharia de Sorocaba, a Brazilian team ranked 28th in the world.

“This year, we stuck close to what we knew and changed only specific things and changed them well,” said Kyle McDougall, a junior in the Department of Engineering Technology. “Also, knowing why we were changing something was big.” Last year, the team placed 33rd.

“We were more prepared this year than we had been in years before,” said McDougall. “We were more confident in our car, and we had a team full of people who had been in competition before and knew that it takes.”

The competition is a culmination of a year’s worth of work. Mean Green Racing, a segment of the student organization Society of Automotive Engineers, is already up and running on next year’s model.

“It’s good for those engineers who have been working on this car – learning the rules, seeing the requirements – to then go look at how engineers at schools like MIT and Auburn interpret the rules and did in the competition. It’s a great, well-rounded hands-on experience for any student in engineering.”

Much of the support Mean Green Racing receives each year is from UNT’s College of Engineering, along with local and national sponsors.

“The support from the College of Engineering and the Department of Engineering Technology has been amazing,” said McDougall. “They have always sent someone with us to ensure we have the help we need to succeed, and Bobby Gittens has been great to work with each year.”
ENGINEERING ALUMNA DOES IT ALL

A self-defined overachiever, Smith graduated high school at only 17, and decided to pursue two degrees – one in mechanical and energy engineering at UNT and another in mathematics at Texas Woman’s University (TWU) through the dual-degree program.

“I am hands-down into anything I can do, touch or be involved in, so mechanical engineering was a perfect fit for me,” said Smith, who graduated from UNT’s Department of Mechanical and Energy Engineering in May 2017.

The program, which is the only one of its kind, was good for her in that it both challenged her academically and helped her branch out of her comfort zone.

“That’s the thing about this campus: it’s very welcoming, and we have faculty who are approachable,” said Smith. “I felt like I could really ask the professors questions about any subject we were studying and get real life applications to relate it back to.”

In addition to her studies, Smith also led a rather active social calendar. From the American Society of Mechanical Engineers (ASME) to the Society of Women Engineers (SWE), Smith was always on the go, looking for new ways to make an impact on the field in addition to furthering her career goals.

She even found time for archery, which is now a hobby at this time for her. She went on to compete in the World Field Archery Competition for Team USA and placed 10th during 2014 as a sophomore in college.

“I’m always working towards a goal, whether it’s something that will help me personally, academically, or professionally. I want it to be something that really matters to make me into a diverse person,” she said.

And it’s that same practicality that led this engineer to re-think the traditional senior design project – a graduation requirement for all UNT College of Engineering undergraduates.

“I learned so something different, and I thought I’d be really neat to build a rocket, because it was something I’d never done,” she said. “I didn’t want to just do something normal. I wanted to go big or go home.”

Smith, along with three other seniors, banded together and entered into the NASA’s Student Launch rocket competition in April 2017. The competition brought schools across the nation, who each designed and built their own rocket, to the Marshall Space Flight Center in Huntsville, Alabama.

“I won such an educational packed experience,” said Smith. “We learned most of the fundamentals from our classes, and then we were given the opportunity to put that into action by creating a rocket and then launching it at the Marshall Space Flight Center.”

It was this experience, coupled with Smith’s three internships at GE Transportation, Bell Helicopter, and Lennox International, that she says were eye-opening experiences that taught her more about herself.

As GE, Smith worked as a supply chain manufacturing engineer intern where she worked with produc- tion kitting. At Bell Helicopter, she interned in the Engineering Technology and Innovation department where she worked on tail rotor blade sensors for autonomous vehicles in the Air Vehicle Design Department. And, at Lennox International, Smith developed her project management skills in addition to completing her Six Sigma Green Belt in technical support.

“Through each of my internships, I really gained an understanding of what I liked and didn’t like and what I’d want to do as an engineer,” she said. “I was able to test the waters in each of my internships and gain practical experience that would increase my chances of getting a job after I graduated.”

Now, in a rotational leadership role as a manufacturing develop- ment program engineer at Cummins Inc., Smith is tackling her career with the same tenacity she had during college.

“I love my current position, because it allows me to learn about the company as a whole and not become too specific in a certain engineering function just yet,” said Smith. “Most of my time is spent working on projects for different business units that vary from turbo, distribution systems and engine build centers to power generators or filtration systems. In addition to this, I am able to tour all of the U.S. locations and receive intensive training.”

And she’s even thinking joining the National Guard.

“It’s my dream to serve my country, and this is a way that I can do so without affecting my job as a manufacturing engineer,” she said.

Smith plans to pursue her Master’s in Business Administration after she completes her Leadership Development Program and moves into another full-time position at Cummins Inc.
Raised in a well-educated family, there was no doubt Miles would head to college.

"Growing up, there were standards we all had to meet – college wasn’t optional," he said.

Each year, Miles spent a couple weeks with his grandparents in Louisiana.

"My grandfather was one of the first black interns at NASA, and my grandmother teaches reading for the gifted. She taught me to read, and taught me basic math concepts."

UNT + FOOTBALL

So, when it came time for Miles to look into colleges, it was no surprise he would pick one that would allow him to combine his educational goals with his favorite sport – football.

"I felt like I was just at home – the family atmosphere and the football aspect," he said. "UNT was one of the only schools that could show me someone who played football and did engineering."

Academically, Miles had participated in a variety of student organizations, but it was his senior design project for the Department of Mechanical and Energy Engineering that had really challenged him.

"Up until then, it had been mostly theory. With senior design, we had to actually make something," he said. "There’s always experimental error and human error and trying to put that with real-world application – there’s just always going to be something that happens."

Pursuing an engineering degree while playing football for UNT Mean Green wasn’t easy, he says.

Miles’s typical day went a little something like this: 7:30 a.m. workouts with lifting and conditioning, 8:30 to noon back-to-back class, mandatory team dinner at 6:30 p.m., and class or study hall afterwards.

It was a routine that helped him and his team get into our bowl game. That was a pretty big deal. And, afterwards, going to be something that happens."

"So, when it came time for Miles to look into colleges, it was no surprise he would pick one that would allow him to combine his educational goals with his favorite sport – football."

"I felt like I was just at home – the family atmosphere and the football aspect," he said. "UNT was one of the only schools that could show me someone who played football and did engineering."

Academically, Miles had participated in a variety of student organizations, but it was his senior design project for the Department of Mechanical and Energy Engineering that had really challenged him.

"Up until then, it had been mostly theory. With senior design, we had to actually make something," he said. "There’s always experimental error and human error and trying to put that with real-world application – there’s just always going to be something that happens."

Pursuing an engineering degree while playing football for UNT Mean Green wasn’t easy, he says.

Miles’s typical day went a little something like this: 7:30 a.m. workouts with lifting and conditioning, 8:30 to noon back-to-back class, mandatory team dinner at 6:30 p.m., and class or study hall afterwards.

It was a routine that helped him and his team earn a spot at the Heart of Dallas Bowl.

"Southern Mean was probably my favorite game to play in; it was a monster game," he recalled. "It was our fifth win, which helped us get into our bowl game. That was a pretty big deal. And, afterwards, I received an Honorable Mention for offensive lineman."