

UNT
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COLLEGE OF
ENGINEERING

ANNUAL REPORT

2016-2017



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 foci in cybersecurity and data science, to our a 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.

C. Tsatsoulis
Costas Tsatsoulis



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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

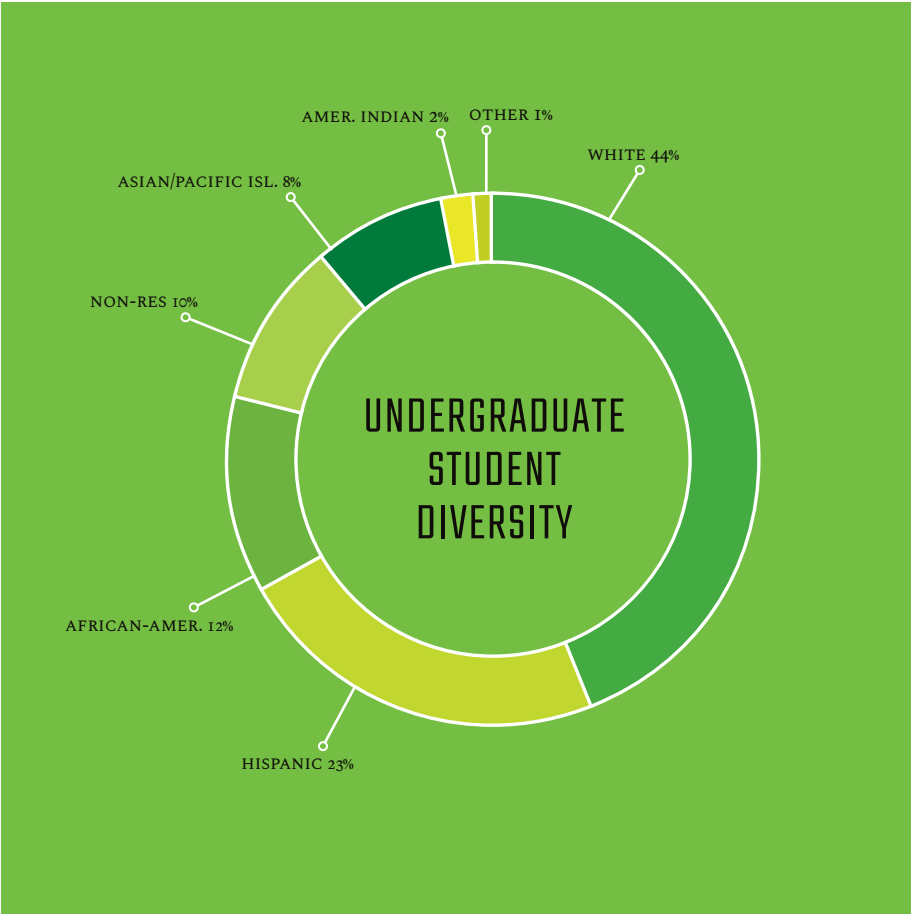
Undergraduate degrees awarded since 2011

1,504

Master's degrees awarded since 2011

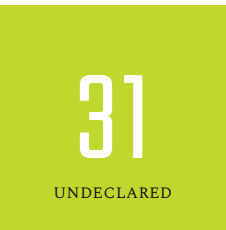
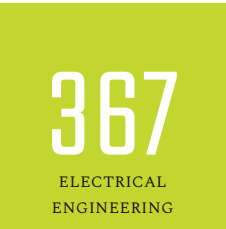
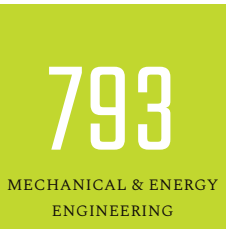
171

Ph.D. degrees awarded since 2011



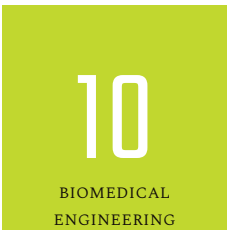
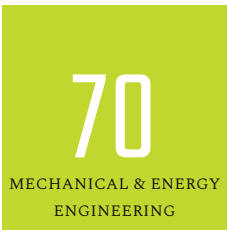
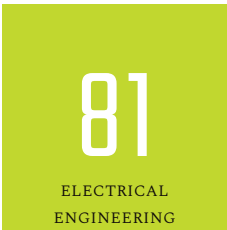
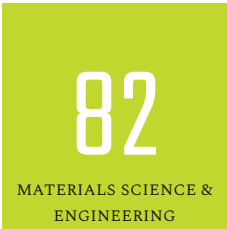
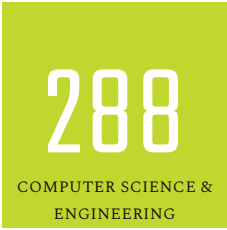
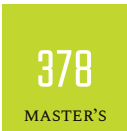
UNDERGRADUATE ENROLLMENT

3,050



GRADUATE ENROLLMENT

586



IN THE MEDIA:

115

Media Hits



45

Internal Hits
(within the University of North Texas)

70

External Hits
(outside the university of North Texas)

38,600,000+ people reached and \$445,000+ in equivalent advertising value (EAV)

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)

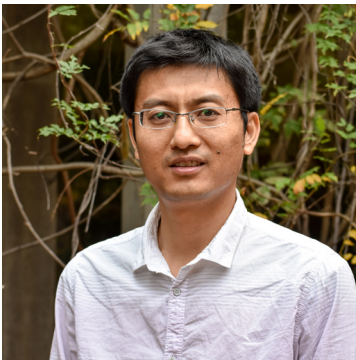
NEW FACULTY



ALOYSIUS ATTAH
ENGINEERING TECHNOLOGY
SENIOR LECTURER



DR. COLLEEN BAILEY
ELECTRICAL ENGINEERING
LECTURER



DR. LINGQIAN CHANG
BIOMEDICAL ENGINEERING
ASSISTANT PROFESSOR



DR. RUSSELL REID
MECHANICAL AND ENERGY
ENGINEERING
ASSISTANT PROFESSOR



DR. HAMID SADAT
MECHANICAL AND ENERGY
ENGINEERING
ASSISTANT PROFESSOR



DR. HECTOR SILLER
ENGINEERING TECHNOLOGY
ASSISTANT PROFESSOR



DR. XUAN GUO
COMPUTER SCIENCE AND ENGINEERING
ASSISTANT PROFESSOR



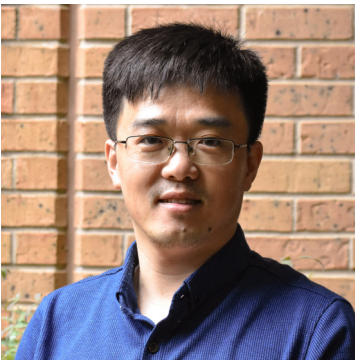
DR. ANUPAMA KAUL
PACCAR DIRECTOR & PROFESSOR
MATERIALS SCIENCE AND ENGINEERING
ELECTRICAL ENGINEERING



DR. IFANA MAHBUB
ELECTRICAL ENGINEERING
ASSISTANT PROFESSOR



DR. HUA SUN
ELECTRICAL ENGINEERING
ASSISTANT PROFESSOR



DR. QING YANG
COMPUTER SCIENCE AND ENGINEERING
ASSISTANT PROFESSOR



DR. YONG YANG
BIOMEDICAL ENGINEERING
ASSOCIATE PROFESSOR



DR. MAURIZIO MANZO
ENGINEERING TECHNOLOGY
ASSISTANT PROFESSOR



DR. KIRILL MOROZOV
COMPUTER SCIENCE AND ENGINEERING
ASSOCIATE PROFESSOR



DR. LOGAN PORTER
BIOMEDICAL ENGINEERING
LECTURER



DR. RICHARD ZHANG
MECHANICAL AND ENERGY
ENGINEERING
ASSISTANT PROFESSOR



DR. XIANGNAN ZHONG
ELECTRICAL ENGINEERING
ASSISTANT PROFESSOR

UNT PARTNERS WITH CHINESE
UNIVERSITY TO OFFER MATERIALS
SCIENCE AND ENGINEERING
TRANSFER PROGRAM

BY COURTNEY TAYLOR

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 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 Jincheng Du, 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 Accreditation Board for Engineering and Technology accredited engineering program at a 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. “With its success, this partnership can be a model for other transfer programs with institutions in China and other countries in the world.”

*University presidents
Guan Tianmin and
Neil Smatresk sign
agreement*



Stephanie Ludi

UNT PROFESSOR 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 to 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 computing, she created curriculum and tools to help them overcome the obstacles. It’s a program that caught the attention of the White House, which recently touted Ludi in a news release stressing the importance of giving every American child the

opportunity to learn computer science.

“Mainstream programs that teach computer science rely heavily on being able to see,” said Ludi. “As part of our work, we have carefully identified web resources and designed the software tools to help these students explore computer science. A lot of it is making things accessible with screen reader software that reads what is on the screen. For the program we’ve been working on that is acknowledged by The White House, we’ve taken a block-based program, called Blockly, and modified it so that visually impaired students can create programs. For example, the program tells the student that they’ve selected a block with the keyboard versus having to see it and pick it up with the mouse.”

Making sure more students have the ability to learn computer science is also a priority for UNT’s College of Engineering Dean Costas Tsatsoulis.

“This year, our computer science program is celebrating its 45th anniversary,” said Tsatsoulis. “We are home to the first computer science department in Texas, and we are proud that in all these years we’ve been able to teach so many people. The program Ludi is working on is one that will let us reach even more students and help us gain even more success stories.”

Ludi offers all her educational tools and curriculum online for free so that they can be used by any student. She believes that with schools starting to have more computer classes, it’s just a matter of time before more teachers will be using them.

“The biggest hope is to have some impact for teachers to present the curriculum in a more inclusive way and to help kids who want to pursue computer science,” said Ludi.

NEWEST VERSION OF ONLINE
GAME COULD CHANGE THE FUTURE
OF ELECTRONICS

BY COURTNEY TAYLOR

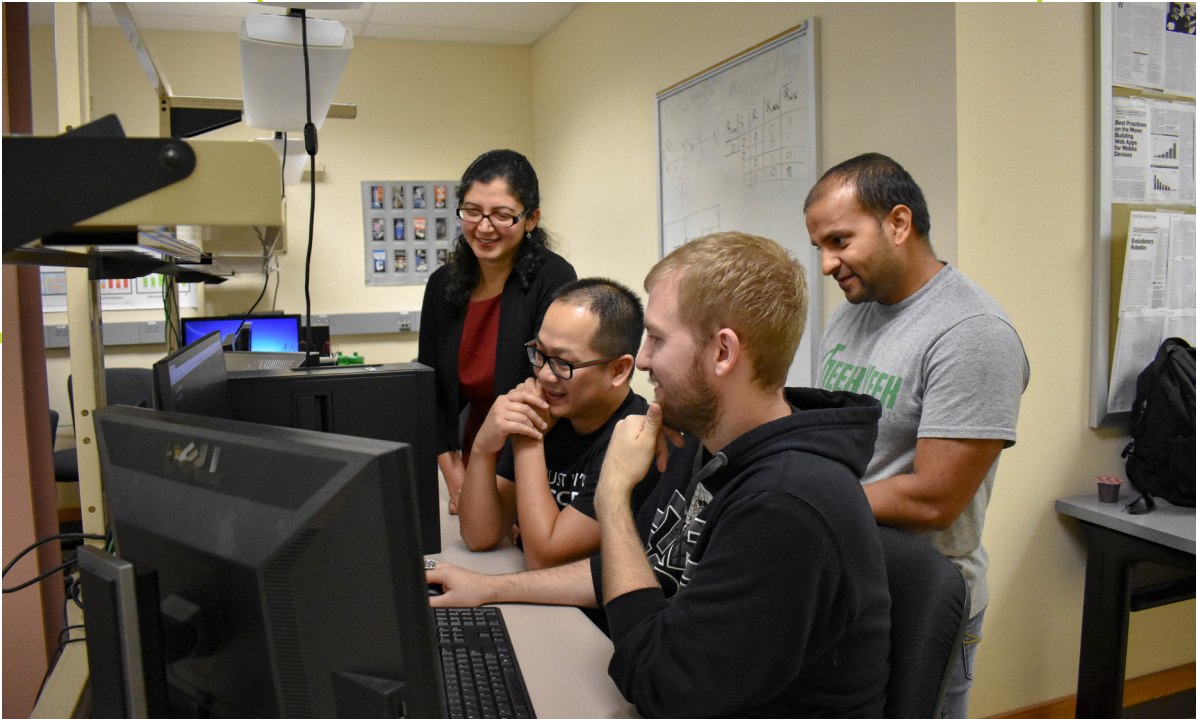
Can an online game help discover fast and effective algorithms that inspire architectural innovation and lead to opportunities for new designs to develop next generation electronic devices? Gayatri Mehta, associate professor of electrical engineering, thinks so – and she, along with a team of students, 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 unlock a series of blocks inlaid 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 in 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



From left to right: Dr. Gayatri Mehta, Loc Huynh, Zachary Simpson, Alok Pal.

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.”

UNT COLLEGE OF ENGINEERING
ADDS COMPUTER SCIENCE
EXECUTIVE MASTER'S DEGREE

UNT’s College of Engineering recently launched a new executive master’s degree in computer science, exclusively offered at the UNT New College at Frisco. The degree, with concentrations in data science and cybersecurity, was designed for working professionals to build upon their expertise and expand their career opportunities in the field of computer science.

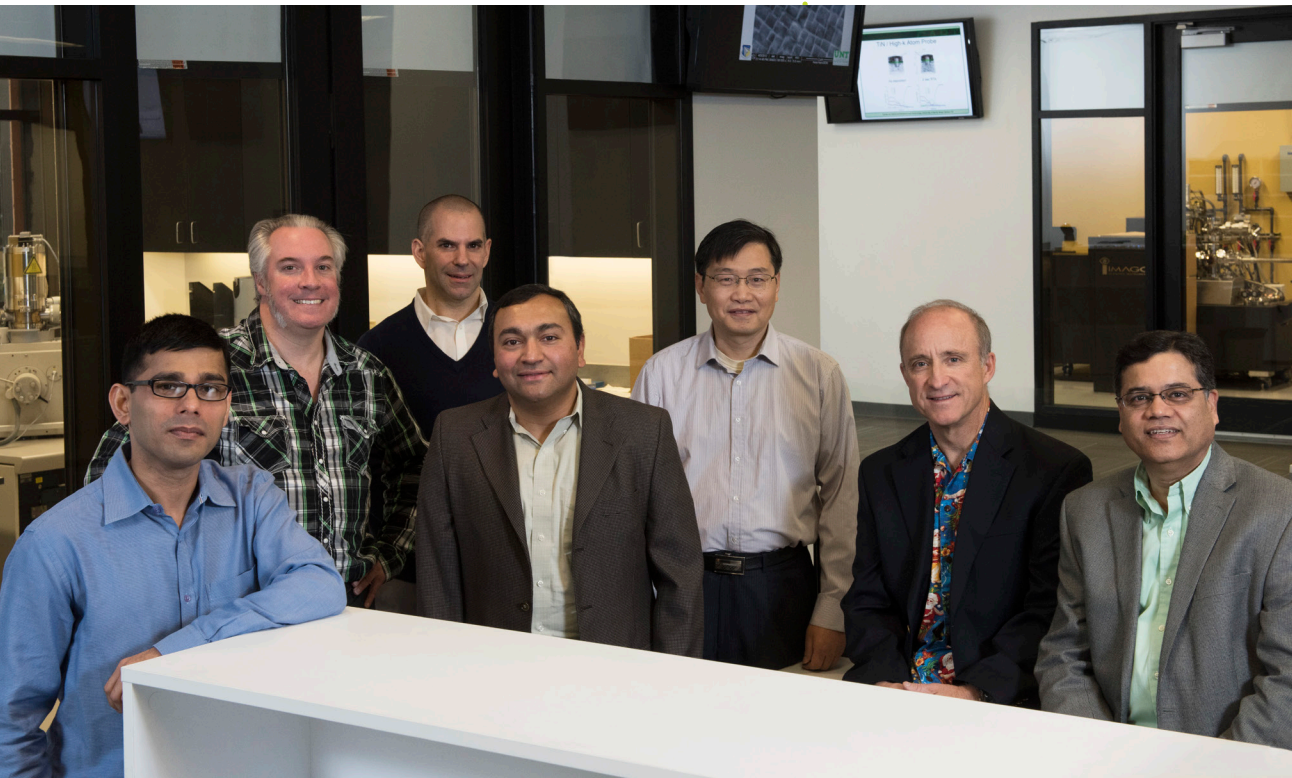
“This unique program allows students to explore and strengthen their skills in the ever-growing worlds of security and data science,” said Barrett Bryant, professor and chair of the Department of Computer Science and Engineering. “As part of this degree program, students also can earn professional certifications or stand-alone professional development credits.”

The program is designed for working professionals with at least two years of experience. Classes are offered in three eight-week sessions during evenings for flexibility. The program’s location at the Frisco off-site facility makes it easily accessible to North Texas professionals, placing it in one of the fastest-growing areas in the country and home to the \$5 Billion Mile.

“We wanted access to this degree to be as convenient as possible,” Bryant said. “We wanted to accommodate busy industry professionals so they can earn a high-quality degree while networking with other students who are experts in the field.”



For more information on the degree
and admission requirements, visit
executivescs.unt.edu



From left to right:
Drs. Sundeep Mukherjee,
Marcus Young, Thomas
Scharf, Raj Banerjee,
Zhenhai Xia, Rick Reidy,
and Rajiv Mishra

UNT INSTITUTE PART OF A \$20 MILLION GRANT TO RESEARCH NEW

WAYS TO KEEP SOLDIERS SAFE

BY TANYA O'NEIL

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 ballistics 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 united 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-tech 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 higher 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.”

BROTHERS JOURNEY FROM JORDAN IN PURSUIT OF PH.D. AT UNT

BY TANYA O'NEIL

It's hard to miss the striking resemblance between Omar and Khaled Almahmoud, but their similarities don't stop on 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 as 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.”

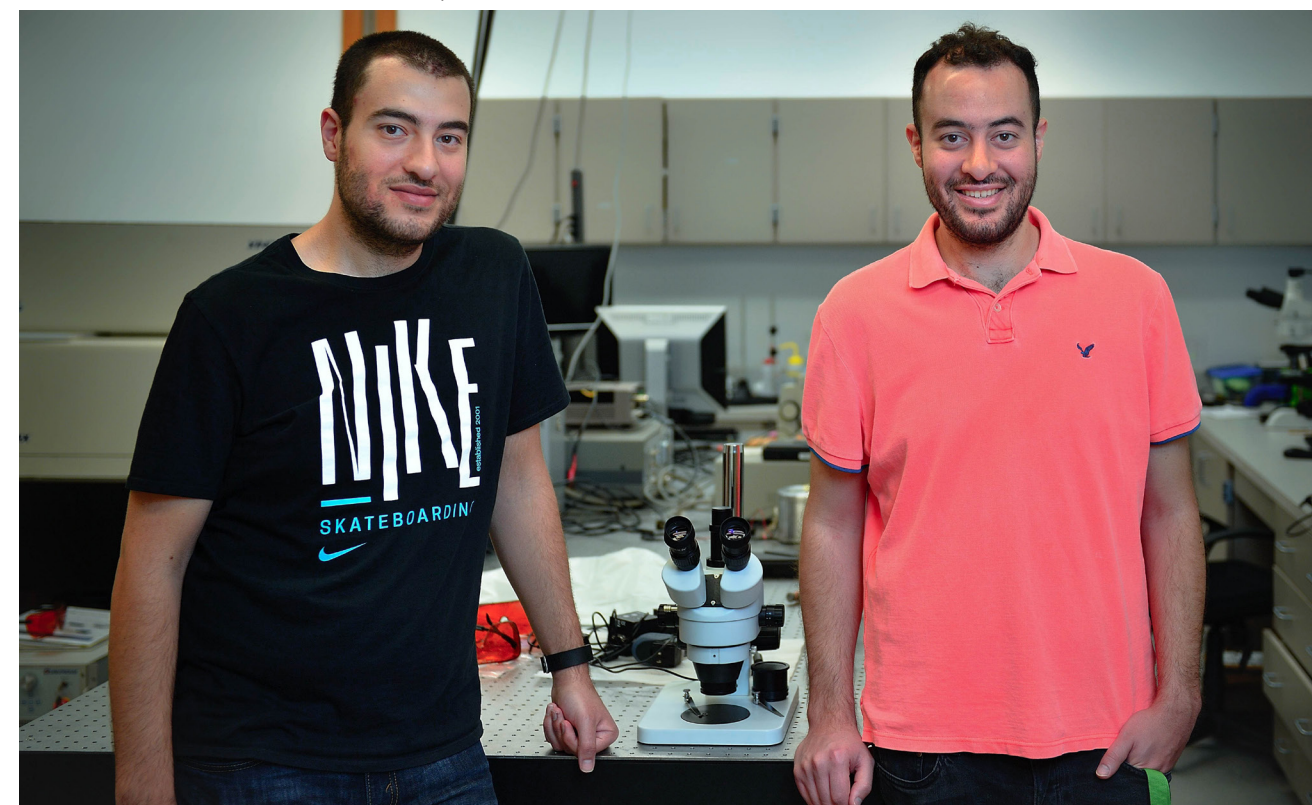
Khaled first started his studies in electrical engineering at German Jordanian University, then like his brother got a master's degree in Los Angeles. He came to UNT in fall 2016 and the brothers were able to take classes together.

“We do lots of brainstorming,” said Khaled. “You can't even imagine. Sometimes I come up with ideas for Omar, and sometimes he initiates 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 messed up and without him saying a word, I knew it,” said Omar. “I couldn't stop laughing and had to apologize to the professor.”

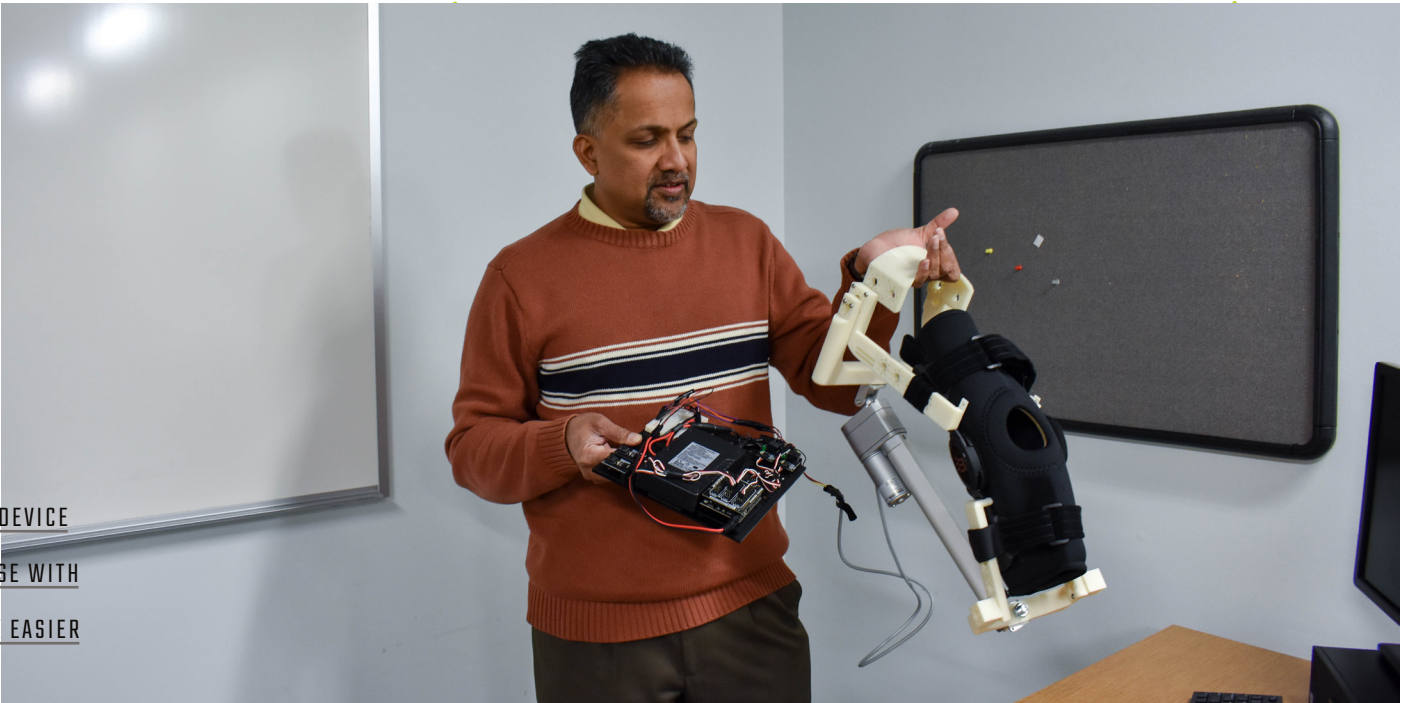
It's not just Omar and Khaled who have a love for engineering. Their father was an engineer back in their home country of Jordan. The brothers say his dream was for all six of his kids to get their doctoral degrees. Their older brother is already a medical doctor. They also have a sister studying medicine,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



Brothers, Omar and
Khaled Almahmoud

UNT STUDENT CREATES DEVICE
AIMED AT HELPING THOSE WITH
ARTHRTIC KNEES WALK EASIER

BY TANYA O'NEIL



Dr. Vijay Vaidyanathan
with Cao's exoskeleton
prototype

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've tried it out myself, and it really works. It's very new, but we now have created a brace that could potentially increase range of motion."

While Cao was studying mechanical engineering, she had an undergraduate degree in biomedical engineering and found a mentor and inspiration in Vijay Vaidyanathan, the founding chair of UNT's Department of Biomedical Engineering.

"Dr. Vaidyanathan's father is elderly and has trouble walking," said Cao. "That was the inspiration behind this exoskeleton idea. There currently isn't one made for the elderly, so, we wanted to create one that was 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."

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

"This is potentially a big picture idea that could work for anyone who could use functional knee help on a day-to-day basis," she said. "We're still in the process of digging deeper to see how we could model something like this into a more concrete form. However, I am excited about what could happen next."

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 Abbott 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 because I was a full-time student," said Cao. "However, Dr. Vaidyanathan had great advice for me. He told me that I'm getting 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."

UNT PROFESSOR CREATES COATING
THAT REDUCES GLASS REFLECTION

BY TANYA O'NEIL

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.

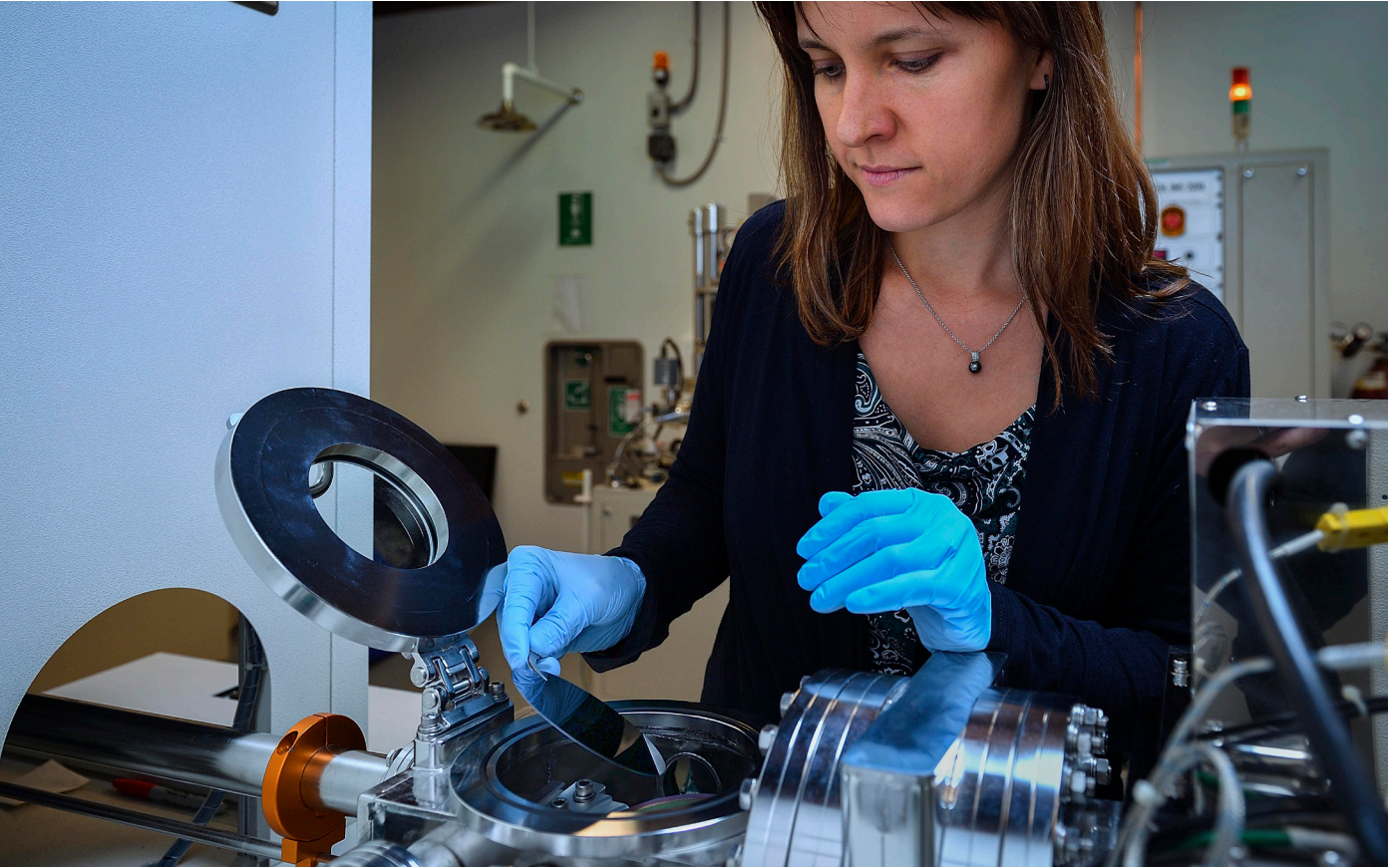
"This could help the everyday person in many ways," said Berman. "For example, when you look at your cellphone outside, it's hard to read because of the light reflection. This could change that. It could also help when you're driving. Think of how the sun's glare on your car windshield can make visibility 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."



Dr. Diana Berman

RAM DANTU NAMED TECH
TITANS AWARD FINALIST

BY COURTNEY TAYLOR

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 Inventor 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 as a whole.

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

Dantu, who has 25 patents with nine more pending, was considered based on

new innovative technologies, including a cellphone and smartwatch 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 pressure and rate for chest compressions, but will connect to the hospital or 9-1-1 center to 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.”

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.



Dr. Ram Dantu

STUDENTS RECEIVE REAL-LIFE
EXPERIENCES IN CAPSTONE COURSE

BY KAYLA GREEN

Students who learn to apply theoretical concepts to practical applications are more likely to succeed in the real world than those who don’t gain the hands-on experience. That’s why in the College of Engineering all undergraduate seniors are required to complete a senior design capstone, known as The Engineer’s Aerie.

The capstone program teaches students about project planning, budgeting, scheduling, analysis, design, fabrication and testing. It also enables students to develop their communication skills through a visual and oral presentation before an audience of peers, faculty, and experts in industry at Design Day, held on the last Friday of April each year.

Last year, 80 percent of the senior design projects in the Department of Mechanical and Energy Engineering were sponsored by industry.

“As their capstone experience, our students yearn for real life projects to apply what they have learned. They spend so much time together their senior year in teams designing and building their own ideas. Many develop lifelong friends. Nothing teaches engineering like a customer with a real project need, and nothing provides a better education than matching students with projects they are passionate about,” said Mark Wasikowski, mechanical and energy engineering clinical associate professor, senior design coordinator and undergraduate advisor. “Personally, it has been a joy to help the students and watch them mature in their engineering career.”

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.



Blake Stewart and Sarah Bundy discuss their project during the Senior Design Day presentations.

One group of students – Sarah Bundy, Brandon Leney, Ryne Spears, Preston Stalter, 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 this option by creating our own simplified version of this robotic drilling system and track,” said Bundy, who focused on the project’s mechanical design.

Stewart, 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 letters 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 sponsor 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 the team 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’s a lot to be learned from people who have been working 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 hole drilling processes and methods. They each had an opportunity to actually drill test plates and install rivets in our training classroom. As a 1987 UNT alumnus, it also provided me an opportunity to give back to the college and maybe spark some student interest in the career of aerospace and manufacturing with Triumph.”

To learn more about sponsoring a capstone project, contact Thomas Derryberry, assistant dean for corporate relations, at tom.derryberry@unt.edu.

MATERIALS RESEARCH FACILITY

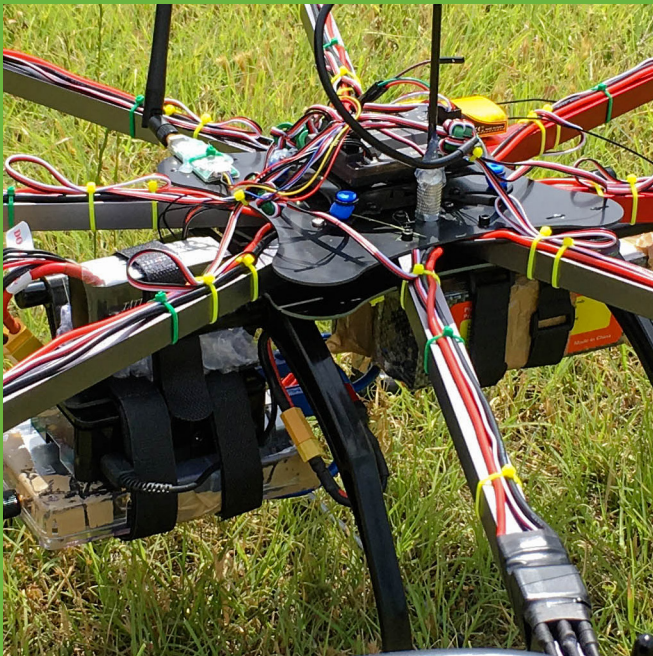


To find out more about the Materials Research Facility and research opportunities, give us a call at [940.369.8106](tel:940.369.8106)

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 micro 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.

FEATURES



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ABOVE

A

VIEW
FROM

VIEW
FROM

ABOVE

How the College of Engineering has taken
flight in drone research.

✍ KAYLA GREEN
TANYA O'NEIL
JULIE PAYNE
COURTNEY TAYLOR

IN ITS 14 YEARS, UNT'S COLLEGE OF ENGINEERING
HAS REALLY TAKEN FLIGHT – AND ESPECIALLY, IN
ITS DRONE RESEARCH.

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 an on-demand emergency communication infrastructure that benefits first responders, control centers and survivors.





WE WANT TO PROVIDE
CONNECTIVITY
WHERE IT IS NEEDED

Even now, Fu continues to partner with the City of Denton and other local communities to test 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, also 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 cellphone 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 Virtual Network Communications, a Virginia-based start-up company that developed Greencell, a portable cellular base station. Greencell can transmit cellular signals at power levels ranging from 250 Milliwatts to 10 Watts.

“By working with Greencell, we were able to test the cellular coverage at 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



More information on this field test can be found in the September 2017 print issue of IEEE Spectrum as “Flying Cell Towers to the Rescue.”

WE WANT THE ABILITY
FOR MULTIPLE DRONES
TO HANDLE ONE MISSION
— DRONES THAT CAN
WORK AS A NETWORK

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 testers with information on assembly, calibration and flight instructions and build central processing units for the drones

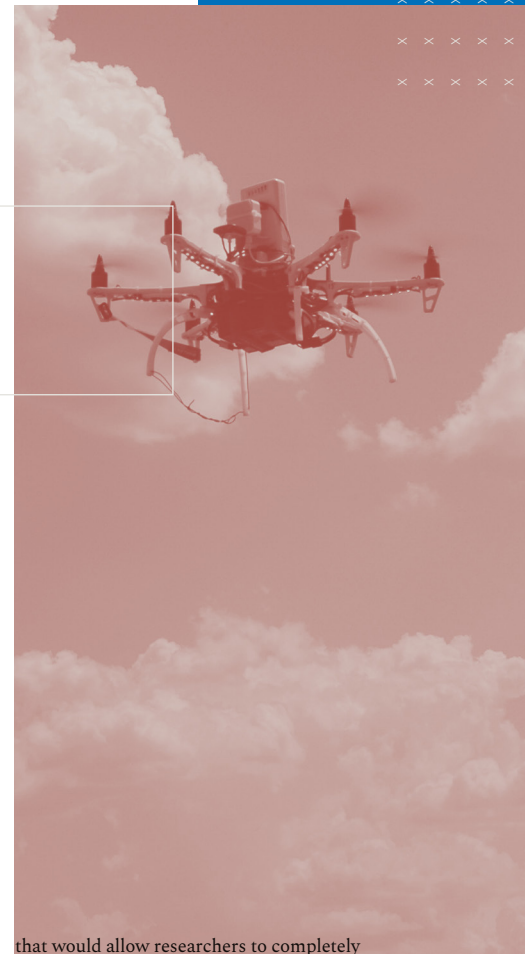
that would allow researchers to completely customize their usage through applications they develop.

“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 testing.

“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 tested 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. ●



UNT Computer Science:

45 Years Of

Changing Lives And Technology

Tanya O'Neil

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 occupation. 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 commuted from work to Den-

ton daily. Sometimes we were even in the computer lab all night."

While his friendship with Rogers grew, the newness 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, we were working with card punches 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 fellow 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 1998, computers were common in homes, but a new technology was emerging.

"The internet wasn't really around when I graduated," said Thurman. "Netscape came 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!'"

It's that kind of excitement for new technology that made Thurman love computer science. However, when he first got to UNT, he had no idea that would be his path.

"I was undeclared for my first two years," he said. "I was planning to go to law school, but I was also interested in engineering. One day, I was talking to a computer science major and he recommended taking the 101 class; after that, I was hooked! I absolutely loved every aspect of it."

While he loved it, college wasn't always easy, yet he says he still had a good time even when it was difficult.

"I had a lot of good teachers," said Thurman. "Don Retzlaff, a retired lecturer, was one of the best. A lot of the coursework is very difficult, so you can't equate it as fun, but he could actually make it fun. I ran into him at Apogee Stadium recently and told him how much impact he made on my life. He stopped me and ran and got his wife so I could tell her. It was so funny!"

After getting his degree, Thurman spent 10 years as a developer/programmer. Now he's the director of Clinical Information Systems for Sonic Healthcare USA. While he's in more of a leadership role than hands-on work these days, he says he still has to keep up with the technology.

"As for computer science, the fundamentals are always the same, but what changes is the framework and additions to the technology," said Thurman. "It's an ever-evolving thing. Today, we

focus more on user experience, we also mine a lot more data, we do more intelligent business and figure out how to let computers help us do things in more effective and efficient ways."

Not only is Thurman keeping up with the ever-changing world of computer science, he's making sure he can help the next generation.

"The thing about my profession is that it is rapidly changing," he said. "The things I learned in college were in a lot of ways theoretical. I serve on a UNT advisory board to help keep them knowing what the industry is using. It's changing just so much."

What has never changed is Thurman's love for computer science.

"I feel so grateful that I've been able to be in computer science for 20 years and that's what my degree is in," he said. "I'm so blessed. If I retired today, I would feel like I accomplished everything I wanted. UNT played a big part in that."

By 2016, UNT was seeing a generation of students who didn't know a world before computers, tablets had taken over and social media had become part of everyday life. That was the year Tyseanah Spell graduated with her computer science degree.

"I honestly don't even remember the first computer we got," said Spell. "I think we had one in my house my entire life. Now, I do remember my first social media account. It was Myspace, and 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 it 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 Pottathuparambil 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. Robin, I had to really study, I couldn't just memorize. He pushed me to actually learn, to work harder."

That hard work paid off. While attending a College of Engineering career fair, she got not one but two job offers before she had even graduated with her undergraduate degree. She decided to accept a position with L3 Technologies in Rockwall.

"I'm really using my degree in this job. I'm a software engineer, and UNT gave me the background I needed," said Spell. "At L3, we modernize planes, and I help with updating them with the latest technology. Our biggest customer is the U.S. government, the military in particular. I work a lot with coding, always trying to make it better 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 broaden her horizons and make friends.

"I learned so much in class," said Spell. "But in those organizations I learned about leadership and resumes 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 others 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 mark 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



ARMY TACTICAL SHELTERS

✍️ Tanya O'Neil



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.

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.



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

"It's pretty cool; it's nice to be on the other side," said Derrick. "We're being helpful, and making it easier to set up in the field. There is nothing worse than getting to a new place, like Iraq, and immediately having to pull a detail like putting together these shelters. If we can create a shelter that is easier to set up and gives soldiers better protection, it will be so helpful for them."

The project began in October 2016 and is expected to last two years. The researchers hope the Army will be able to create all new shelters for their soldiers based on their work.

"We are very good at projects like this, and we are excited that we can help contribute to the Army's needs," said Mukherjee. ●





This year, UNT's Mean Green Racing, the university's Formula SAE racing team, placed 13th at Formula SAE



FORMULA SAE



Lincoln, a four-day competition

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, outranking 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 know and changed only specific things and changed them well," said Kyle McDougal, 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 McDougal. "We were more confident in our car, and we had a team full of people who had been to 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 interpreted 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 McDougal. "They have always sent someone with us to ensure we have the help we need to succeed, and Bobby Grimes has been great to work with each year." ●



UNT COLLEGE OF ENGINEERING

ALUMNA LINDSEY SMITH KNOWS

HOW TO SET A GOAL AND ATTAIN IT.

✍ KAVLA GREEN

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 wanted to do something different, and I thought it’d be really neat to build a rocket, because it was something I’d never done,”

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I want it to be
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a diverse person.

she said. “I didn’t want to just do something normal; I wanted to go big or go home.”

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

“It was 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.

At GE, Smith worked as a supply chain manufacturing engineering intern where she worked with production 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 development 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 turbos, distribution centers 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 rotates into another full-time position at Cummins Inc. ●



UNT’s launch during the
NASA Student Launch
Rocket Competition.



CHRIS MILES

ISN'T YOUR

AVERAGE

ENGINEER.

NOR IS HE

YOUR

AVERAGE

FOOTBALL

PLAYER,

EITHER.

✍️ KAYLA GREEN

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 he 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 foot- ball 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 orga- nizations, 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 some- thing,” 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, 1:50 p.m. pre-practice and tape review, practice, mandatory team dinner at 6:30 p.m., and class or study hall afterwards.

It was a routine that helped him and his team beat Southern Miss last season – a game Miles, number 67, is truly proud of – and helped land the team a spot at the Heart of Dallas Bowl.

“Southern Miss 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.”

BLEEDING GREEN

Both experiences, he said, are what make him bleed UNT green.

“The work I feel like I’ve put in here – I’m proud of it,” said Miles. “With football, I’ve bled, I’ve sweat, I’ve cried. Academically, I feel like I’ve been pushed pretty hard. I’m proud of it; this is my college experience.”

The alumnus, who graduated in May 2017, is now tackling his MBA at UNT and also plans to continue playing ball.

“I still have two years of eligibility, so I’m still going to play while I get my MBA,” he said. “I figured my MBA would make me more competitive in the job market for leadership and management posi- tions, and I still get the opportunity to play Mean Green football.” ●

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WHY GIVE?

A gift to UNT is transformational—for our students, our faculty and our potential.

Your support for UNT empowers the best and brightest students, supports faculty in teaching and research, transforms campus and helps strengthen our educational and community partnerships.

Every gift is useful to us. Even a small gift will help. Our hope is that our UNT Engineering alumni will become regular donors who give back to the university. Each year, many of our alumni work for companies with an “employee matching gift benefit.” But, research shows that only about one-third of employees with this benefit, who make a charitable gift, will actually complete the paperwork or online application for the company to make a matching gift. If your company is eligible, request a matching gift form from your employer, and send it completed and signed with your gift. We will do the rest. The impact of your gift to this organization could be doubled or possibly tripled!

We thank you for your support and generous contributions to UNT’s College of Engineering. For more information about giving to the college, please contact Angus McColl, director of development, at angus.mccoll@unt.edu or call (940) 565-2180.

THE COLLEGE OF ENGINEERING THANKS THE FOLLOWING FOR THEIR GENEROUS CONTRIBUTIONS

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