2025

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UND ENGINEERING

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& Terry and Diane Severson Endowed
Professor of National Security
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UND ENGINEERING is published by the College of Engineering & Mines at the University of North Dakota. Please send comments and address changes to **Deb Austreng** at debra.austreng@UND.edu or call 701.777.4249.

COVER: Inside the Mark & Claudia Thompson National Security Corridor, students work inside the Anechoic Test Chamber, an integral part of the college's space and satellite development activities. Photo by Shawna Schill.

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Visit blogs.UND.edu/cem for the latest news and updates from the College of Engineering & Mines.

LETTER FROM **THE DEAN**

Dear Alumni and Friends,

The College of Engineering and Mines is in the midst of an exciting period of transformation and growth. In December, we bid a fond farewell to our former dean, Dr. Brian Tande, who accepted the role of President at the South Dakota School of Mines and Technology. We are incredibly grateful for his visionary leadership and wish him continued success in this new chapter.

In January 2025, I was honored to step into the role of Interim Dean, and I am pleased to share that I have now been selected to continue in this role for the coming years. It is a privilege to lead such a dynamic college, filled with talented students, dedicated colleagues, and forward-thinking partners. Prior to this appointment, I served as the Associate Dean for National Security, Director of the School of Electrical Engineering and Computer Science, and Grand Challenge Lead for Computational and Data Research.

The momentum across the college is strong. Our new Bachelor's degree program in Aerospace Engineering, launched in Fall 2023 in partnership with the John D. Odegard School of Aerospace Sciences, has exceeded all expectations with rapid enrollment growth. This trend mirrors a broader surge in student interest and enrollment across our entire college.

In support of this growth, we are moving full speed ahead with planning and preparation for the new STEM complex. This state-of-the-art facility will be built on the site of the Hyslop Sports Center, adjacent to the Columbia Road Overpass. The North Dakota legislature has committed $57.4 million for Phase I of the project, matched by a $25 million private fundraising goal. Just this spring, the legislature authorized an additional $55.6 million for Phase II, with another $25 million needed in private support.

Phase I architectural design is nearing completion, with construction anticipated to begin in Fall 2025 and a grand opening projected for 2027. This new facility will include dedicated spaces for student success services, a vibrant MakerSpace, and a showcase area for student club projects. It will also feature teaching laboratories for Chemical and Mechanical Engineering, and specialized research spaces in hypersonic vehicles, machine vision, advanced materials, and robotics.

We were also proud to celebrate the grand opening of the Mark and Claudia Thompson National Security Corridor in Fall 2024. Located on the first floor of Harrington Hall, this cutting-edge facility includes labs for digital engineering and satellite development. The satellite lab is fully equipped to support the design, construction, and testing of Low Earth Orbit satellites, and has already attracted grant support from major space agencies. It also serves as home to our new interdisciplinary CubeSat Club, offering hands-on opportunities for students in all majors. These initiatives position us to support key national projects, including the recently announced "Golden Dome" effort and ongoing work with the Space Development Agency at Grand Forks Air Force Base.

Our commitment to research continues to expand. Over the past year, we have launched five new research centers:

- The Center for Process Engineering Research
- The Center for Artificial Intelligence Research
- The Center for Cybersecurity Research
- The Center for Materials and Manufacturing
- The Center for Water Research

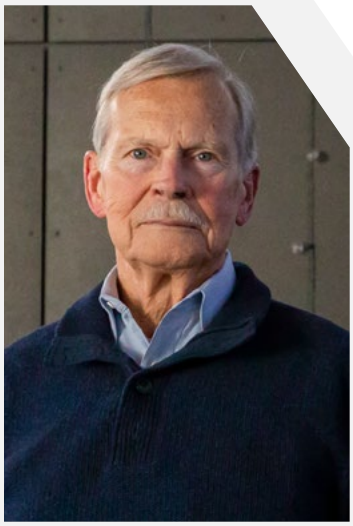
We also remain proud partners in the new interdisciplinary Center for Engineering Education Research, housed in the College of Education and Human Development. These centers are helping fuel the university's recent advancement to Carnegie R1 status—the highest designation for research universities in the nation.

Thank you for your continued support and connection to the College of Engineering and Mines. Together, we are building a future of innovation, impact, and excellence.

Warm regards,

Ryan Adams, Ph.D.
Dean, College of Engineering & Mines
University of North Dakota

MESSAGE FROM THE BOARD



Terry Severson

Terry Severson is the Chairman of the College of Engineering & Mines Executive Board. He is Founding Partner, former President, now Senior Advisor of Trace Systems Inc. Terry brings 60 years of industry and military experience, ranging from on-the-ground field support to command and corporate-level leadership.

Steve Burian

Steve Burian is the Board Vice Chairman of the College of Engineering & Mines Executive Board. He is the President & CEO of the civil engineering consulting company Burian & Associates. He brings 30+ years of industry and leadership experience to the CEM Executive Board.

The momentum for our College of Engineering & Mines continued to build over the last year. CEM is now UND's largest college, as well as the largest engineering college in N.D.; a new STEM Facility will be built; the National Security Corridor is open and garnering national attention; Aerospace Engineering is the fastest growing program at UND; and appropriately, UND achieved Carnegie Classification R1: Very High Research ranking.

Best wishes to our former Dean, now President Brian Tande of SD School of Mines & Technology—that transition happened in a hurry. More importantly, thanks to Dean Ryan Adams for keeping the CEM momentum going and laying out new initiatives.

CEM Fall 2024 enrollment was 2670 total undergrad and grad—a record. That's not a fluke—CEM has had continued steady growth for 5 years, and the projections for Fall 2025 (based on applications and deposits) are for an even larger enrollment. Aerospace Engineering, a collaborative program with Aerospace, had 154 students last fall, its 2nd year, with continued rapid growth projected.

One technique to recruit students is an increasingly active CEM competitive robotics outreach program. These competitions are highly popular with STEM-oriented students and their parents from grade through high school. CEM supports the events with a UND-branded trailer, trappings and highly experienced organization. Notably, UND will sponsor and support a signature event at the Mall of America in Bloomington early this August, which is expected to attract 120 teams (~1,000 students) from across the U.S. and Canada. Anecdotally, CEM professors say that many of their top students are former robotics participants.

The newly completed National Security Corridor in Harrington Hall has already drawn a number of ranking U.S. Air Force and Space Force leaders who were impressed with its satellite development and high-end digital engineering infrastructure and capabilities. A bi-static radar for satellite and space debris tracking is in the works. The collaborative CEM and Aerospace, plus the commercial Grand Sky, along with N.D. National Guard create a technical and testing ecosystem that offers significant UAS and counter-UAS development and testing capabilities to Department of Defense (DoD)—a top priority.

The N.D. Legislature this spring approved Phase 2 of the STEM Complex—UND's No. 1 facility priority this year. That means that CEM and Arts & Sciences (A&S) will soon have a new $162M complex on the current site of the Hyslop Sports Center to support our growing programs and capabilities. Phase 1 groundbreaking is tentatively scheduled for this fall with completion for the fall of 2027. Phase 2 is in planning stages. As a result, CEM will have a first-class infrastructure to appropriately support and sustain its programs.

If it's been more than two or three years since you've visited campus, you'd be blown away by the very positive changes that have taken place within CEM, as well as across UND. If you have the chance, schedule a visit to see first-hand what all has changed or been added or replaced, and maybe add a visit with some CEM students to pass on your experiences as a CEM grad.

RYAN ADAMS NAMED DEAN

Ryan Adams, Terry and Diane Severson Endowed Professor of National Security and associate dean of National Security, has accepted the position as dean for the College of Engineering & Mines.

Adams has served as interim dean for the College of Engineering & Mines since January and as the associate dean for National Security since 2022. During his time as associate dean, Adams established and executed the vision for national security research in the College. In coordination with UND's Division of Research & Economic Development, Adams has been instrumental in bolstering funding and research outcomes in areas related to national security, including funding from the U.S. Department of Defense and the Test Resource Management Center.

During his time at UND, Adams has served as a Grand Challenge Champion for Data & Computational Research, managing central high performance computing resources on campus and recruiting new faculty and staff to strengthen computational research in support of all application areas. Adams also served as the director of the School of Electrical Engineering & Computer Science, where he helped increase enrollment, establish a new doctoral degree in Computer Science and oversaw changes to doctoral and master's programs in the School. As director, he also helped with the successful accreditation of both the Electrical Engineering and Computer Science programs by the Accreditation Board for Engineering and Technology.

Adams received his doctorate in Electrical Engineering at the University of Idaho. He held academic appointments at the University of North Carolina at Charlotte as an assistant and associate professor before coming to UND as a professor of Electrical Engineering in 2019. Before academia, he served as a program manager and development engineer for the U.S. Air Force Space and Missile Systems Center. Adams also served his country as an active-duty member of the Air Force as an aircraft maintenance technician.

Adams' research interests include electromagnetic wave propagation in complex media, including ferrites, metamaterials and chiral media; antenna design for both cellular and medical applications; and numerical schemes for the simulation of wave propagation in a variety of scenarios.

Dean Brian Tande is now president of South Dakota School of Mines & Technology

In December, Brian Tande accepted the presidency of South Dakota School of Mines & Technology in Rapid City.

"There is no greater honor than to have the opportunity to lead an institution of higher learning, and Brian Tande is going to be an incredible president for South Dakota Mines," said UND President Armacost. "I am so proud of him and know that he'll bring the spirit of UND with him to Rapid City."

"Dean Brian Tande has been an extraordinary leader of the College of Engineering & Mines here at the University of North Dakota, and I am sure he will be a very effective and successful leader of South Dakota Mines," said Eric Link, UND vice president for academic affairs and provost. "Here at UND, Dean Tande's innovative and entrepreneurial approach to leadership has resulted in significant enrollment and research growth for CEM. He is a leader with vision and a strategic thinker. We will miss him here at UND, but we also know that South Dakota Mines is getting a great president ready to lead that institution forward."

"UND has been a big part of my life for over 17 years," Tande said. "It has given me countless opportunities to grow and develop as a teacher, researcher, and leader. I will be forever grateful to this great institution. I'm thankful for all who have mentored me over the years and for all the faculty, staff, and students with whom I have had the privilege of working."

UND HOLDS GRAND OPENING FOR MARK & CLAUDIA THOMPSON NATIONAL SECURITY CORRIDOR

Labs and classrooms, housed in renovated Harrington Hall, will provide hands-on training in fields vital to national security

Campus officials, state legislators and community members gathered at a renovated Harrington Hall to celebrate the opening of a facility designed to boost UND's role in securing the homeland.

Named the Mark & Claudia Thompson National Security Corridor, the newly constructed space honors the support of the husband-and-wife alumni, whose generosity helped establish endowed faculty positions in national security.

The corridor will house laboratories and classrooms to facilitate work on initiatives such as satellite testing and design, quantum computing, cryptography and unmanned aircraft systems – all vital to the nation's security.

The event has been years in the making, UND President Andy Armacost said. He recalled addressing "one of our local philanthropic charitable organizations" in 2021, where he outlined his vision that has now become reality.

"There were 13 members there, one of whom was a member of the press," Armacost said. "I uttered something at that meeting in response to the question 'what's your grand vision for the university?' I said something like the following. 'I have a vision for the University of North Dakota to one day design, build, test, launch and fly satellites from Grand Forks.'"

Armacost's statement – which later appeared in the Grand Forks Herald – gained traction among lawmakers.

It was kind of an infinity and beyond moment," he added. "It caught the attention of some legislators – not just locally but also around the state. Thus began some great momentum to gain the support of the vision of how UND can support national security interests, and to have our faculty and students doing amazing things for our state and nation."

In his opening remarks, Brian Tande, dean of the College of Engineering and Mines, praised the support of the North Dakota Legislature – of which several members representing the Grand Forks region were in attendance – alumni and community partners for their role in establishing the corridor.

"Those connections are really what make this special," Tande said. "I don't think we see that level of collaboration between a university, city, county, military and our congressional delegation like we see here in Grand Forks."

As referenced by Armacost, the Legislature has been steadfast in its support of UND's national security initiative, appropriating $14 million for the corridor's construction during the 2021-23 biennium.

Mark Thompson, who graduated from UND with a degree in mechanical engineering and served in the U.S. Air Force, said staying on top of technological developments is imperative for the nation to maintain its position of strength.

"We live in the greatest nation on the face of the earth," he said. "But we have an obligation to keep it that way. We know that the only way that we're going to keep it the greatest nation on earth is to be more technologically advanced than the people who do not cherish the way we live our lives. This is a place that is going to encourage experimentation and growth. All this technology is going to help save lives of people in this country."

"We always knew that we wanted to do something that would make a difference, but it had to be exactly the right thing," added Claudia Thompson. "We can't do the things you're doing here ourselves, but we can help support it and are blessed to be able to do that."

Rep. Mark Sanford, whose District 17 represents the southeast portion of Grand Forks, spoke at the event. A retired educator and school administrator, who Armacost called "an incredible supporter of higher education across the state," Sanford said the new facility will benefit the state from a workforce development standpoint.

“It’s been a delight to be able to listen to the UND folks when they come in and present their requests,” he said. “This is really good stuff for North Dakota. Not only from the standpoint of selling our state, but also bringing business and industry.”

Ryan Adams, associate dean of national security concurred, stating that students are enthusiastic about the prospect of partnering with entities such as the Space Development Agency. The agency recently announced an educational partnership agreement with UND, which will allow SDA personnel to utilize newly constructed lab space and instruct students.

“The most important piece that I want you to try and envision, is the students who will come through here,” Adams said. “We had a kick-off meeting for our first satellite development club three weeks ago – we have almost 25 students in that club now — and I got several emails this morning from more students who want to build satellites. They’re absolutely excited.”

Attendees were also able to tour UND’s Nanofoundry, housed in the university’s Tech Accelerator. The Nanofoundry and its equipment will employ a process called molecular beam epitaxy, to forge thin films of vanadium nitride, and other transition metals.

According to Nuri Oncel, professor of physics & astrophysics and the Nanofoundry’s director, transition metal nitrides are used for a host of applications vital to national security, including cryptography, intelligence gathering and secure communications.

Written by Joe Banish // UND Today

[1] From left to right: Dean Brian Tande, Grand Forks Mayor Brandon Bochenski, Mark Thompson, Ryan Adams, Claudia Thompson, Rep. Mark Sanford and UND President Andy Armacost cut a ribbon inaugurating the new state-of-the-art facilities on campus. Photo by Joe Banish/UND Today. [2] Mark and Claudia Thompson joined alongside their family. [3] Rep. Mark Sanford speaks to grand opening guests. [4] One of many honored visits to the college, Headquarters U.S. Air Force representatives Lt Gen Adrian Spain (Deputy Chief of Staff for Operations, Lt Gen David Tabor (Deputy Chief of Staff for Plans and Programs) and others tour the Mark & Claudia Thompson National Security Corridor.

SENIOR DESIGN EXPO 2025: HANDS ON, HAVING FUN

At UND, work on applied engineering projects can start in freshman year

From independent student research to industry-sponsored research, student engineering projects were on display in the Memorial Union Ballroom on April 29, at the College of Engineering & Mines annual Senior Design Expo.

The Expo is when students distill their research projects down into one poster, then stand ready to explain to everyone from casual viewers to industry experts exactly what they are doing, and why. Dozens of research projects were on display that Tuesday, in an event that Dean Ryan Adams said allows students practice their presentation skills.

And that practice also happens to give students a glimpse into the life of a working engineer.

"It gives our students a chance to practice what they've learned, not just the technical but their presentation skills," Adams told UND Today about the event. "It's nice to see them see themselves as engineers."

In his introductory remarks, Adams said he is grateful for all the hard work put in by the students, faculty and staff, and that they should be ready to speak about their projects, but still "have fun" with the day.

"It's my pleasure to kick this event off, although you the students have done all of the hard work," he said. "I really appreciate all you've done this year and am grateful for all the dedication you put into it. I'm also grateful for the dedication of your instructors and the staff members, and everyone else involved."

This year's winners

First Place Prototype: NASA Lunabotics. Mechanical Engineering team members included Gunnar Anderson, Cole Graner, Kevin Jean-Baptiste, Michael Nordstrom, Dillon Schulz and Jacob Warrick. On the Electrical Engineering side of the team were Lucy Bevelacqua, Garrett Manley, Keith Harris, Zach Hilber and Samuel Alness.

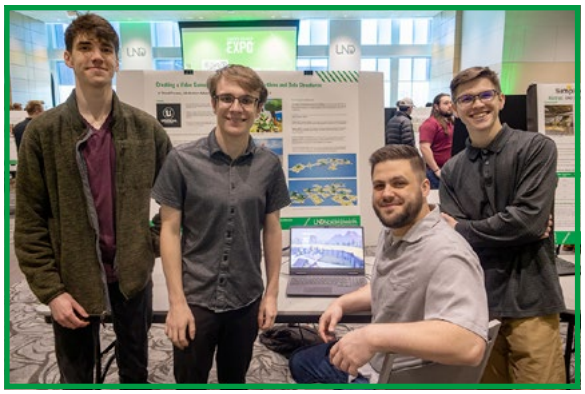
First Place Research/Process: Sugar Beet Refining. Chemical Engineering team members included Daniel Poynter, Erin Becker and Casey Michelsen.

Event sponsors

Sponsors at this year's CEM Expo included AE2S, Air Force Research Lab, Altru Health System, Barr Engineering, Burian & Associates, BTD Manufacturing, Fruitful, Hess, J.R. Simplot, John Deere, Marvin Windows, MindMend Biotech, North Dakota Department of Transportation, Retrax, RJ Energy Solutions and Steffes.

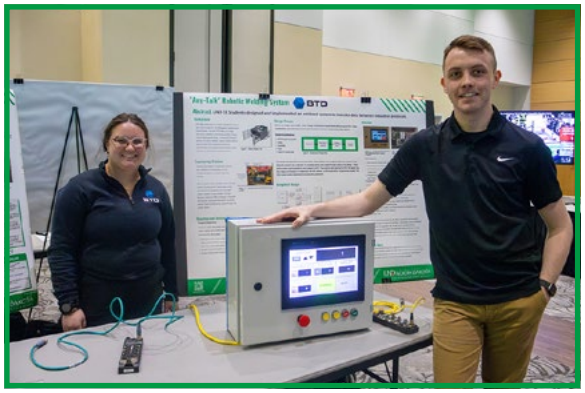
[Excerpt]

Written by Adam Kurtz // UND Today



Computer science students build a procedurally generated video game from scratch

For a group of senior computer science students, the final boss wasn't just a giant in-game monster; it was their senior design project. The objective? To build an entire video game from the ground up that was not only fun and playable but procedurally generated — meaning that the game is different every time you press start. (Spoiler alert: They beat the boss.)



Mechanical and electrical engineering students teach machines to speak the same language

As technology evolves, the barrier of communication between newer and older mechatronics systems increasingly becomes more of a headache — and a costly one. To weld their communication divide, BTD Manufacturing sponsored a cross-disciplinary team of UND students to design and build a working solution for their welding machines.

Biomedical engineering students design smart mattress pad to combat pressure ulcers

For a team of senior biomedical engineering students at the University of North Dakota, solving a problem wasn't just about innovation — but empathy. Their senior design project, titled "Smart Reusable Multisensor Monitor for Pressure Ulcers," targets a common and painful issue among individuals with limited mobility: pressure ulcers.

Chemical engineering students build a blueprint for world-scale indigo production

As global demand for denim rises and major production plants restructure or shutter operations, a team of students set out to design a large-scale solution. Their senior design project challenged them to create a commercially viable indigo production plant, minimizing environmental impact and prioritizing safety and health.

From innovative to extraordinary

Scan the QR code or visit **blogs.UND.edu/cem** to explore these featured projects and more.

Other student projects are featured on pages 14, 16, 18, 26 and 39.

SPACE FORCE GENERAL, SPACE LEADER TOUR 'MIRACLE HOUSE': UND

In tandem with Sen. Kevin Cramer, Space Force Gen. Michael Guetlein and Space Development Agency Director Derek Tournear praise UND's capabilities

A pair of senior space leaders and one of North Dakota's U.S. senators visited UND in April, making introductions, learning about research capabilities and discussing an upcoming agreement that will provide many opportunities for both the federal government and the University.

The space leaders were Gen. Michael Guetlein, vice chief of Space Operations for the U.S. Space Force, and Derek Tournear, director of the U.S. Space Development Agency. They spent the afternoon visiting Grand Forks at the behest of Sen. Kevin Cramer, as well as touring UND's Mark & Claudia Thompson National Security Corridor and John D. Odegard School of Aerospace Sciences.

It was an opportunity, Cramer said, to bring academic, federal and military leaders together for a proverbial handshake, so they can better work together to make strides in the ever-evolving field of space development.

"My job is really easy," Cramer said. "I just introduce my friends to my other friends, and they do things together that make a huge difference — not just for this University, not just for the United States of America, but for the security of the world."

The tour got underway in the National Security Corridor, where Ryan Adams, dean of the College of Engineering & Mines, showcased labs surrounding satellite design and control, and much more.

Adams also made sure to touch on other ongoing research projects, such as that of Hallie Chelmo, assistant professor of Mechanical Engineering, who is researching the impact of ice crystals on hypersonic vehicles — think space shuttles and beyond.

He also noted that his college is gaining momentum, as leaders there are working to hire additional faculty members to accommodate continued growth in enrollment. In addition, the expected completion of the STEM Complex in a few years will only add to UND's research and teaching capabilities, the latter of which means UND can supply more graduates to take up roles in technical fields.

Guetlein recognized the importance of workforce development.

“There’s a huge demand for engineers — STEM engineers — in space,” he said. “Every one of these students can have a job wherever they want.”

Next, the group moved to UND’s Aerospace facilities, for a comprehensive tour led by Robert Kraus, dean of Aerospace.

All of this led Tournear to say, at a faculty roundtable discussion following the tour:

‘This is not a university; this is like a miracle house, because of what you’ve done from 2020,’ the year that Tournear made his first visit to the region with Cramer.

“In that same time frame, you guys have stood up a completely new field of study (aerospace engineering) and have grown a completely new area of doing academic research, and you’ve built out a facility in the same time it took us to build our facility.”

Then came the announcement of a pending educational partnership agreement between UND and the Space Development Agency. Tournear cautioned that the “ink has not been put on the paper yet,” but he indicated that signing could come soon.

That partnership, he said, will allow for multiple opportunities for the agency and the University, including:

- UND faculty will be able to go on sabbatical and work at the SDA, gain valuable experience and knowledge and then bring it back to the classroom.
- Students will be able to pursue multiple internship opportunities with the agency.
- And SDA personnel will be able to serve as UND faculty members and thus share their expertise.

At a press conference following the roundtable, UND President Andy Armacost recognized the momentum happening across campus. Armacost also recognized the “great sponsorship” of Cramer and Tournear, as well as the many positive forces that are benefiting UND faculty members and leadership.

Together, Armacost said, those leaders are working to take full advantage of “the great capabilities that the University of North Dakota can bring to elements of national security and the space enterprise.”

[Excerpt]

Written by Adam Kurtz // UND Today

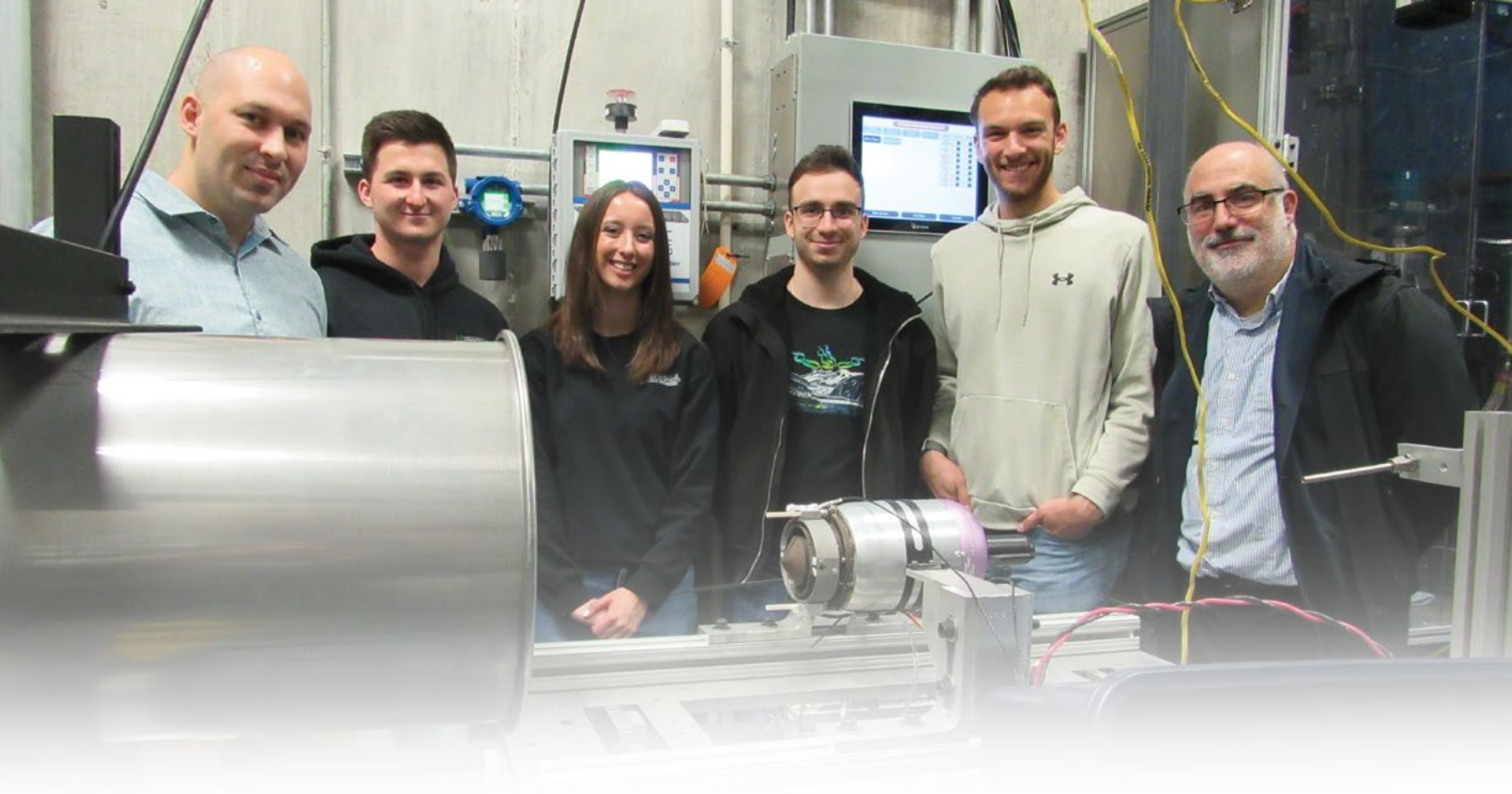
GRAD SPOTLIGHT: MOLLY RAYHORN

2025 Grand Challenge Scholar

Meet Molly Rayhorn, an electrical engineering major from New England, North Dakota, whose journey at the University of North Dakota is proof that success starts with stepping outside your comfort zone. After transferring to UND, Molly made it her mission to get involved, try new things, and make meaningful connections — and it paid off in more ways than one.

From Engineers Without Borders, the Society of Women Engineers, building a solar battery charger for her senior design project, to mentoring Girl Scouts through STEM activities, Molly’s story is all about finding purpose, pride, and possibility at UND.

Scan the QR code to listen to Molly’s story!



UND STUDENT-DRIVEN INNOVATION TAKES OFF WITH THE U.S. AIR FORCE

In the U.S. Air Force's Aerospace Propulsion Outreach Program, UND students enthusiastically embrace new challenges

Innovation is a core skill for UND's engineering students, but it's not every day they get to create new technology for the U.S. Air Force.

For a team of mechanical engineering students, it was a unique and new opportunity to reimagine jet engine technology.

The University of North Dakota was recently invited to participate in the U.S. Air Force's prestigious Aerospace Propulsion Outreach Program (APOP), joining a select group of top-tier engineering schools nationwide.

APOP is more than just a capstone project. Backed by the Air Force and facilitated by the Air Force Research Laboratory (AFRL), the program funds university student teams to explore cutting-edge engine design, giving them the chance to engineer real-world innovations and receive feedback directly from top Air Force scientists.

Small engine, big challenges

This year's challenge? To design and build a variable thrust system for a Jetcat P100-RX — a compact turbine engine about the size of a football.

If that doesn't sound staggering to you, consider this: variable thrust systems exist for the large engines you would see on a jet plane, but when it comes to scaling down that technology…it just doesn't work.

"There weren't any existing blueprints or guides — we had to invent a solution from scratch," said senior Jaydn Affolter, one of the team members. "Scaling things down caused all kinds of problems, so we had to rethink and redesign everything."

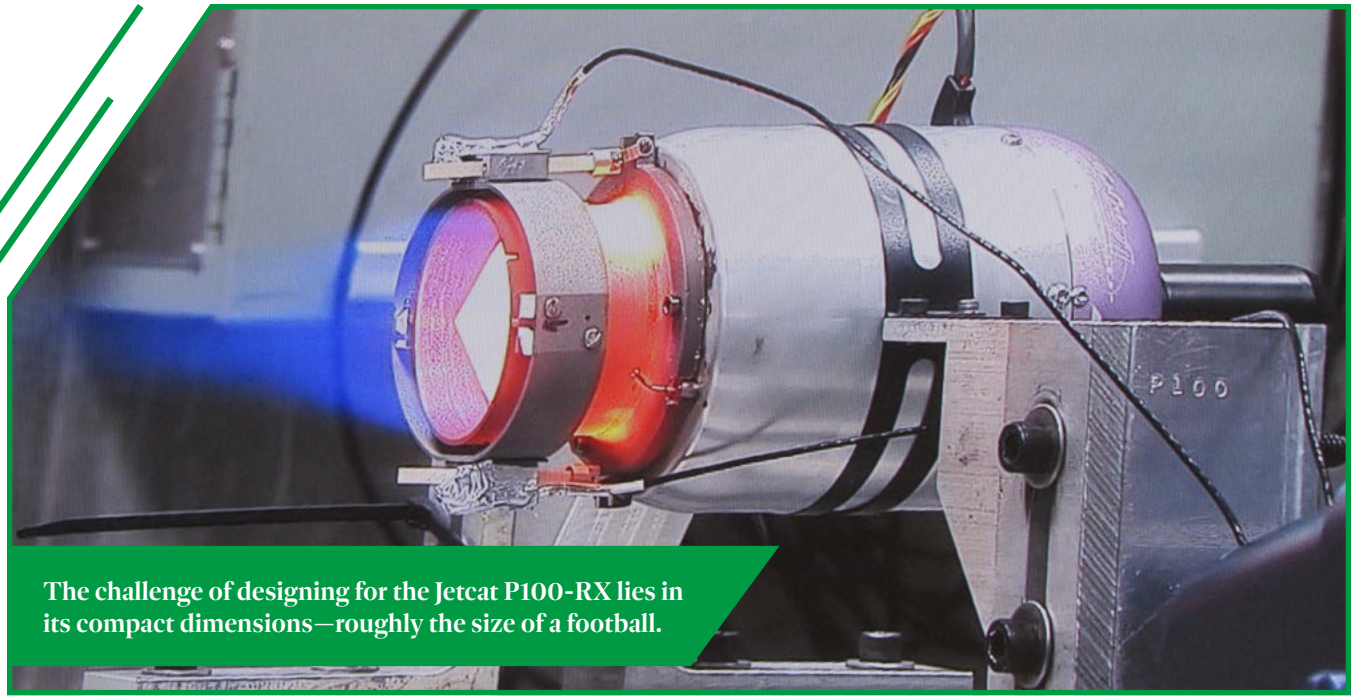
UND students embraced the challenge — and the opportunity.

"It was a pretty new experience. We've done design and manufacturing work in class before, but this was next-level."

There was an additional challenge for the UND team: the college's first APOP project, the team had to design and create their own workstations and testing setup before they could even begin testing and modifying their engine.

"Almost all of the other schools involved in this project have previously competed, so we started off with a disadvantage," stated Jaydn. "Luckily, we have a great team and were able to quickly design and construct our testing setup and obtain all of the necessary equipment."

In the fall, the team built a custom test stand to house their engine, a piece of equipment that will benefit future UND projects as well. The test stand allows them to safely run the engine while



The challenge of designing for the Jetcat P100-RX lies in its compact dimensions—roughly the size of a football.

collecting key performance data like RPM, thrust, and temperature.

Like other senior design projects, they ran into other challenges along the way. "This project really exemplified the difficulties of engineering projects outside of the actual design," said team member Rob Weakly. "Things such as lead times for parts, scheduling, meeting deadlines, project funding and more were challenging aspects to work with that gave valuable experience for the real world."

"The biggest lesson I learned from this project was the importance of constant and clear communication when working virtually with other individuals," said team member Katherine Kempel. "Our team was made up of both on-campus and distance students…as more and more 'real world' jobs transition to hybrid positions, I think that this experience will only become more relevant."

An unmatched opportunity

"This kind of hands-on experience is invaluable," said Dr. Carson Running, the team's faculty advisor. "Students aren't just learning theory — they're building, testing, solving problems in real-time, and directly engaging with the purpose and mission of the Air Force."

The program's arrival at UND was no accident. Dr. Running, who previously advised an APOP team at the University of Dayton, helped bring it to Grand Forks. He made the case that UND — home to a new Aerospace Engineering degree, reputable for national security initiatives, and a prime location near an Air Force base — was the perfect fit.

The payoff? UND students found themselves at the heart of an elite program culminating in a national showcase at Wright-Patterson Air Force Base in Ohio. The team presented their engine modification to top engineers and researchers there, comparing results with those of other schools and demonstrating their accomplishments.

"This is the kind of challenge that launches careers," Dr. Running said. "These students stand out because they've already done the kind of work many engineers don't get to touch until they're well into their profession."

And the students were grateful for the opportunity. "The support from others was also a huge factor for our success," said Jaydn. "Our team was awesome and we had some bright minds working on this project, but our faculty advisors helped us tremendously. We can't thank Dr. Running, Dr. Fernandez-Tous and Mr. Steinhaur enough for their wonderful guidance and support."

"I was immensely proud that our team was able to represent UND at the university's first-ever year participating in the APOP competition," said Michael Elua, a team member pursuing a concentration in Aerospace Engineering. "The team was able to take an extremely demanding set of design criteria and create a prototype that was able to function as intended."

"I have always had a passion and interest in both aviation and spaceflight," said Michael. "The APOP Competition seemed like an ideal way to learn more about jet propulsion while also being able to apply my creativity and the engineering knowledge I have obtained through UND."

Written by Paige Prekker // blogs.UND.edu/cem

Photos courtesy of the Air Force Research Laboratory.

UND students Rachel Francis (from left), Daniel Voxland and Gabriel Hanson are part of a team working with USA Luge on a project that may improve equipment or training practices to protect the athletes. Photo by Enrique Alvarez Vazquez.

IN LAKE PLACID, N.Y., UND STUDENTS CONDUCT BRAIN-HEALTH RESEARCH

By attaching sensors to USA Luge Team members' helmets, Biomedical Engineering students study G-forces athletes endure

A group of UND Biomedical Engineering students have entered into a research partnership with the USA Luge Team (USA Luge) on a project that could lead to improved brain health for some Olympic athletes.

What's more, the project was conceived by a UND student who just happens to be a member of the U.S. Ski Jumping Team.

That student is Paige Jones, who last summer began wondering what effects inertial forces may have on winter sliding athletes competing in events such as luge, skeleton and bobsled. She discussed her ideas with athletes from those sports and, ultimately, secured a research agreement with USA Luge, to gather data about those inertial forces.

Back at UND, she put a research proposal together and secured the help of four other UND students. And she accomplished all of this as an undergraduate student – a sophomore.

On Dec. 2, members of the student engineering team traveled to Lake Placid, N.Y., which has a U.S. Olympic training facility. They stayed there for four days to attach sensors to the helmets of athletes as they went on their practice runs. Luge athletes often exceed 60 mph on the track; bumps, twists and turns on the track produce large g-forces that may impact brain health.

The biomedical engineering students are hoping the data collected in Lake Placid will point to improved equipment or training practices that can better protect the athletes.

For Dan Ewert, professor of Biomedical Engineering at UND, the research project is but one example of the department's approach to education, which is referred to as "Innovation Based Learning (IBL)."

IBL classrooms teach students how to engage in their own learning process, and offer a way to participate in hands-on, experiential learning, which is a strategic priority of the UND LEADS Strategic Plan. IBL also encourages interdisciplinary collaboration, and prepares students for the fast-paced field of biomedical engineering.

Each student in the department is required to take part in a research project that is unique. Measuring how much force a luger's head is being exposed to fulfills that requirement.

"The University of North Dakota is a pioneer in the innovation-based learning educational process, which gives a lot of freedom to students to envision what they want to do," said Ewert. "Students form teams to do something that has never been done before. What I think is truly fantastic is this is a team of undergraduate students, and they're working at an international level."

One member of the research team is Gabriel Hanson, a UND freshmen. Hanson said the team is now working to analyze the data they collected. They plan to submit a paper to an academic journal about their research and present at conferences about it, as well.

Plus, he found the work enjoyable (even though he said he decided not to give luging a try, while in Lake Placid).

"This project highlights the capabilities that you get with an innovation-based learning classroom," Hanson said. "It was super exciting to actually go to Lake Placid to do the project that we worked on in the classroom. We got to meet real Olympic athletes, and hopefully our research will produce something

that will help them in their training and competitions."

Conducting research on humans (not to mention Olympic athletes) is strictly governed. First, Jones had to work to secure an agreement with USA Luge. Then the students had to receive permission from UND's Institutional Review Board (IRB). IRBs at research universities govern research on humans. Their role is to protect human research subjects, and well as assure adherence to best practices for data storage and security, among other things.

Finally, the students had to generate an informed consent document for athletes to sign.

That's a lot of work for a group of students.

"They did an awesome job on this project," Ewert said. "I'm just so proud of them."

Members of the research project include Jones, Hanson, Rachel Francis and Daniel Voxland. Caitlin Lambert, a Systems Engineering graduate student, also assisted with the project. Advising the student team are Ryan Striker, assistant professor of Biomedical Engineering and Enrique Alvarez Vazquez, also an assistant professor of Biomedical Engineering. The professors accompanied the students to Lake Placid.

Written by Adam Kurtz // UND Today

'JURASSIC PARK': NO. 'PLEISTOCENE PARK': MAYBE?

While dinosaur DNA remains unrecoverable, molecular paleontology still has come a long way, a UND geologist says

"Where do you get 100-million-year-old dinosaur blood?" asks Laura Dern, acting in the 1993 blockbuster "Jurassic Park."

The film answered that question shortly thereafter with a scene that many will recall: A large bead of amber with a prehistoric mosquito inside – which a lab technician subsequently drills into to extract the ancient blood.

An ingenious concept for a movie. But does it actually work? Do prehistoric proteins and DNA exist, and if they do, what can be done with them? What do they tell us about the past, and, perhaps, the future? Are we going to … clone something?

Those were the questions that Paul Ullmann, assistant professor of Geology and Geological Engineering when he took part in the fourth installment of the Randy Rasmussen Memorial Lecture Series, held in the Chester Fritz Library. His talk? Dinosaur Molecules: Exploring how soft tissues and biological molecules can persist in dinosaur bones.

[Excerpt]

Written by Adam Kurtz // UND Today

Photo by Adam Kurtz/UND Today

Read all of this story and more at blogs.UND.edu/cem

SMOOTHIE MEETS SMART ENGINEERING

Fruitful partners with UND students to design and create a frozen beverage vending machine

What if grabbing a fresh and delicious smoothie was as easy as pressing a button?

Teams of UND engineering students have spent the past four years blending innovation with automation to make it work — quite literally.

Fruitful, a startup founded by UND engineering alumnus and MBA graduate Cole Levine (BSEE'20), has sponsored a senior design project for the past four years. Those teams have been working on a smoothie vending machine that not only delivers custom drinks at the push of a button but showcases what's possible when entrepreneurial vision meets engineering grit.

The result of a breakthrough in its second year of development by Stephan M. Tjaden (BSEE'23), the machine utilizes nitrogen and kegs to keep the fruit fresh. A novel solution, it allows for much more than whipping up fresh fruit smoothies; it also serves slushes, nitro coffee, and margaritas.

"We wanted to be able to offer something unique to the public, while at the same time, preserving fresh smoothies without all the additives seen in other products," explained Stephan.

Like many others who had a hand in the project's development, Stephan emphasizes the power of teamwork. "Without my team at UND, including Jesse Iverson (BSME'23) (a fellow UND alumnus responsible for all of the mechanical work), this project would never have been possible."

But the real question is: are the smoothies any good? Yes, uniquely so.

"Our nitrogen-infused smoothie is a different taste from any other smoothie," says Cole. "It's interesting—think of the flavor and texture of nitro coffees and other beverages."

"The velvety texture, along with the sweetness of the fruit, gives Nitro Smoothies a taste experience like no other," describes Stephan.

At the Senior Design Expo

The functional, vibrant, vinyl-wrapped prototype—capable of serving smoothies, slushies, margaritas, and nitro coffee—was a highlight of the 2025 Senior Design Expo, drawing curious crowds eager to peek inside and see its inner workings in action.

The Senior Design Expo gives students the spotlight to present projects they've worked on for the past year. Expo visitors talked directly with the students, asking about the challenges they faced and the lessons they learned.

"The most important thing I've learned from this project is that in the real world things don't always go the way you expect," said team member Tanner

Kirkeby. “I have learned that you can try as hard as you can to predict what is supposed to happen but unexpected problems will come up. The ability to adapt and solve these unplanned issues is what makes a great engineer.”

Regarding challenges, team member Wyatt Tollefson noted, “Our group came together to overcome the challenge of losing some team members early on in the Fall semester. We were able to fine-tune and correct many issues that arose throughout the year and continuously came together to find the best solution.”

Other expo visitors asked broader questions about automation in our daily lives.

“Automation is rising in popularity for many different things,” explained team member E’anna Won. “Why not bring it into something delicious like a slushie or a smoothie? People find excitement when robotics can be integrated into their lives; it’s like a window into the future and all the innovation that is coming. As a kid, I dreamed of a machine that could serve us with just the push of a button. This vending machine is a step closer to that dream.”

From concept to fruition

A vending machine that could serve exceptionally fresh and delicious smoothies, Cole first dreamed of this idea back in his undergrad days.

“You think of a smoothie vending machine and think of it as a blender with a bunch of fruit containers that ends up somehow pouring out as a smoothie, but that’s not practical,” explained Cole. “We did what we could at first and made a slushy vending machine. I said, ‘That’s great, but what about a real smoothie vending machine?’”

The UND College of Engineering & Mines’s experiential learning and real-world opportunities — including senior design projects — spoke to his own inventiveness and creativity.

“UND gave me a place to build this project I’ve been dreaming of since 2014,” Levine says. “Fruitful is a product of UND’s engineering and entrepreneurial spirit.”

He recalls passionate and supportive instructors like Dr. Kouhyar Tavakolian, Dr. Dominik Steinhauer, and Dr. Clement Tang. “They believed in me to be a sponsor, which was big for me. And they trusted that the students would gain something from it.”

After earning his B.S. in Electrical Engineering, completing UND’s MBA program alongside his mom and dad, and several years into sponsoring the senior design project to explore his idea, he and his wife Ashleigh are looking forward to seeing the idea come to life.

Looking back at these past years, he’s grateful for how beneficial this partnership has been, especially for the students involved. “It all worked out really well. And they all have jobs now too, and that’s the key, right?”

“Working on this project has helped me prepare for the work force in so many ways,” said E’anna. “Throughout this project, many challenges arose and all I could do was resolve and work through them. This polished my skills of critical thinking, as well as perseverance. This experience was challenging, but I had a lot of fun too.”

[Excerpt]

Written by Paige Prekker // blogs.UND.edu/cem

Fruitful founder Cole Levine (center) and students working on the Fruitful Smoothie Vending Machine senior design project show off the project in a prototype stage.

UNDERSTANDING CYBERTHREATS TO PROTECT THE FUTURE

Fourth annual Cyber Awareness and Research Symposium advances cutting-edge cybersecurity concepts

The exponential growth in cyberattacks, mitigation strategies for individuals and industry, and the current state and future of cybersecurity were all topics industry insiders and researchers delved into in the Memorial Union Ballroom on Oct. 28-29.

The occasion was the fourth annual Institute of Electrical and Electronics Engineers Cyber Awareness and Research Symposium (IEEE CARS), which covered all those topics and more.

CARS is a networking event for students, members of the community, academics and industry professionals to get together to advance emerging concepts in artificial intelligence-driven threats, and data science for cybersecurity, among other topics. The symposium is hosted jointly by UND's Center for Cyber Security Research, and University IT, with the aim of raising awareness and promoting state-of-the-art cybersecurity activities.

Appearing virtually from his office in Bismarck, North Dakota University System Chancellor Mark Hagerott thanked participants for attending and congratulated the UND team that organized the symposium. He exhorted attendees to meet one another in a spirit of cooperation that can lead to beneficial results for industry and beyond.

"You create knowledge, you share many great ideas, you meet new people and maybe budding new companies will come together," he said. "As a historian of technology, I can tell you that more than once, people just meeting at a conference had an idea, and they created something new."

Speaking next, UND Provost Eric Link also welcomed the attendees, and offered them a message of gratitude, which, he mused, is probably not a message cyber researchers are used to hearing.

"This is a scary new world in many ways that we live in, but because of the work that you are doing it is less scary for us," Link said. "We want to thank you for your continued push on the boundaries of knowledge, helping us get smarter, better, faster and stronger in our awareness of what cyber can do for us."

Prakash Ranganathan, director of C2SR and associate professor of Electrical Engineering, said conducting research and teaching courses is one thing, but putting on an event like CARS is quite another. He thanked the 15 graduate students and C2SR staff members for their support in organizing the event ("Without you, I could not do this," he said), and he expressed his gratitude for CARS' sponsors.

Up next that first day was Rees Machtemes, of Waterfall Security, who spoke about trends in cyberattacks on critical infrastructure — think entities such as railroads and water treatment plants. Those attacks, he said, are dramatically on the rise.

Machtemes and Waterfall Security publish an annual threat report of cyberattacks. About 80% of those attacks are ransomware attacks (an attack that locks out a business from their own files until they pay a "ransom" to get that access back), but attacks from nation-states and hacktivists — people who hack computers to achieve political aims — also are increasing, he said.

These trends have serious implications for business and critical infrastructure security. In one instance, a tooling company for a microchip manufacturer was hit by cyberattack and had to shut down for a time. The cost of that event? Two hundred million dollars in lost revenue.

In another instance, hotel and casino chain MGM Resorts was hit by a ransomware attack that disrupted operations to a significant degree: All hotel doors suddenly unlocked; the online reservation system was shut down. The attack occurred for 10 days and showcased the need for entities around the globe to invest in cybersecurity measures to protect themselves.

Machtemes, who predicted that about 100 major attacks will occur by the end of the year, said the objective is clear:

“Ultimately, the goal here is to try to understand what kind of attacks we are seeing in order to better defend against them,” he said.

Capturing the Flag

Over the course of the two-day symposium, other speakers addressed topics including the future landscape of cybersecurity, and how to protect physical systems from attack (there are those water treatment plants again). Workshops were held on topics ranging from fraud detection to machine learning to a general discussion of cybersecurity for individual people. In addition, 58 academic papers — presented and discussed at 15 paper sessions — were accepted for publication by IEEE Xplore, a digital repository “of scientific and technical content.”

But the CARS Symposium was home to another challenging area, as well: one that pitted middle school, high school and university students against one another in a cybersecurity challenge.

The challenge was called the UND CyberHawks National Capture the Flag Competition. Students visiting UND formed mixed teams to demonstrate their skills in a six-hour event.

[Excerpt]

Written by Adam Kurtz // UND Today

Scan the QR code for more info on IEEE CARS!

2025 SCHOLARSHIP AWARD CEREMONY

Celebrating the impact of philanthropy

On April 29, the UND College of Engineering & Mines hosted its second Scholarship Award Ceremony. A chance to reflect and celebrate the impact of scholarships, it also gave donors a chance to meet the students they impacted directly.

For the Wendschlags, it meant seeing the cycle of philanthropy thriving and in action. Jim Wendschlag (ME’77,’79) spoke on stage to ceremony attendees, sharing why he considered starting a scholarship endowment at UND with his family.

“I received scholarships when I went to college, and all of my children received scholarships,” said Jim. “I viewed this as a way to pay it forward.”

While Jim and his wife Janey (BSN’79) never expected to see much of an impact in their lifetime, Jim said that he was glad they chose to donate now while they can see their generosity in action.

He noted that the scholarship “speaks well to the education we received at UND that allowed so many of us to be in a position to give back, and it speaks well to the lasting relationships we created in our time at UND.”

Pictured above: Jim and Janey congratulate the recipients of the Wendschlag Family Scholarship who attended the ceremony to express gratitude to their donors in person.

CHAMPIONING COMPASSION

A LESSON FROM RONALD APANIAN

Ronald A. Apanian Distinguished Lecture series honors a legacy of service, teaching and compassion

At the inaugural lecture of the Ronald (Ron) A. Apanian Distinguished Lecture Series, the man of honor himself returned to the podium.

While he's given decades of lectures before, this one was truly special: offering a rare and personal look into his history.

Setting the stage in the small town of Souris, North Dakota, Apanian described his life as a series of "very good life experiences." He shared memories and reflections from his childhood in Souris, his days as a student at UND, and his long career at the university. His stories—punctuated with wit, humility, and heartfelt appreciation—resonated deeply with students, faculty, alumni, family and friends who gathered to honor him.

"Often times I would brag that I graduated high school only eighth from the top of my class," he joked. "But then there were only eight of us."

His tenure was defined not only by academic leadership but also by a fierce commitment to student success. Former students recall his kindness, patience, and willingness to spend time outside the classroom helping them master challenging concepts, find internships and build their careers.

Apanian fondly remembered the UND faculty who inspired him: those who supported students from small rural schools during the 1950s. "There were a lot of students at UND back in the 50s who knew what an Erlenmeyer flask was… but there were those who didn't," noted Apanian, who empathized with students who came from rural schools like he did. "We had faculty members like Gustafson in Chemistry, Nelson in Math, Henderson in Physics and a slew of others who recognized where some of these freshman and sophomore students were behind," he recalled. "They taught one separate class each week for those students who came from small towns."

"That is UND," Apanian stated proudly. "I thought they were great, and what great role models they were for someone like me."

For Apanian, there was never a question about what part of his career meant the most. When asked whether he preferred teaching, research, or leadership, his answer came easily: "No question. Teaching."

A testament to his impact on students, UND Civil Engineering instructor Bruce Dockter, one of Apanian's former students, recalled classroom moments that left a lasting impression: "I always remember your classes—and hearing stories from your classes—where you gave demonstrations of forces using a yardstick, torquing it to show how the forces were acting… I always wondered if that day would come where the thing would just snap." (Apanian confirmed it had, at least once, and even mentioned how former student Steve Burian had brought a yardstick to Apanian's Alumni Academy induction in homage to the iconic lesson.)

"I am so proud of the University of North Dakota," said Apanian as he summarized those "very good life experiences" he had and the gratitude of sharing them with all of the students he met along the way.

"The rest of me is now history," he chuckled. "And hey, I'm 90 years old!"

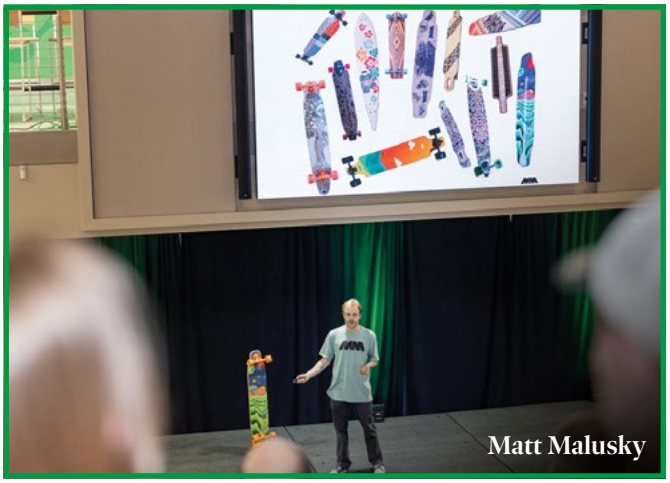
[Excerpt]

Written by Paige Prekker // blogs.UND.edu/cem

UND ENTREPRENEURS PRESENT BUSINESS IDEAS AT LAUNCH EVENT

Early-stage entrepreneurs step up in Memorial Union, pitch products developed with UND programs' support


Mercedes Terry


Matt Malusky

The entrepreneurial spirit took center stage on April 29 at LAUNCH: Demo Day, UND's first multi-program startup pitch event, held at the Memorial Union's Social Stairs. The event was powered by the Runway Accelerator and hosted by the UND Center for Innovation.

LAUNCH brought together nine emerging founders from three innovative programs — Runway, I-Corps and SBIR/STTR, or Small Business Innovation Research/Small Business Technology Transfer — to present their ventures to a crowd of students, faculty, industry mentors and potential investors.

The event marked a first-of-its-kind collaboration, connecting UND talent across academic disciplines with the broader entrepreneurial ecosystem, organizers say. With entrepreneurs from fields ranging from engineering to biomedicine to aerospace, the lineup highlighted the university's growing role as a launchpad for diverse, high-impact ventures.

Dan Newman, doctoral student in Biomedical Engineering, introduced SHARP Biomedical, a minimally invasive solution for back pain.

Carson Running, an assistant professor of Mechanical and Aerospace Engineering, presented RH Technologies, offering high-precision fluid imaging using NASA-based tech.

Mercedes Terry, a Biomedical Engineering doctoral student, presented MindMend Biotech, developing wearables for real-time Parkinson's monitoring.

Anakin Bosek, an Engineering student, presented Bosek Industries, a snowmobile performance consultancy for racing teams.

Matt Malusky, a Mechanical Engineering student, shared his venture, MMLongboards, custom-designed boards combining engineering and artistry.

Following the pitches, attendees engaged directly with the founders through Q&A and product demonstrations, gaining hands-on experience with technologies in development.

"There was great energy, fantastic idea generation and meaningful networking among participants and the crowd," said one attendee. "I loved how it was such a public and exciting way to spread the innovation bug to UND students, staff and faculty alike."

LAUNCH exemplified how UND's programs are converging to support innovation and drive collaboration across departments and industries, organizers said. By combining funding, mentorship and training from initiatives like Runway, I-Corps, and SBIR/STTR, UND is striving to create fertile ground for discovery.

[Excerpt]

Written by Haylee Bjork // UND Center for Innovation

Photos by Mark Maliskey of Mark Maliskey Photography, Grand Forks.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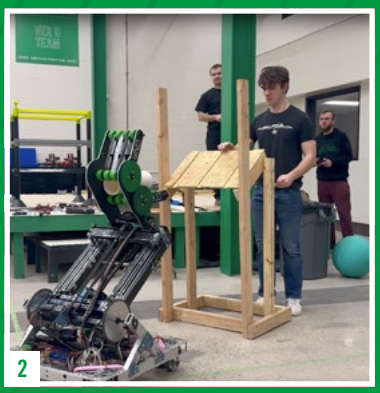
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AROUND CAMPUS & BEYOND

[1] Tarek Elderini, Electrical Engineering instructor, “grillin’ and chillin’” at the SEECS End-of-the-Year BBQ at University Park. [2] UND PRi3D of the North student club. [3] Karsyn, a high school student from Hankinson, N.D., explains her project at the North Dakota State Science & Engineering Fair hosted by the UND College of Engineering & Mines. [4] UND President Andrew Armacost and Matt Dunlevy salute each other as Matt receives his Ph.D. at Commencement. [5] Biomedical engineering student Michelle DiCicco at the 2025 FISU World University Games. [6] UND Society of Petroleum Engineers hosts a Lunch & Learn session with Continental Resources and ChampionX, where the companies engage with students from the Department of Energy Engineering and the Harold Hamm School of Geology & Geological Engineering. [7] Featured guest speaker Megan Larson Ueland (BSEE’21) and Deb Austreng at the annual fall Ring Ceremony. [8] UND Society of Women Engineers Potato Bowl Parade float. [9] ‘Pie your Professor’ event featuring Beth Klemetsrud, Department of Chemical Engineering. [10] Spring 2025 CEM Ring Ceremony. [11] FIRST LEGO League State Robotics Championship hosted by the UND College of Engineering & Mines. [12] UND Society of Petroleum Engineers volunteers at the FIRST LEGO League State Robotics Championship. [13] Chemical, Civil, Electrical, and Mechanical Engineering alumni at Alumni Gathering in Kuala Lumpur, Malaysia. [14] Students tour Minnkota Power Cooperative and learn from experts in the industry. [15] American Crystal Sugar employees engage in hands-on activities during a Project Management Workshop. [16] UND Steel Bridge team has some fun at the regional competition in Milwaukee, Wis.

RETHINKING NORTH DAKOTA'S CULVERT CRISIS

How UND civil engineering students, faculty and researchers come together to address a problem that's out of sight but not out of mind

While North Dakota's roadways stretch wide across the plains, a quieter crisis lies beneath them.

Culverts—structures that allow water to flow underneath roads, railways, and other obstructions—need addressing. The problem? A daunting backlog of projects spanning up to three years.

UND's civil engineering students, supported by faculty and researchers, are determined to address this hidden yet critical situation.

For their senior design project, students Alana Jeannie Monje, Carter Billman and Dan Veenhuizen are tackling the state's growing backlog in culvert construction — focusing on reinforced concrete box culverts, alternative building methods, and long-term resilience.

"We're looking beneath the surface — literally," said Alana Jeannie Monje, who serves as a College of Engineering & Mines Student Ambassador and was previously an intern in the Transportation Technology Research Institute's Student Design Center. "If you look from what is beneath, you will understand that it is as important as the ones you see just on the outside. Culverts are normally ignored since they are not as visible as bridges. However, these two are almost as of equal importance with how the transportation comes together."

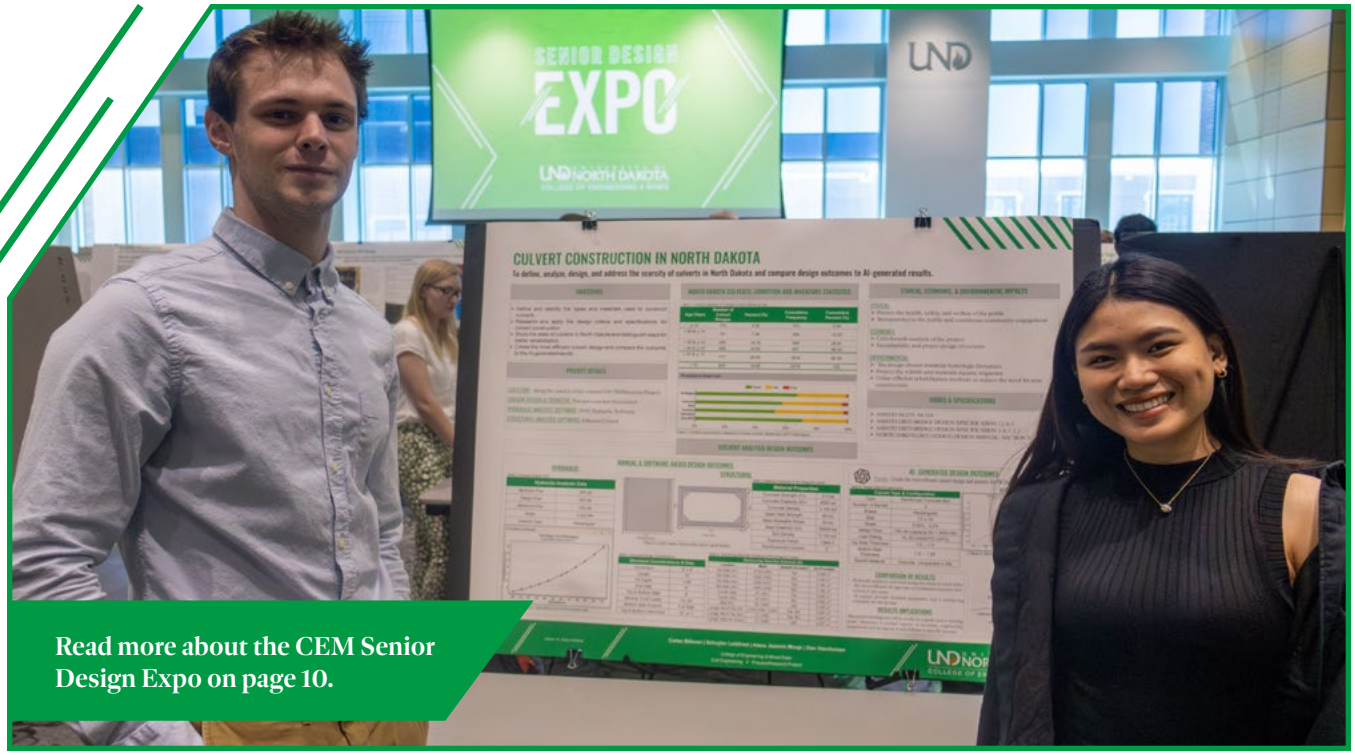
Monje's passion for overlooked infrastructure has led the group on a year-long mission: explore new approaches to culvert design and propose solutions that could reduce North Dakota's 24-36-month backlog in construction. A key part of the problem, they learned, is availability. Where once there were two suppliers of precast box culverts in the state, only one remains.

Drawing on support from the North Dakota Department of Transportation (NDDOT), the U.S. Army Corps of Engineers, and Moore Engineering, the student team dove into real-world case studies, including the massive Fargo-Moorhead Area Diversion Project.

"This project allowed the team and myself to get hands-on experience working with software that the NDDOT utilizes to design reinforced concrete box culverts," said Carter Billman. "Knowing how to utilize a broad range of engineering-related software is a crucial skill to have for our careers following graduation."

Billman added that the learning curve was steep — but rewarding. "The aspect in which I am most proud of our project is the fact that when we first got assigned to our project, we had very little knowledge about culverts or even the process of designing them. Throughout the last year, with Dr. Sattar Dorafshan's assistance, we learned about the multitude of parameters and methods necessary to complete our project."

Monje, the sole on-campus student in the group, worked alongside teammates living in different states and time zones. The project, she says, was as much about engineering as it was about communication and perseverance.



Read more about the CEM Senior Design Expo on page 10.

"With the flexibility of UND having both on-campus and online students, the merge on working on a senior design project has been challenging but truly a great experience," Monje said. "Meeting later at night and even on weekends have been a normal practice of the team. There have been some challenges with division of labor in the group but has been eventually addressed. Good communication and understanding has truly played huge role in making this project work for everyone."

Teammate Dan Veenhuizen agreed that teamwork contributed to the project's success. "It was vital to work together and divide and conquer the tasks," he said. "This would have been a daunting project individually, but when everyone contributed and we divided the work, it wasn't too bad."

Engineering a smarter future together

While the student team's work focused on conventional culverts, their findings align closely with ongoing UND research into new construction methods like additive construction — more commonly known as 3D concrete printing.

Dr. Sattar Dorafshan, the team's advisor, Director of the College of Engineering & Mines's Advanced Transportation Infrastructure Center, and UND's leading expert in 3D concrete printing for transportation infrastructure, has been working with the Transportation Technology Research Institute (a UND-NDDOT partnership) to explore how printed concrete culverts could address workforce shortages and speed up construction.

"One of the conclusions these students made is that there's a need to look into alternative means of construction in the future," Dorafshan explained. "There's just not enough trained workforce or construction facilities right now — essentially a labor shortage backlog." According to Dorafshan, autonomous systems integration in construction through additive construction and AI will contribute to the solution.

Another consideration is that culverts aren't just pieces of concrete—they often serve as passageways for fish and wildlife. Poorly designed culverts can block natural migration patterns and disrupt regional ecosystems. UND experts like Dr. Vida Atashi, along with ESCP Award winners Dr. Mark Kaemingk and Dr. Sattar Dorafshan, are exploring how to balance structural durability with environmental stewardship—aiming to recommend culvert designs that are both strong and wildlife-friendly.

Monje emphasized that the project goes beyond academics. "The project has been inspired by the student's interest not only regarding how culverts work but also to address the current scarcity of this to help the state and make a difference not only for academic purposes but also for the community."

For Monje, the senior design project represents the culmination of hands-on experience that's preparing her for a meaningful career. And like the structures they're designing, her team's work is meant to endure.

"These scholarships and opportunities give us the tools to build — not just roads, but futures," she said. "We want to make sure what we design lasts longer, supports our communities, and maybe inspires others to look a little deeper — even beneath the surface."

Written by Paige Prekker // blogs.UND.edu/cem

2025 HONORARY DEGREE RECIPIENT
DR. NOREN PAN

Pan, co-founder of MicroLink Devices and a UND graduate, addresses graduates at College of Engineering & Mines event

New science and engineering graduates must define their own paths forward in their professional lives, but to do that, they will need to recognize and meet up with difference makers along the way.

Those words of advice were from Noren Pan, a 1982 UND graduate, who was the invited speaker at the CEM Graduation Ceremony, held on May 16 in the Henry Family Ballroom in the Memorial Union. The following day, Pan, co-founder and president of engineering firm MicroLink Devices, went on to receive an honorary Doctor of Letters at spring commencement ceremony.

The CEM ceremony was larger than usual due to increasing enrollment in the college. With the graduates in the first few rows in the ballroom, friends and family filled the rest of the ballroom (including an overflow room).

And the full room just meant there were more ears to hear wisdom from Pan's 40 years of working in the field of Electrical Engineering. It would seem, Pan said, that success comes with a little help from people one encounters on the journey.

"There's always somebody that will make a difference to your life, we just don't know where that person comes from," he told the capacity crowd.

Pan went on to explain that students have a defined path in their academic lives. After starting first grade, they know the desired endpoint is finishing high school. The same goes for undergraduate and graduate degrees. But the path becomes undefined after finishing those degrees, which means they need to move forward on their own, all while keeping their eyes open to meeting the right person and seizing the right opportunity.

"Your degree gives you the skill set, but Artificial Intelligence is not going to tell you how to be successful," Pan said. "You have to go out and meet that person, and meet the decision maker, in order to be successful."

About Noren Pan

Noren Pan is the co-founder and president of MicroLink Devices and a 1982 graduate of the University of North Dakota.

Pan, originally from Cambodia, came to the United States with his mother and siblings in 1974. At the time, the Cambodian government was supported by the U.S.; but in 1975, the government collapsed after a years-long civil war. With the ending of the Vietnam War around the same time, both Vietnam and Cambodia fell under the rule of communist regimes.

UND's president at the time, Tom Clifford, knew Pan's father, Dr. Sothi Pan, who was the secretary of Education for Cambodia prior to the communist takeover. Through President Clifford's efforts, Pan's family was invited to settle in Grand Forks in August 1975. The University and President Clifford provided a scholarship to Pan's mother to obtain a Master of Science in Computer Science, and she later worked at Minnkota Power as an electrical engineer.

Pan spent seven years in Grand Forks studying at Grand Forks Central High School and UND. He graduated from UND with a degree in Electrical Engineering.

[Excerpt from "Noren Pan to CEM grads: Forge your own path...with a little help]

Written by Adam Kurtz // UND Today

ASSOCIATED GENERAL CONTRACTORS OF NORTH DAKOTA (AGC) SCHOLARSHIPS

On September 18, the Associated General Contractors (AGC) of North Dakota visited campus to extend congratulations and awards to four students from the Department of Civil Engineering.

The legacy of AGC scholarships supporting UND students

The AGC of North Dakota's tradition of awarding scholarships to UND students spans over half a century. Among these prestigious scholarships, the John Jardine Scholarship, established in 1964, holds the distinction of being the oldest scholarship in North Dakota and is still awarded annually.

Scholarship Awardees

This year's scholarship awardees are Ryan Bergum (Walt Swingen Scholarship), John Bergum (John Jardine Scholarship), Autumn Bergum (Don Lindberg Scholarship) and Cooper Auge (AGC of ND Scholarship).

MINNKOTA POWER COOPERATIVE ANDREW L. FREEMAN INNOVATION AWARD SCHOLARSHIPS

On May 12, representatives from Minnkota Power Cooperative visited the campus to extend congratulations to this year's Andrew L. Freeman Innovation Award recipients.

Keeping the innovative spirit of Andrew L. Freeman alive at UND

Held since 2000, the awards recognize top senior engineering projects at UND. A UND alumnus himself, Freeman helped lead many energy industry innovations throughout his 42-year career, but he's best known as the inventor of the headbolt heater.

Scholarship Awardees

This year's Andrew L. Freeman Innovation Award recipients are comprised of a pair of teams from the Department of Chemical Engineering and the Department of Civil Engineering. Chemical Engineering group members (first place) include Erin Becker, Casey Michelson and Daniel Poynter. Civil Engineering group members (second place) include Ryan Bergum, Luke Hinderliter, Ryan Kunz and Spencer Rousseau.

AMID CARNEGIE R1 DESIGNATION, TWO NEW STEM DEGREES

New programs are in fields vital to North Dakota's economic growth, workforce development

On the heels of achieving a Carnegie R1 designation, UND is offering three new degree programs that will help meet the needs of employers in fields experiencing strong job growth.

From athletics to artificial intelligence, the new programs help the University better serve the state by matching students' interests with the multiple job openings that many employers report.

Artificial Intelligence Ph.D.

UND is launching a new doctoral program in artificial intelligence, a field with major societal implications and one that needs many more experts and scholars than it now has.

UND's Ph.D. in Artificial Intelligence is a 90-credit program offering coursework in data science and visualization, machine learning and autonomous systems.

The program is being offered exclusively on-campus. It is open to applicants holding a bachelor's or master's degree in a computing, engineering or other science related field, and a grade point average of at least 3.0 on a 4.0 scale.

Ryan Adams, dean of the College of Engineering & Mines, said although existing curriculum offers instruction in artificial intelligence, UND did not have a program solely dedicated to research and instruction in the field.

Adams expressed excitement at the new program's enormous potential. "The new Ph.D. program in AI is an exciting opportunity for the College of Engineering & Mines to prepare students for research in this new and dynamic discipline," he said. "This program incorporates depth of understanding in AI from a technological perspective, as well as some of the human aspects of AI – in a way that is multi-disciplinary in scope."

Adams opined that the program – the only one of its kind in the region – will help boost the state's workforce in a field with high demand.

"Artificial Intelligence is the topic of research in greatest demand among our prospective students in computing disciplines," he said. "This new program allows students to investigate AI from a variety of perspectives. Expertise in AI is also in great demand among many prospective employers, and this program will effectively prepare students to work in the field."

Cybersecurity bachelor's degree

Another new degree is designed to meet the state and nation's growing need to protect personal data and business information, as well as the physical systems that rely on digital architecture.

The Bachelor of Science in Cybersecurity is a 123-credit hour program that provides the knowledge and skills for working in the cybersecurity sector, and can be customized to focus on specific areas in cybersecurity. The degree program also offers hands-on opportunities for students to engage incybersecurity research.

The program is delivered either in-person on campus or fully online.

"Cybersecurity is now a national priority, with increasing threats targeting

everything from personal data to power grids," said Prakash Ranganathan, director of the Center for Cyber Security Research (C2SR). "This degree is necessary for UND to prepare students for critical roles in protecting digital and physical infrastructure, especially as North Dakota expands its own cyber readiness.

"It aligns with UND's commitment to addressing real-world challenges, our National Security Initiative and meeting workforce demands in both the public and private sectors."

Ranganathan said the program was designed with input from industry and government partners to give students exposure to the latest tools, hands-on labs, cyber-informed engineering concepts and emerging areas such as AI security and cyber-physical systems. Graduates from the program will be job-ready, he said, with the option to pursue roles in federal agencies, energy companies and security startups, among other employers — or to continue into advanced research.

The skills gained by students are highly transferable and in demand in North Dakota and throughout the United States.

The new degree program positions UND as a leader in training the next generation of cybersecurity professionals in the Midwest and beyond. UND has also been designated as a National Center of Academic Excellence in Cyber Research (CAE-R) institution by the National Security Administration, a recognition that distinguishes the program from others.

"UND's cybersecurity degree stands out because it integrates technical depth with a strong understanding of critical infrastructure, especially in energy and rural systems," Ranganathan said. "Few programs combine academic rigor, applied learning and close collaboration with federal agencies."

UND NAMED CARNEGIE R1 INSTITUTION

Carnegie R1 designation classifies University as institution supporting 'very high research activity'

UND has ascended to Carnegie R1 status.

Institutions that are classified as a Carnegie R1 institution have "very high research activity." This denotes that the institution has annual research expenditures exceeding $50 million and awards at least 70 research doctorates each year. UND exceeds both of these standards significantly.

This will mark the first time that UND has been included in the classification as an R1 institution.

In receiving an R1 designation, UND joins a peer group of 187 universities, according to the Carnegie Foundation's 2025 report. Included in the R1 category are world-renowned institutions such as Harvard, Yale and Stanford, as well as ones based in the Upper Midwest, such as the universities of Minnesota, Wisconsin and Nebraska.

UND President Andy Armacost said this designation is a recognition of a yearslong effort to expand research opportunities across campus in a variety of fields.

"This recognition highlights UND's exceptional commitment to research and discovery. It serves as a testament to the momentum we have generated through the hard work of so many faculty, students and staff members and through our exceptional growth in research funding, including that supported by North Dakota's elected leaders.

Scott Snyder, vice president of Research & Economic Development, cited UND's growing research profile, with expenditures of $182 million in fiscal year 2023 – an increase of more than $70 million from the preceding three years – as a major factor in achieving the R1 designation.

Provost Eric Link added that the R1 designation is more than just a feather in the University's cap – it will spur scholarship that serves the state as a whole.

"Receiving the Carnegie R1 classification is a testament to the great work going on at the University of North Dakota," he said.

ROBOTS INVADE, BUT STUDENTS ARE WINNERS AT VEX ROBOTICS SIGNATURE EVENT

Inaugural North Dakota Signature event offers engineering challenges, fun and future career pathways

Robots did indeed invade Grand Forks from Nov. 1-2, but teams of high school students from across the nation and Canada ultimately emerged victorious in a VEX Robotics competition.

And one of those teams even brought one of their robots to compete on the world stage.

Early November was when those students, from dozens of high school robotics teams, came to the Alerus Center in Grand Forks to compete in the inaugural North Dakota Signature, a VEX Robotics Signature Event. The event, a challenging test of students' robotics skills, was hosted by the UND College of Engineering & Mines, and was presented by Bifrost Manufacturing.

In the North Dakota Signature, student teams pit their robots — wheeled, motorized creations that are able to grasp and manipulate objects — against other teams. The goal is to earn points by stacking plastic rings on mobile goals, then moving those goals to certain spots in a set amount of time.

The kicker? The students had built these robots themselves, under the tutelage of a coach and per the rules of the VEX Robotics V5 Competition.

Andrew Dahlen, organizer of the event and UND lecturer in Mechanical Engineering, said holding it in the Alerus Center, where UND plays football, was a chance to honor the students' efforts in an impressive fashion.

"We're just celebrating their talent," Dahlen said. "These young folks are doing the all the right things, and we want to elevate what they're doing by showing it to the public and giving them that recognition on a grand stage."

Dahlen, clad in a green suit that evoked one of UND's school colors, emceed the event and gave commentary, as students set their robots to stacking the rings and placing the mobile goals inside an enclosed area— and in a race against another team.

But the goals of the North Dakota Signature (and other VEX Robotics competitions) are twofold: to present a fun and challenging robotics competition for the students, while giving them a chance to become interested in careers in Science, Technology, Engineering and Mathematics (STEM) fields.

"We need to do something to get young folks excited and interested in STEM and engineering science careers," Dahlen said. "Manufacturers are talking about the same thing. We must have that impactful experience to get folks excited and interested and point them in the right direction, then show them, explicitly, these are future career paths."

Killian Erickson, founder and CEO of Bifrost Manufacturing, agreed. He said sponsoring the North Dakota Signature helps expose students to careers that are needed at places like his advanced manufacturing business.

“Our primary goal is building awareness of who we are, and developing the workforce for the future,” he said, adding that exposure begins in places such as VEX Robotics tournaments.

Coach Annette Beattie, from Valley City High School in Valley City, N.D., said the competition gives her students the chance to put into practice things they learn in their robotics programs. It also leads to careers.

“I actually have some kids who have graduated from the program, and one is in engineering and the other one is in a teaching STEM field,” she said. “This is definitely a chance for them to take this competition experience and apply it to a career.”

One student, Ezra Dehaan, a junior from a team based in Sioux Falls, S.D., said being involved with VEX Robotics helped influence his educational path beyond high school, as he is looking at a STEM education at the university level.

“I’m thinking Mechanical Engineering or Aerospace Engineering at the moment,” he said. And VEX Robotics “is a great way to get into it.”

In total, 50 teams from across North America competed in the event. One team, TenTon Robotics, of West Vancouver School District #45, in West Vancouver, B.C., won the Excellence Award, which qualified them to head to the VEX Robotics World Championship.

[Excerpt]

Written by Adam Kurtz // UND Today

Top VEX teams in North America & beyond!

High stakes challenges meets electric fun!

More VEX Signature Events Coming Soon!

University of North Dakota Signature

August 1-2, 2025 // Mall of America

We’re taking over the Mall of America this summer! The unofficial kick-off of the season, top high school VEX Robotics teams converge at this high-stakes competition.

North Dakota Signature

January 9-10, 2026 // Alerus Center

After a successful inaugural event last year, we’re once again hosting the North Dakota Signature, a VEX Robotics Signature Event held at the Alerus Center in Grand Forks!

BrainSTEM @ UND

First BrainSTEM event brings seventh-graders to campus in partnership with American Society of Civil Engineers

Seventh-graders from Valley Middle School in Grand Forks got some hands-on experience in fascinating, STEM-related career fields.

While the CSI: Junior Investigators Workshop extracted DNA from strawberries, other Valley seventh-graders programmed a robot to make perfect welds. Still others built bridges using dry spaghetti and tested them with weights, practiced watershed management by using an augmented reality sand table and learned some "kitchen chemistry" about how acids and bases react with certain foods.

It was all part of the inaugural BrainSTEM event, a program that's the result of a partnership between UND and the North Dakota Section of the American Society of Civil Engineers. Nearly 170 Valley seventh-graders took part, visiting the UND campus to take part in STEM workshops and get exposed to related career fields.

Each workshop was 50 minutes long, with the instructors being faculty members, graduate students or others working in STEM fields.

'Almost like play time'

"You know, in a lot of ways, the engineering and manufacturing industries are invisible," said Andrew Dahlen, lecturer in Mechanical Engineering at UND.

"There are manufacturers all over the United States, of course, but their doors aren't open. Young people don't get to see what they do every day. So, this is just a chance to open up those doors and say, 'Hey, look at this. It's exciting, it's interesting work, it changes every single day.'

"Yes, it's a lot of work, and yes, there's a lot of math and science involved," Dahlen continued. But the satisfactions are immense. "And to be honest," he added with a laugh, "when you're working with such amazing technologies, it's almost like play time."

Dahlen and Logan Proksch, a Chemical Engineering student and UND student ambassador, led the day's workshop on robotic welding. Valley seventh-graders took turns inputting patterns using a control screen, then watching from behind welding masks as the multiton robotic welder torched the base material in exactly the desired pattern.

Finding the right 'bait'

"It's sort of like fishing," Proksch said afterward. "You have to put the bait — the machinery, the robots — out there and in front of the students, in order for some of them to bite. Otherwise, if you just say, 'Have you ever thought about being a chemical engineer later in life?', they'll answer, 'What's a chemical engineer?'"

Proksch remembers a time when he would have answered the same way. "You bet," he said with a smile. "I went to many science camps when I was younger, and that's partly where I developed my own love for this kind of stuff."

Event sponsors: AE2S, American Crystal Sugar, Braun Intertec, Burian & Associates, Byte Speed, Heyer Engineering, Jacobs, John Deere, Lowry Engineering, Microsoft, Moore Engineering, SRF Consulting, Stantec, Ulteig, UND Arts & Sciences, UND Civil Engineering and UND College of Engineering & Mines.

[Excerpt from "Middle schoolers program robots, build bridges, extract DNA at UND"]

Written by Tom Dennis // UND Today

LIVE LONG AND PROSPER:

STAR TREK-INSPIRED MEDICAL DEVICES ON AGENDA AT UND

University hosts meeting of NSF-established group, whose mission focuses on advancing key biomedical technologies

Chances are you have heard of a “tricorder,” the fictional device found in the television series “Star Trek” used for everything from medical diagnoses to engineering solutions. But did you know that such a device might actually get built?

That idea, and dozens of others aimed at accelerating the development of healthcare technologies for in-place care, were presented and discussed at the fourth annual meeting of the Center to Stream Healthcare In Place (C2SHIP), on Sept. 16, and for the first time held in the Memorial Union.

C2SHIP was established by the National Science Foundation, through its Industry/University Cooperative Research Centers (I/UCRC) consortium. C2SHIP’s goal is to create partnerships between academia and industry to develop health care technologies for in-place care — which means advancing research on devices like the tricorder and others. The aim of in-place care is to develop technology that keeps a patient out of the hospital and in their home, a welcome idea to those who make frequent hospital visits or lack easy access to a healthcare facility.

UND, along with five other leading research universities, is a member of C2SHIP, which works with 21 industrial partners. Kouhyar Tavakolian, executive director of UND’s BioInnovation Zone, or BiZ, is on the group’s leadership team. UND joined C2SHIP last summer, an event which, Tavakolian said, marks the first time in more than 50 years that an I/UCRC site has come to the University.

[Excerpt]

Written by Adam Kurtz // UND Today

UND ENERGY ENGINEERING STUDENT ADVANCES TO NATIONAL THESIS SHOWCASE

“Imagine losing 60% of your income because there’s no bank to save it in. That’s exactly what’s happening with wind energy.”

That was one of the statements made by Rachael Josephs, a doctoral student in energy engineering, back at UND’s Three Minute Thesis Competition in January. “Over 60% of wind energy is wasted because we lack the infrastructure to store it,” Josephs explained.

Her presentation about a promising wind energy storage solution leveraging the salt layers under our feet earned Josephs first place at UND’s competition, second at regionals and a spot at the upcoming national showcase in Washington, D.C.

EDMONTOSAURUS
(some assembly required)

A once-in-a-life experience, UND Harold Hamm School of Geology & Geological Engineering welcomes volunteers to get hands-on with real dinosaur fossils

It's like a jigsaw puzzle—except it's three-dimensional, extracted piece by piece out of a block of rock that weighed over 4,400 pounds, is 67 million years old… and also a dinosaur.

UND's newest resident dino, the Edmontosaurus specimen, nicknamed Marvin, that came to campus last October, is undergoing a process akin to solving an absurdly large jigsaw puzzle.

The goal? To bring it to life through careful cleaning and assembly done by volunteers from the community—from Grand Forks and beyond.

Protectively encased in layers of plaster and burlap, the specimen holds approximately 25 bones, a substantial amount compared to most fossil discoveries.

"Anything better than two bones is a wonderful find," says Paul Ullmann, the project's team lead and an Assistant Professor of paleontology in the UND Harold Hamm School of Geology & Geological Engineering.

Discoveries in paleontology don't always happen in the field. Volunteers and researchers have already uncovered at least one fossil bone inside the plaster jacket that was hidden during field excavations, meaning there is even more of the skeleton preserved. In addition, Marvin's caudal vertebrae (tail bones) preserve pathologies. Just like in medicine, these paleopathologies are evidence of abnormal tissue from disease or injury. Researchers don't yet know what happened to the tail of this dinosaur, but it was not something good.

"Studying the paleobiology of dinosaurs helps us better understand how they interacted with their world," says Kristyn Voegele, who also took part in the excavation of this specimen and joined the UND Harold Hamm School of Geology and Geological Engineering in August as an Assistant Professor of paleontology this fall. Researchers will be investigating the cause of these pathologies as more of the tail is prepared.

Since February, 100+ participants from UND, Grand Forks, and the surrounding community—including community volunteers who have come from as far away as Bismarck and Bemidji—have dedicated their time to advancing the project, and through it, science.

"This is something I never thought I would ever do, but getting to actually touch real dinosaur bones was so cool," says an anonymous volunteer and community member from Grand Forks. "Just your average Friday in Grand Forks!"

"We are now starting to 3D scan the exposed tibia [shin bone] so we can digitally capture its form before sampling for soft tissue, geochemical, and molecular research by our Master's student, Skylor Booth," says Ullmann. "Skylor is planning to explore how the

bone has been chemically altered through fossilization and to test it for the preservation of original bone cells, blood vessels, and their component biologic molecules, such as the structural protein collagen."

So, how long will it take to put the dino back together again? From the looks of it, probably another two years or more. There's still plenty more to do with nine tail vertebrae and two large limb bones remaining to be finished, and more bones still waiting to be extracted from the block and prepared.

Volunteers are still needed, so if you've ever wondered what it's like to get your hands on authentic dinosaur bones, now is your chance! Interested community members can register for fossil prep sessions through the link below. There are periodic cancellations, so please check back often!

Written by Paige Prekker // blogs.UND.edu/cem

bit.ly/UND-Dinosaur

Scan the QR code to learn more and sign up for a session!

MEET NEW DEPARTMENT LEADERSHIP

DR. RICHARD SCHULTZ

Chair, Department of Energy & Petroleum Engineering

DR. MOH RASOULI

Director, School of Electrical Engineering & Computer Science

IT'S BROTHER AGAINST BROTHER AT THE BATSUBOT ROBOTICS COMPETITION

Competitors play for money, national standing and engineering bragging rights at the UND tournament

Spinners, grabbers, trappers and pushers made their way to the Henry Family Ballroom where there they spun, grabbed, trapped and pushed one another in a BatSuBot Robotics Competition.

That competition — the name, by the way, is a mash-up of "Battle Bot" and "Sumo Bot" — is now in its fourth year and is an in-house chance for students to put their engineering skills to the test, not to mention have a little fun.

The event was born in 2021 from an engineering class taught by Tarek Elderini, lecturer in the College of Engineering & Mines, when some students approached him with the idea of a competition. From there, Elderini grew it to the point where he is ready to get other universities in the region to join in on the mayhem. The same thing happened when it grew beyond the class in which it originated.

People might remember a TV show called "BattleBots," where robots smashed, sawed, burned and pulverized one another to a cheering audience. The BatSuBot competition is similar, though minus the explosions.

Competitors are victorious after they've pushed or flipped their opponent's three-pound robot off the fighting platform. They also get points for "grabbing" the opposing robot — students can build their robot with a short, armlike appendage — and trapping it for a number of seconds.

The competition took place tournament-style, with $1,000 in prize money — and quite possibly some bragging rights — on the line. Match by match, students and their robot creations spun, flipped and trapped their way through the bracket, while John Nordlie, an instructor with the School of Electrical Engineering & Computer Science, added to the atmosphere by launching a small drone.

What also added to the atmosphere were the emcees, UND students John Merilla and Ian Picklo — fun fact, both Merilla and Picklo were the first-place winners of the original BatSuBot competition held in 2021 — who made announcements and gave commentary throughout the event. They were joined by Garrett Tjernagle (BSEE'22) who came back to UND from Bloomington, Minn., at Elderini's request, to help with the tournament.

And that's a long drive to make for doing color commentary at a robotics tournament. Why come back?

"Because I love this school," Tjernagle said, and added that Elderini was that unique professor in his life who opened his eyes to the possibilities of robotics and engineering. Incidentally, Tjernagle works for Bloomington-based The Toro Company, which co-sponsored the event. The tournament's other sponsor was the Thief River Falls-based electronics distributor DigiKey.

Tjernagle said it was Elderini who led him to his career.

"A lot of the stuff that I learned here was through Tarek; I took mostly his classes," he said. "They directly translated to my career path."

Taking home the top award this year was Mechanical Engineering student Kannon Knutsvig, who received $500 with a first-place finish. His brother, Caden Knutsvig, came in second place, and also took the "last-man-standing award" from a robotic battle royale. Caden Knutsvig collected $300 and $200, respectively, from his combined awards.

Perhaps those awards gave the brothers something to talk (or argue) about over the Thanksgiving dinner. And a reason for revenge next year.

[Excerpt]

Written by Adam Kurtz // UND Today

GRAD DAY HIGHLIGHTS RESEARCH AT UND

UND grad students work toward energy advancements

Muhammad Alam, a doctoral student in electrical engineering, explored the viability of a method to keep wind and solar energy sources stable, even in unpredictable circumstances.

The U.S. aims to surpass 50% renewable energy use by 2035, Alam explained, but there are still kinks that need to be worked out. His research explores how artificial intelligence can optimize energy distribution and prevent disruptions when there's an unexpected spike in demand.

"In Northern California, temperatures hit 90 degrees in February this year," Alam explained. "That means millions of people turned on their air conditioners unexpectedly. That put a strain on the power. My research uses AI to ensure power systems remain stable and reliable."

Alam that he's interested in leveraging AI to relieve some of the stress on the grid, analyzing large data sets to predict weather patterns and energy production so that no one goes without power.

"We are just at the beginning of using AI in energy optimization," he said. "If we can integrate AI with traditional power systems, we can make renewable energy more reliable and efficient."

While Alam focuses on renewable energy stability, **Ashraf Mohammed**, a master's student in geological engineering, is working on a different solution: enhanced geothermal systems. His research targets the Deadwood Formation, a deep rock formation in North Dakota known for permeability — a factor that makes heat extraction challenging.

His solution? Injecting biopolymer gel to seal fractures in the rock, ensuring that heat remains trapped and can be efficiently transferred to the surface for electricity generation.

"We're testing whether biopolymer gel can block fractures and improve heat retention," Mohammed said. "Our simulations show that this method reduces temperature loss, making geothermal energy a viable clean energy source for the state."

With North Dakota's growing energy demands, enhanced geothermal systems could provide a reliable and sustainable alternative to fossil fuels, Mohammed suggests. His research, funded by the North Dakota Industrial Commission (NDIC), could play a vital role in bolstering North Dakota energy resources.

Mohammed, who took home first place in the Engineering category at the day's end, worked for the Ghana Geologic Survey Authority before coming to UND. He said that this research gave him a chance to study something new and expand his interests.

"I have a passion and love for anything subsurface. My background is in geophysics. So, any resource that is under our feet, I'm interested in it," he said. "This also happened to be a new area for me, and I was so fascinated by using heat from the ground to generate power. That's what really motivated me, and this kind of renewable energy can compliment our existing energy sources."

[Excerpt]

Written by Walter Criswell // UND Today

WHY I ♡ CEM

"I found my purpose conducting Ph.D. research in UND's National Security Corridor, building a space radar and applying Artificial Intelligence and Machine Learning techniques for space object identification. Through UND's SATLAB club, we use state-of-the-art facilities to design, build, test and launch satellites into space!"

Vig Parameshwar

Ph.D. Computer Science, Member of the Satellite & Aerospace Technology Lab Student Organization

ACHIEVEMENTS & AWARDS

UND Founders Day Awards

Lydia & Arthur Saiki Award for Individual Excellence in Service

Wayne Seames

McDermott Faculty Award for Excellence in Research and Creative Activity

Prakash Ranganathan

UND Award for Departmental Excellence in Research and Creative Activity

Department of Civil Engineering

VPAA Award for Outstanding Professional Academic Advising

Jill Caya

UND's first year in U.S. Air Force's Aerospace Propulsion Outreach Program

Joining a select group of top-tier engineering schools nationwide, UND was selected into the APOP program which funds university student teams to explore cutting-edge engine design while receiving feedback directly from top Air Force scientists. Read more on page 14.

CEM Dean's Outstanding Faculty & Staff Awards

Outstanding Faculty Awards:
Mahmut Ersan & **Ryan Striker**

Outstanding Staff Awards:
Angie Cantera & **Joe Egan**

UND Early Career Scholars Program

In a campus program that selects junior faculty from across the campus to initiate cross-disciplinary projects, **Ahmed Abdelhadi**, **Hallie Chelmo**, **Mahmut S. Ersan**, **Maria Goriacheva**, **Gautham Krishnamoorthy**, **Chonglin Zhang** and **Jielun Zhang** represented CEM in 2024.

Ahmed Abdelhadi, **Jesse Caviasca**, **Sattar Dorafshan**, **Tarek Elderini**, **Sherif Gaweesh**, **Daba Gedafa** (Senior Mentor), **Maria Goriacheva**, **Naima Kaabouch** (Senior Mentor), **Tingjun Lei**, **Daniel Laudal** (Senior Mentor), **Taufique Mahmood** (Senior Mentor), **Prakash Ranganathan** (Senior Mentor), **Carson Running**, **Sicong Shao**, **Clement Tang** (Senior Mentor), **Johannes van der Watt**, **Chonglin Zhang**, **Jielun Zhang**, represent CEM in the 2025 cohort.

3-Minute Thesis (3MT) Competition

First Place: **Rachael Josephs** (Energy Engineering)

Third Place: **Anabela Kajibanga** (Chemical Engineering)

Rachael Josephs will compete on the national stage in December 2025 following impressive regional finish at the 3-Minute Thesis Competition in Denver, CO. Read more on page 35.

GRAD Day 2025 Awards

First Place: **Ashraf Mohammed** (Geological Engineering)

Second Place: **Kobena Eghan** (Civil Engineering)

CEM Senior Design Expo

First Place Prototype: NASA Lunabotics

Mechanical Engineering team: Gunnar Anderson, Cole Graner, Kevin Jean-Baptiste, Michael Nordstrom, Dillon Schulz and Jacob Warrick.

Electrical Engineering team: Lucy Bevelacqua, Garrett Manley, Keith Harris, Zach Hilber and Samuel Alness.

First Place Research/Process: Sugar Beet Refining

Chemical Engineering team: Daniel Poynter, Erin Becker and Casey Michelsen.

David Loveday Scholarship

Civil engineering graduate student **Tihitna Mulugeta** has been awarded the David Loveday Scholarship, a nationally recognized honor in the water industry. Her research poster, titled "A Challenge for Full-Scale Prediction: Ion Exchange Resin Preparation Impacts Adsorption of PFAS during RSSCTs," impressed Water Quality Association's (WQA) Annual Convention attendees and judges alike with its technical rigor and relevance to pressing water quality concerns.

Fellow of the American Society for Metals International

Surojit Gupta has been elected a Fellow of the American Society for Metals International for his contributions in the field of materials science and engineering. An award-winning Fellow in the American Ceramic Society, Gupta was selected "for sustained contributions, leadership and mentoring in the area of advanced ceramics, composites and multi-functional materials and the development of green and sustainable manufacturing technologies," according to ASM.

University Cooperative Research Center for Infrastructure Security in the Era of AI

UND has been awarded a NSF grant to support its participation in the planning phase of the proposed Industry-University Cooperative Research Center (IUCRC) for Infrastructure Security in the Era of AI (ISEAI). **Prakash Ranganathan**, **Jielung Zhang**, **Sicong Shao** and **Diego Fregolent Mendes de Oliveira**, all assistant professors in the **UND School of Electrical Engineering & Computer Science**, and **UND Center for Cyber Security Research (C2SR)**, are the Principal Investigators of the grant.

UND STEEL BRIDGE TEAM ADVANCES TO NATIONAL STAGE

Regional Competition Results

1 Construction Economy	1 Construction Speed	1 Cost Estimation	1 Concrete Cornhole
2 Structural Efficiency	3 Stiffness	3 Lightness	2 Overall

2024 INDUCTION CEREMONY

ALUMNI ACADEMY

CEM's highest honor bestowed upon three alumni at the 19th annual Alumni Academy Induction ceremony.

On September 27, 2024, the University of North Dakota College of Engineering & Mines celebrated the achievements of three distinguished alumni during the annual Alumni Academy Induction Ceremony. Family, friends, and colleagues gathered to observe the induction into the Academy.

Roger Borg
Civil Engineering '63

Craig Kipp
Mechanical Engineering '78, '81

John O. Larsen
Electrical Engineering '87

Leaders of Today, Mentors for Tomorrow

The Alumni Academy Hall of Fame honors graduates whose careers have made a significant impact on their industries and communities. Their stories, preserved on plaques displayed in the Upson II Building, provide a source of motivation for current UND students by highlighting the achievements of those who once walked the same campus halls.

View the Alumni Academy Hall of Fame at engineering.UND.edu/alumni/alumni-academy

Roger Borg

Civil Engineering ’63

Roger Borg helped shape America’s Interstate Highway System, contributing 46,876 miles of transformative infrastructure. His master’s thesis introduced a forecasting algorithm that influenced early traffic planning.

Kraig Kipp

Mechanical Engineering ’78,’81

Kraig Kipp began at EAPC in Grand Forks, then led global expansions for GE, including its first Budapest office. He built China’s first wind turbine factory and took Boart Longyear public in Australia as CEO.

John O. Larsen

Electrical Engineering ’87

Over a 40-year career at Alliant Energy, John O. Larsen rose to Chair, President, and CEO. He led the company in launching innovative, sustainable energy solutions to meet changing customer needs.

Alumni Academy unites and welcomes newest members

Left to right: Dean Wieland, Mike Lodoen, Terry Severson, Dwight Wendschlag, Mark Thompson, Ronald Apanian, Craig Kipp, John Larsen, Jim Albrecht, Thomas Owens, Chuck Kummeth, Charles MacFarlane, and LeRoy Kuta.

2024 ALUMNI HONORS

CHUCK KUMMETH

From pumping gas in western N.D. to building a major global biotech conglomerate, engineer-turned-CEO attributes leadership preparation to his UND experience.

Charles "Chuck" Kummeth (EE'83) was working his summer job at a gas station in Glen Ullin, North Dakota, when a group of travelers pulled up in a convertible, looked around at his small town and surrounding fields, and asked Chuck, "Why do you live here?"

At the time, the high schooler didn't have a good answer. Forty-one years later after a career in corporate leadership that took him far from rural North Dakota, he now has the perfect answer for the curious convertible crew.

Chuck's electrical engineering degree from UND helped him land a job at 3M Corporation. Over the span of 24 years, he went from a lab coat to a suit coat, earning his MBA along the way. As vice president of the company's medical division and an international division director, he expanded 3M's products and services across the globe.

Chuck spent the last 11 years as CEO of S&P 500 company Bio-Techne Corporation, turning a shrinking company into a leader in the development, research, and manufacturing of life science tools and diagnostics. During his tenure, he oversaw 19 acquisitions, nearly quadrupled its employee count, and grew revenue from $311 million to $1.1 billion.

Chuck acknowledges creating a name in the industry took years of work, building a strong executive team, and overcoming hurdles. "Overhauling the company infrastructure to compete in a modern biology world was the ongoing challenge," Chuck explained. "The company didn't even have laptop computers when I started. I bought the first!"

While UND fueled his interest in digital electronics, it also prepared Chuck to become an effective industry leader, but not in the traditional sense.

"I was a 'B/C' student," Chuck explained. "I loved the schooling but was not a 'book' person. The work taught me discipline and focus. The knowledge learned – and mostly not used in years – was more a mental readiness process for me to become a leader."

The Alumni Honors is the second prestigious UND award Chuck has received, following his 2009 Engineering Alumni Academy honor. "I never dreamed I could get acknowledgment at this level… I was always the person who assembled the people who could then work together to crack the problem. I could never on my own."

Chuck and his wife, Angela, give back financially to the College of Engineering & Mines, recently establishing an endowed professorship within the School of Electrical Engineering and Computer Science to support faculty recruitment and retention incentives.

If given the opportunity, Chuck's response to the interstate excursionists of his youth would now go something like this: "I've always been proud of being from North Dakota. I put it in my speeches and bring it up as I meet people from around the world. I've racked up 4.4 million Delta travel miles in my career, but it's hard to describe the feeling I get every time I cross the border coming back into the state other than 'home.'"

Written by Jenn Lukens // UND Alumni Association & Foundation

UPCOMING EVENTS

Follow us on social media to stay informed about these upcoming events and more!

Join us during UND's Homecoming Week at the CEM Homecoming Social!

Fossil Preparation Sessions

Now through project completion
Wilson M. Laird Core & Sample Library, UND Campus

Do you like dinosaurs? We do too! We're looking for volunteers to help clean and stabilize the fossils of a duck-billed dinosaur called *Edmontosaurus*. Read more on page 36.

Visit **bit.ly/UND-Dinosaur** to register for a session.

University of North Dakota VEX Robotics Signature Event @ MOA

August 1-2, 2025
Mall of America

We're taking over the Mall of America this summer! The unofficial kick-off of the season, top middle and high school VEX Robotics teams will converge at this high-stakes competition. Read more on page 32.

Visit **bit.ly/UND-VEX** for more event information.

CEM Homecoming Social

September 19, 2025 // 5-7 p.m.
Collaborative Energy Complex, UND Campus

Calling all CEM alumni and friends! We're thrilled to invite you back to our annual Homecoming Social back on campus during UND's Homecoming Week. During the social, we invite you to join us on a tour of the new and changing spaces around the college.

Visit **bit.ly/CEM-Homecoming-2025** to RSVP.

Seattle Alumni & Industry Partners Gathering

October 23, 2025
Seattle, Washington Area

Connect with fellow UND alumni, friends, and industry partners to create lasting memories at the Museum of Flight in the Seattle metropolitan area.

Contact **Deb Austreng** for questions.

Cybersecurity Awareness & Research Symposium

October 28-30, 2025
Memorial Union, UND Campus

The IEEE Cyber Awareness and Research Symposium (CARS) is a premier event bringing together researchers, industry leaders, and students to explore cutting-edge cybersecurity challenges and advancements. Organized by the UND Center for Cyber Security Research, IEEE Red River Valley Section, IEEE Region 4 and University IT, CARS provides a unique platform for collaboration, knowledge sharing and hands-on learning in the evolving landscape of cybersecurity, artificial intelligence, and critical infrastructure protection.

Visit **ieee-cars.org** for more event information.

Twin Cities Alumni Gathering

October 2025
Minneapolis, Minnesota Area

We're coming to the Twin Cities area! Keep a look out on our social media for event details.

Contact **Deb Austreng** for questions.

BatSuBot Robotics Competition

Fall 2025
Memorial Union, UND Campus

At BatSuBot (a hybrid of BattleBot and SumoBot robot competitions), UND students are challenged to design, build and operate robots capable of forcing opponents' robots out of the ring. Everyone is invited to spectate and cheer on this bot-to-bot showdown! Stay tuned to our social media for more event details.

North Dakota VEX Robotics Signature

January 9-10, 2026
Alerus Center, Grand Forks, ND

After a successful inaugural event last year, we're once again hosting the North Dakota Signature, a VEX Robotics Signature Event. With activities and entertainment for all ages happening during the matches, everyone is invited to join in on the electric excitement! Read more on page 32.

Visit **bit.ly/UND-VEX** for more event information.

Harry Nyquist Birthday Party

February 6, 2026
Upson II First Floor, UND Campus

Grab a slice of birthday cake with us! Held in honor of famous inventor and CEM alumnus Harry Nyquist, this annual tradition celebrates the legacy of CEM students who go on to change the world.

The party will be held near the Nyquist memorial in Upson II. Born in Sweden on Feb. 7, 1889, Nyquist received his BSEE in 1914 and his Master's degree in 1915 from UND. As an engineer at Bell Labs, his work was the foundation for much of modern communication. He is famously known for the "Nyquist Frequency" and the "Nyquist Rate."

Visit **bit.ly/UND-Nyquist-Birthday-2026** for event info.

CEM Senior Design Expo

April 28, 2026
Memorial Union, UND Campus

The annual CEM Senior Design Expo is a showcase of student projects which highlights different areas in engineering, computer science and geology.

Visit **engineering.UND.edu/outreach/cem-design-expo** for more event information.

"HAPPY BIRTHDAY, HARRY!" SAYS UND

Harry Nyquist, famous inventor and UND alumnus, has his 136th birthday celebrated by the College of Engineering & Mines community

Last February, UND students, faculty and staff flooded the first floor of Upson II to celebrate the birthday of the man with a memorial built into the wall: Harry Nyquist. A Swedish-American physicist and electrical engineer, this famous UND alumnus made critical contributions to communication theory — something students in engineering and science learn about in classes today.

Stay up-to-date on upcoming events like these by following us on social media!

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Concept rendering provided by Clark & Enersen.

A LETTER TO OUR ALUMNI & FRIENDS

Every day, our students are pushing boundaries, exploring bold ideas and building a future we can all believe in. We hope that the stories in this issue resonated with a similar sense of pride we have in our students and the activity happening within the college.

For those who haven't heard: on the horizon is the new **STEM Complex**—a transformative space on campus that will spark innovation, collaboration and real-world learning like never before. More than just a new building, it's a launchpad where UND students will tackle today's toughest challenges and prepare to lead tomorrow's breakthroughs.

We are excited to share that the North Dakota legislature approved Phase 2 of the STEM Complex, and groundbreaking for Phase 1 is scheduled for this fall. This is your opportunity to be part of something extraordinary. Whether you lend your support through giving, mentoring, or simply staying connected, you're helping fuel the experiences that shape confident, capable engineers and scientists.

Want to see the future in action? Reach out to Robin or Brett to learn how you can contribute to this project or visit UND.edu/stem-complex.

Looking to reconnect? We want to hear back from you! Whether you're planning a campus visit, looking to engage with our students or meeting with our leadership and faculty, your alma mater is always open for you. Contact Deb to arrange visits and other opportunities.

Together, we build a place where the next generation of thinkers, creators and leaders will thrive. Let's shape what's next—starting now.

UND UNIVERSITY OF NORTH DAKOTA
COLLEGE OF ENGINEERING & MINES

Upson II Room 165
243 Centennial Drive, Stop 8155
University of North Dakota
Grand Forks, ND 58202-8155

ON THE COVER:

ANECHOIC TEST CHAMBER

The Anechoic Test Chamber, situated in the Mark & Claudia Thompson National Security Corridor, is a vital component of the college's space system development activity. The chamber provides for full antenna design and testing, as well as assurances of Electromagnetic Compatibility and reduction of Electromagnetic Interference.

blogs.UND.edu/cem

Want to hear more stories like these? Follow us on social media and visit our blog to stay tuned to all UND College of Engineering & Mines' latest updates and news.