



NDSU

COLLEGE OF
ENGINEERING

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FALL NEWSLETTER
NORTH DAKOTA STATE UNIVERSITY



A group of NDSU engineering students received a grant from NASA to develop and build a remote-controlled, solar-powered robot.

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ON THE COVER

The 2022 Senior Design Expo gave more than 80 student teams a chance to showcase their work for the campus community, alumni, public, and middle and high school students.



DEAR ALUMNI AND FRIENDS OF THE COLLEGE OF ENGINEERING,

It's been an exciting last few months on campus. Besides all the events for Orientation, Welcome Week and Homecoming, we also held the Inauguration for NDSU's 15th President, David Cook. Since starting in May, President Cook has outlined five key areas of focus for advancing NDSU's success and vision. They include:

- Enhancing enrollment, retention and academic success;
- Prioritizing our R-1 Carnegie classification status;
- Investing in the well-being of the people across our NDSU community;
- Building a stronger culture of diversity, equity and respect; and
- Embracing our critical role as a land-grant university.

These focus areas are well aligned with the strategic plan we created for the College of Engineering in 2020 and we are excited to be working collaboratively across campus on these important key areas of focus.

One of our strategic initiatives in the college is to build the leadership and innovation skills of our students. That's why I am thrilled the College of Engineering is the lead on a new \$14 million grant from the National Science Foundation to establish the Great Plains Innovation Corps Hub at NDSU.

The I-Corps program has a proven record of being an economic catalyst. During the next five years, this program will provide immersive training for an entrepreneurial workforce and bring cutting-edge technologies to market. I'm thankful for the leadership of David Grewell, chair of industrial and manufacturing engineering, who will serve as the director of the new Great Plains I-Corps Hub.

As an economic engine for North Dakota and the region, increasing enrollment and retention continues to be a top priority. This fall, we welcomed our largest freshman class to the College of Engineering since 2018. We're also investing in new programs to meet the demands of industry and prospective students and will be launching a new undergraduate degree in software engineering.

As you may have heard, a new engineering building was listed as NDSU's top priority in the capital projects request to the North Dakota Legislature. While there is still a long road ahead, we are excited to take this next step in the journey to securing funding for the project by sharing our story and vision with lawmakers, alumni and other stakeholders. We believe the outcomes of an investment in the College of Engineering will be transformative for all of North Dakota.

Finally, this will be my last newsletter message as dean of engineering at NDSU, as I will be starting a new position as the head and professor of materials science and engineering at Johns Hopkins University in January. I look forward to watching the continued upward trajectory of NDSU's College of Engineering from afar.

Thank you for your support for the College of Engineering. Go Bison!

Michael R. Kessler

Dean, NDSU College of Engineering



CREATING OUT-OF-THIS-WORLD TECHNOLOGY

A group of NDSU computer, electrical and mechanical engineering students developed and built a remote-controlled, solar-powered robot that could help build structures on the moon. The senior design project got NASA's attention, earned major awards and elements of the final product could end up on a future lunar mission.

The Pathbuilder team completed a large portion of the project in about a year with long, hard-working days and nights and support from NDSU faculty.

"We had a lot of professors there to help us," said Alex Hubbard, a recent computer engineering graduate. "They went out of their way to make sure we solved every problem that came up. NDSU has amazing people who helped us move forward with this project."

The NDSU robot was created to bulldoze and compact the moon's surface, which could allow structures to be built. The team's goal is to lay the foundation for future civil engineering projects on the moon and possibly help facilitate a sustained human presence.

The design was selected as one of seven national winners in the Moon to Mars eXploration Systems and Habitation Academic Innovation Challenge, which finds projects to assist the Artemis missions for NASA's Moon to Mars explorations. The prize was \$34,000 to further innovate the idea.

The project gave students valuable hands-on experience with design, research, development and manufacturing. It also helped hone teamwork, leadership and presentation skills.

"This project was a blast," Hubbard said. "It was amazing to think about all that we learned, created and built at NDSU. We jumped in, worked together and loved the entire process."



RESEARCH ON THE EDGE

Danling Wang, assistant professor of electrical and computer engineering, and Jen Li, professor of computer science, have been awarded more than \$1.4 million from the National Science Foundation to develop cutting-edge healthcare technology using artificial intelligence.

The project is a collaboration between six universities and several private-sector partners in North Dakota, Alabama and Arkansas. The team's goal is to integrate research expertise from several areas, including sensor development, nanotechnology, 3-D printing and Edge AI to build a smart, wearable device to predict the onset of diabetes by monitoring a patient's own breath without the need for a doctor to interpret the results.

"This project will enable a transformational advancement in the capabilities of AI in edge devices by developing new algorithms, hardware, sensors and devices," Wang said. "Multiple patents and intellectual property are expected from this effort and our team will work with existing industry partners or spin-off small businesses for commercialization."



Wang



Li

It also will provide hands-on opportunities for NDSU students, allowing them to apply the knowledge they learn in the classroom to scientific research solving a real-world problem, and creating an education-to-workforce pipeline that can fuel North Dakota's economy.

"Local companies such as Sanford and John Deere have shown their support for this project," Li said. "The workforce training program of the project will provide high-quality potential employees for the community and the proposed Edge AI technology can benefit local industries such as agriculture and manufacturing."

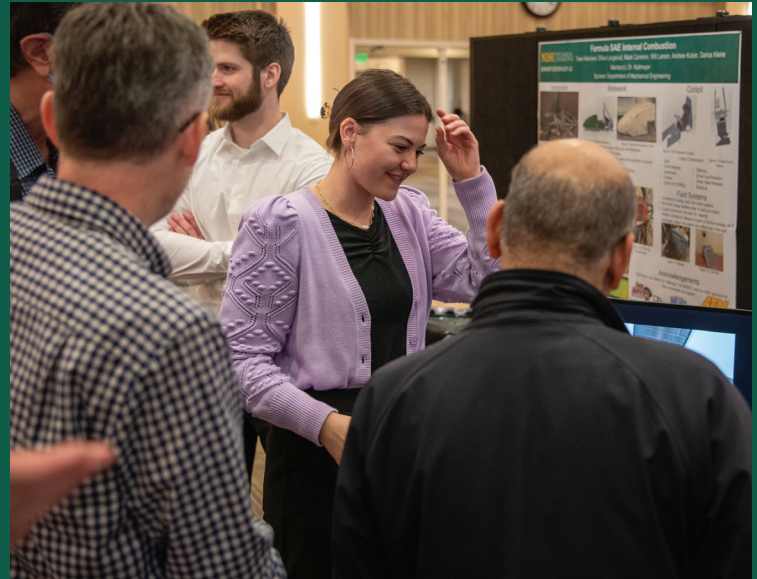
Other workforce development efforts include training high-school teachers in lessons to improve high-school students' knowledge and skills in AI-integrated curricula and establishing an online Edge AI certificate program designed for industry professionals.

The lead institution on the project is the University of South Alabama; the collaborating institutions are NDSU, the University of Arkansas, the University of North Dakota, Alabama A&M University and Nueta Hidatsa Sahnish College.



A SHOWCASE TO SHINE

THE NDSU COLLEGE OF ENGINEERING'S SENIOR DESIGN EXPO GIVES STUDENTS A CHANCE TO SHOWCASE THEIR WORK FOR THE CAMPUS COMMUNITY, ALUMNI, PUBLIC, AND MIDDLE AND HIGH SCHOOL STUDENTS.



The May 2022 event featured the work of more than 80 senior design teams from the Departments of Agricultural and Biosystems Engineering, Computer Science, Construction Engineering and Construction Management, Electrical and Computer Engineering, Industrial and Manufacturing Engineering, and Mechanical Engineering.

“Every major in the College of Engineering concludes with a capstone experience. The course draws upon our students’ entire education and immerses them in hands-on projects, typically for actual business and industry clients,” said Michael Kessler, dean of the College of Engineering.

Design teams work on their projects for one or two semesters depending on the program. Many work closely

with an industry sponsor who also serves as a mentor and provides valuable guidance.

“Going into this project the framework was completely new to us and our sponsor was there every step of the way helping us. It was a really great experience,” said Devin Gluesing, a computer science major.

“Our group really worked well together,” said Amy Bodvig, an industrial engineering and management major. “It was just a great experience to see these are the kinds of questions and meetings you’ll have in the business once you graduate.”

The College of Engineering’s capstone program is designed to help students develop critical skills by allowing them

to apply the knowledge they learn in the classroom to solve a real-world problem.

“We are preparing students for a lifelong career, and we want them to be ready for what comes next when they graduate with a degree from NDSU,” said Ali Amiri, assistant professor of practice in the Department of Mechanical Engineering.

“It’s a lot more than a class,” Gluesing said. “It’s as close as you’re going to get to the real business world, I’d say.”

The 2023 Spring Senior Design Expo is scheduled for Thursday, May 4.



ALUMNI NEWS

ALUMNUS PUTS DEGREE TO WORK



NDSU alumnus John Olhoft is at the epicenter of the 3D printing universe. As president of Fargo's LulzBot and its parent company, FAME 3D, his NDSU degree has been indispensable.

"The engineering degrees at NDSU prepare you to be a professional problem-solver," said Olhoft, BS '17, agricultural and biosystems engineering. "It doesn't matter what the issue is, you're able to take all of the given information, assess what you're trying to find out and then develop a solution."

Those steps are fundamental, he said, in any engineering career.

"When we're designing, developing and deciding if what we're making is a good idea, or if we're vetting a supplier or a decision on material choices, that technical background is invaluable. It provides me with the ability to interpret what I'm faced with, take a technical approach and use that to say if this is possible or if it's a bit far-fetched," he said.

Olhoft knew little about 3D printing in college until a fraternity friend used a homemade 3D printer to replicate a miniature boat.

"My mind was blown," Olhoft said. "The next day, I want over to Fargo 3D Printing and I said, 'You're hiring me. I need to learn more about this.'"

He started his first company, Fargo 3D Printer Repair, in 2018 with his father and NDSU senior lecturer Matt Olhoft.

In November 2019, Olhoft and two partners, Cooper Bierscheid and Ron Bergan, formed FAME 3D to purchase the LulzBot brand's assets. They packed the company's equipment on 28 semis in Loveland, Colorado, and moved everything to Fargo, opening in the new location Jan. 1, 2020. The new company built its first 3D printer two weeks later.

"At this point, we are the biggest and one of the only desktop 3D printer manufacturers in the U.S.," Olhoft said, noting the company has five different model lines. "This past July, we launched a brand-new printer that is 100% Fargo-designed, Fargo-built. We do all business operations here in Fargo. Our newest model is the most affordable printer we've ever made, so we're hoping for a lot higher volume on that line."

With just over 75 employees, LulzBot utilizes an onsite print farm with 300 printers to manufacture many of its own parts to build its printers.

Among LulzBot's clients are universities, schools, the military, hobbyists, hospitals and large manufacturers, such as Tesla, John Deere and Ford.

And it all started at NDSU.

"It's been a pretty adventuresome journey," Olhoft said.

FIND OUT HOW YOU CAN GIVE BACK TO THE COLLEGE OF ENGINEERING: [NDSU.EDU/COE/ALUMNI](https://www.ndsu.edu/coe/alumni)

FORMER ENGINEERING DEAN RECEIVES IMPACT AWARD



Stanislawo

Joseph Stanislawo, dean of the NDSU College of Engineering from 1975-1993, was named the inaugural recipient of the College of Engineering Impact Award.

The College of Engineering created the award to recognize individuals for their contributions to the college. Stanislawo was selected as the first recipient for his commitment to excellence, dedication to the mission of the college and vision for the future.

While at NDSU, Stanislawo was instrumental in bringing the Robert Perkins Center for Computer Technology Transfer to campus in 1985, doubled the number of degrees offered by the college and saw enrollment increase from 657 students to more than 2,500.

In 1991, he received the first Economic Development Award at NDSU for his substantial contribution to the economic development of North Dakota through teaching, research or service activities.

JOHNSON HONORED WITH DISTINGUISHED ALUMNI AWARD



Johnson

NDSU alumnus Dennis Johnson was named the recipient of the 2022 College of Engineering Distinguished Alumni Award.

Johnson earned his bachelor's degree in electrical and electronics engineering from NDSU in 1971 and master's degree in industrial engineering from NDSU in 1974.

After graduation, he joined TMI Systems Corp., located in Dickinson, North Dakota, as plant industrial engineer. He became president in January 1982 and has served continuously as either president, chief executive officer or board chair since.

Johnson is a member of Bank of North Dakota's advisory board and a member of the board of directors of MDU Resources Group Inc. He is a former director of the Federal Reserve Bank of Minneapolis.





EMPOWER THE NEXT GENERATION

The Society of Women Engineers at NDSU is teaching the next wave of female scientists at outreach events throughout the year. One event, “Dads and Daughters Do Science,” invites elementary age girls and their fathers to engage in activities that showcase engineering.

“The Society of Women Engineers mission is to empower women to achieve their full potential as engineers and leaders,” said Sabrina Kase, past president of the organization and a mechanical engineering graduate. “Outreach is a core part of our mission. By hosting outreach events like DADDS, we hope to empower the next generation of leaders through STEM education.”

At the event, girls complete experiments that showcase different types of engineering. Members of NDSU’s chapter of the society explain how engineering concepts relate to the activities during active experiments.

“Getting the opportunity to learn about science and engineering in a fun way from women in engineering is so impactful for young girls,” Kase said. “It not only shows them that STEM is fun, but that one day they can be an engineer if they want to.”

Other events hosted by the organization include “Mommy, Me and SWE,” “Tech Kids” and “Tech Teens.”

“I always look forward to these events because they bring me back to when I was a kid playing with Legos and bottle rockets,” Kase said. “It reminds me that engineering can be fun. And, to top it off, seeing the joy our events bring to the kids is unmatched and can brighten any bad day.”

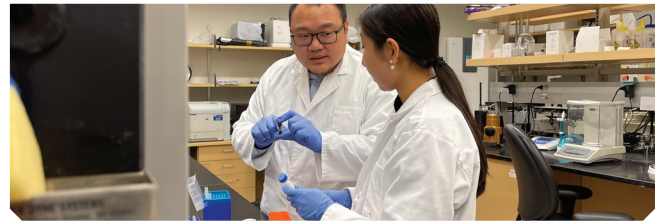
COLLEGE HAPPENINGS CANCER RESEARCH

Dali Sun, assistant professor of electrical and computer engineering, was awarded nearly \$400,000 from the National Institutes of Health to study new ways to find and treat pancreatic cancer.

Sun’s research focuses on exosomes, small amounts of protein, DNA and RNA, which are released by cells and can be found in bodily fluids. His goal is to use the exosomes released by pancreatic cancer cells to both find the disease earlier and develop new treatments to fight it.

“This exosome-driven observation has the potential to help develop new treatments that selectively targets tumor cells, protects normal cells and increases the length and quality of life for patients,” Sun said.

Sun’s work also creates an opportunity for NDSU undergraduate and graduate students to get hands-on experience working on cutting-edge biomedical research.



ENGINEERING STUDENT RECEIVES ASTRONAUT SCHOLARSHIP

NDSU senior Max Salzer has been awarded the Astronaut Scholarship for the 2022-2023 academic year. Salzer, who is from Barnum, Minnesota, is majoring in mechanical engineering and minoring in robotics.

“It is an honor to receive such a prestigious scholarship,” Salzer said. “I am excited to represent NDSU as I meet my fellow scholars who include the best and brightest of the next generation. With their help, I look forward to shaping a better tomorrow.”

The Astronaut Scholarship Foundation was created to ensure that the United States maintains its leadership in science and technology by supporting some of the best science, technology, engineering and mathematics college students.

The foundation awarded its first seven scholarships in 1986 when each founding Mercury 7 astronaut sponsored a \$1,000 scholarship. The foundation now awards more than 60 scholarships valued up to \$15,000 to each selected scholar.



STUDENTS SHINE AT NATIONAL CYBERSECURITY COMPETITION

NDSU students took top spots in the spring 2022 National Cyber League individual competition. Eight students placed in the top 10% of more than 3,000 participants and two ranked in the top "Diamond-1" medal category.

An additional 11 students received diamond-level medals, 16 received platinum medals, 10 received gold medals, three received silver medals and four received bronze medals. Overall, 56 NDSU students participated in the competition.

National Cyber League provides students an exciting competition environment to learn and demonstrate their cybersecurity skills.

"The competition showcases students' technical and problem-solving skills," said Jeremy Straub, NDSU Cybersecurity Institute director and assistant professor of computer science. "NDSU students can show employers throughout the country that they are well prepared for real cybersecurity jobs."

COLLEGE OF ENGINEERING AWARD WINNERS

The College of Engineering has announced the 2022 college award winners.

Teaching

- Excellence in Teaching Award – Mijia Yang
- Early Career Teaching Award – Abdul-Aziz Banawi
- Graduate Teaching Assistant of the Year – Zhaofan Li

Research

- Excellence in Research Award – Zhibin Lin
- Early Career Research Award – Wenjie Xia
- Graduate Research Assistant of the Year – Amirhadi Alesadi

Staff

- Outstanding Staff Award Paraprofessional – Ruth Wirtz
- Outstanding Staff Award Professional – Rob Sailer

FACULTY AWARDS

KESSLER NAMED NATIONAL FELLOW



Michael Kessler, dean of the NDSU College of Engineering, has been selected as a fellow member of the American Society of Engineering Education.

Kessler was among nine new fellows honored during the 2022 ASEE annual conference held in Minneapolis.

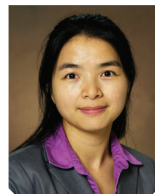
GREWELL RECEIVES NATIONAL AWARD



David Grewell, professor and chair of industrial and manufacturing engineering, was selected by his peers to receive the R.D. Thomas Memorial Award.

Grewell was chosen for the award for his contributions to the activities of the International Institute of Welding. He was recognized during the annual awards recognition ceremony in Chicago.

\$6 MILLION RESEARCH INFRASTRUCTURE AWARD



Ying Huang, associate professor of civil, construction and environmental engineering, is the principal investigator on a cooperative agreement from the National Science Foundation that will create an artificial intelligence research center.

The goal of the four-institution collaboration is to prepare a knowledgeable workforce with the skills to create tools that leverage AI within a broad cross-section of industries.

SRINIVASAN WORKS TO IMPROVE CYBERSECURITY



Sudarshan Srinivasan, professor of electrical and computer engineering, has been awarded more than \$350,000 from the National Science Foundation to develop new ways to protect private data. His latest project is focused on finding ways to protect computer systems from Spectre, a security flaw discovered in 2018.

PROMOTIONS

PROMOTED TO FULL PROFESSOR

- ▶ **Jordi Estevadeordal**, mechanical engineering
- ▶ **Roger Green**, electrical and computer engineering
- ▶ **Long Jiang**, mechanical engineering

PROMOTED TO ASSOCIATE PROFESSOR AND AWARDED TENURE

- ▶ **Ravi Yellavajjala**, civil, construction, and environmental engineering
- ▶ **Qifeng Zhang**, electrical and computer engineering
- ▶ **Yan Zhang**, mechanical engineering

EMERITUS APPOINTMENTS

- ▶ **Thomas Bon**, agricultural and biosystems engineering

NDSU

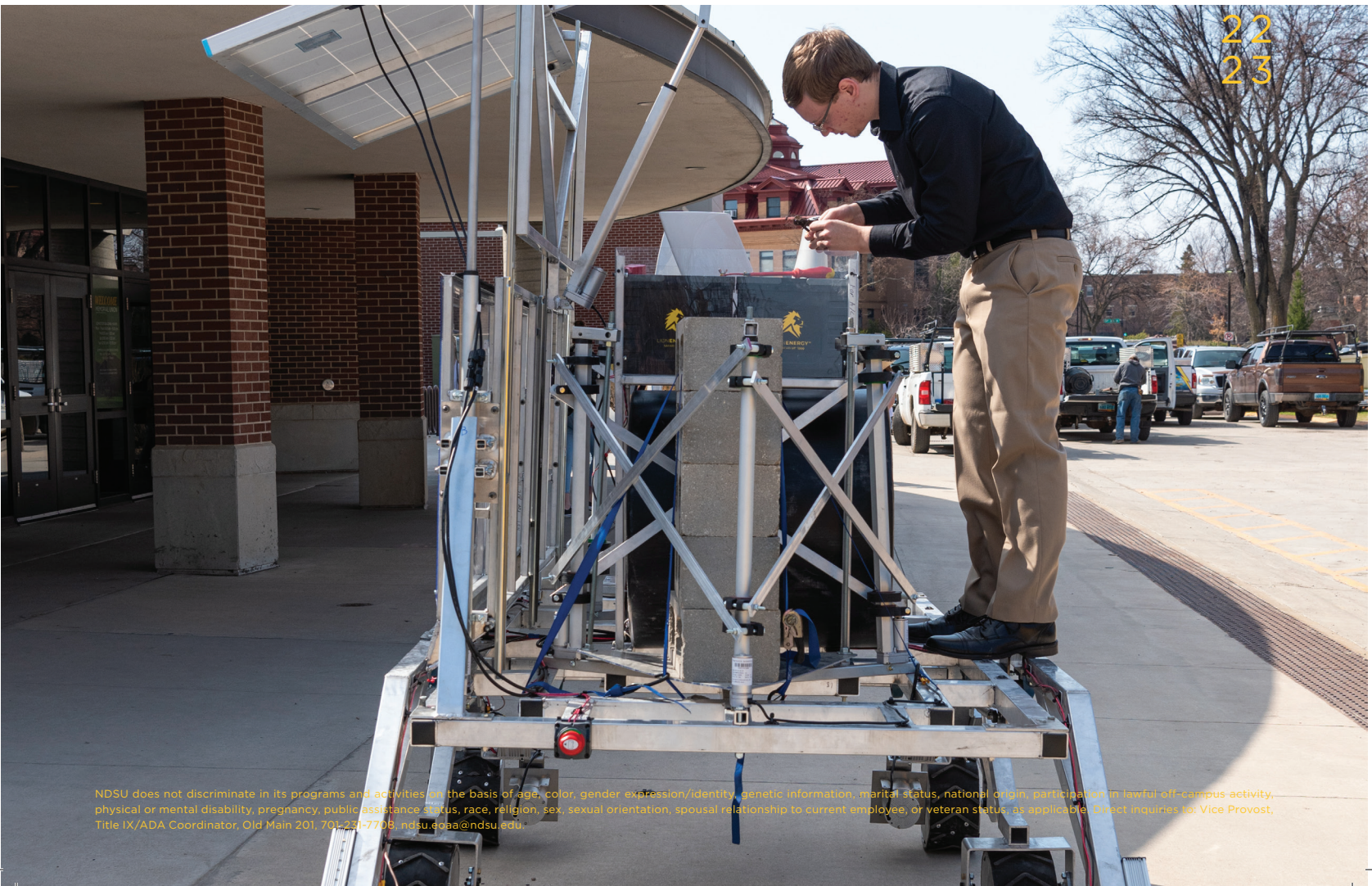
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