



# IMPULSE

JEROME J. LOHR COLLEGE OF ENGINEERING



THE BALANCING ACT:  
FOOTBALL & ENGINEERING



SPRING 2023

# HONORS AROUND — AND NOT JUST ON THE GRIDIRON

Greetings from the Jerome J. Lohr College of Engineering.

Wow! What an introduction this has been for me to life as a Jackrabbit. So many wonderful things have happened in the college and the university since we published the last Impulse. It is hard to believe my first academic year here is almost complete.

Winter has been a little longer than I expected, but the beauty of the white, fluffy snow on the ground and hoarfrost on the trees is breathtaking and makes you forget about the heavy coats.

The spring semester will close in a flurry—Dean’s Advisory Council welcome dinner and recognition of engineering students on the FCS championship team on April 25; Engineering Expo, Jackrabbit Engineering Day and the Engineering Banquet on April 26; and Commencement and Order of the Engineer on May 6.

It has been so satisfying to witness the dedication to excellence by the college’s staff, faculty and students. That is exemplified both in the classroom and outside. Certainly, a shining example of this is the SDSU football team, which won the Football Championship Series national title Jan. 8 in Frisco, Texas. That team had 10 students majoring in engineering, including MVP Mark Gronowski. You can read about his dedication on pages 10-12.

Gronowski, one of SDSU’s best mechanical engineering students, said, “I always think that how you do anything is how you do everything. If I’m going to be competitive on the football field, then I’m going to be competitive in the classroom. If I want my best there, then I have to do my best at everything I do.”

That “be the best you can be” attitude seems to be the Jackrabbit way. I find that not only in Mark and his teammates—four engineering majors were named to the District All-Academic team—but also in students whose extracurricular achievements aren’t on the football field.

So far, two SDSU entries in NASA contests have advanced to the finals. By the time you read this, we may have a third team qualify.

The prestige and challenge to build a project for a NASA contest both attracts and excites students. To quote one student, “It’s been one giant learning experience.” And that was even before the students started on the final phase of their project.

The FLOATing DRAGON (Formulate, Lift, Observe And Testing; Data Recovery And Guided On-board Node) and Break the Ice Lunar Challenge teams will have completed most of their construction by the end of the semester as most of them graduate, but the actual NASA testing won’t be until this summer and fall.

These aren’t the only engineering students competing in academic-related extracurriculars. For instance, the quarter-scale tractor team wants to defend its national title. Our human-powered vehicle team is traditionally a national contender, and our Baja and Formula vehicle teams continue to become more competitive.

As dean, I see my role as being both resource manager and cheerleader for the college. I want to encourage these students to continue to put their heart and soul into these projects because of both the personal gratification they gain and for how it puts them a step ahead of the other applicants as they enter the work world.

As resource manager, I want to be sure these students have the resources, tools and state-of-the-art labs they need to excel and achieve their highest potential. The most important resource our students have is the open access to our world-class faculty who are dedicated and go above and beyond to ensure student success.

That’s where our alumni and friends come in.

Thank you to those who participated in this fall’s One Day for STATE, responded to phone calls from the university’s Jackrabbit Philanthropy Center or joined the Dean’s Club. It’s that kind of support that helps our students be the best they can be.



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### ABOUT THE COVER

**MARK GRONOWSKI**, a third-year mechanical  
engineering student in the Jerome J. Lohr College of  
Engineering, quarterbacked the SDSU football team  
to its first-ever national championship in January.  
See his story on page 10.

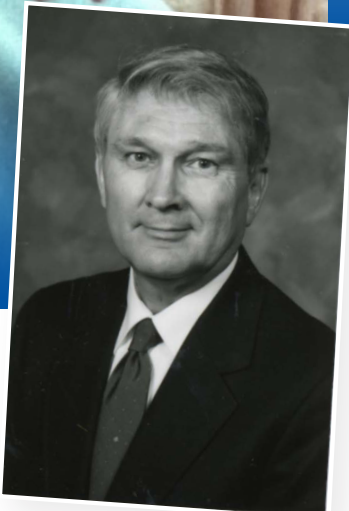
# IMPULSE

SPRING 2023



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## DEWEY ROLLAG | LONGTIME CIVIL DEPARTMENT HEAD KNOWN FOR CARING SPIRIT

Dwayne Allen “Dewey” Rollag, who taught civil engineering at SDSU for 31 years and served 20 years as department head, died March 11, 2023, at Surprise, Arizona, under the care of family and hospice.

Rollag, 92, had been wintering in Arizona. He moved to Sioux Falls after retiring as department head in 1999.

Rollag is remembered as a well-liked supervisor, a challenging instructor and an influential leader, especially in water and wastewater engineering. He served on many related organizations, including the South Dakota section of the American Water Works Association, the South Dakota Water Pollution Control Association and the South Dakota Engineering Society.

In November 2009, Rollag received the Gold Water Drop Award from the American Water Works Association for lifetime achievement.

But the strongest memories of Rollag are those held by the people he influenced.

### ‘SUCH A GREAT MAN’

One was Marsia Geldert-Murphey, a 1992 graduate who now is the regional director for Lochmueller Group in Troy, Illinois, and president-elect of the American Society of Civil Engineers. “He was such a great man who truly made a profound difference in my life.”

She gave a couple examples.

“I was accepted to SDSU but not to the civil engineering department until I completed some math and science classes I did not have in high school. After the first semester, I earned all A’s and B’s, and Dr. Rollag was genuinely more excited than I was by the results and told me I would be accepted to the civil engineering department.

“He knew I was a first-generation college student and that I was working several jobs while attending school and active as an ASCE student chapter member, so he would check in with me occasionally to see how I was doing.”

### ADVICE THAT STEERED A CAREER

Rollag was true to his word.

Geldert-Murphey said, “Before graduation I was offered a job with the Illinois Department of Transportation in Collinsville, which is part of the St. Louis Metro area. Dr. Rollag shared his concerns about me going to an urban area from rural South Dakota.

“During my exit interview he gave me the advice that I should find someone who could be my trusted adviser at IDOT and make sure they help me navigate this new area; he told me to make sure I speak up and speak up forcefully if I do not feel comfortable.

“At that time I had no idea how valuable that advice would ultimately prove to be. (But) I listened to him and found a trusted adviser, and I did speak up forcefully when I found myself in troublesome situations on the construction site where I was assigned. His advice empowered me when I followed it and had effective results.

“His advice was essentially ‘use your voice,’ and I did then, and that was the building blocks of the confidence and voice I have today as a worthy civil engineer. My only regret is I wish I could have told him how much his support and advice meant to me.”

### ‘MOST INFLUENTIAL GUIDE TO MY CAREER’

Delvin DeBoer, an SDSU Distinguished Engineer and professor emeritus of civil and environmental engineering, said, “Dr. Rollag was far and away the most influential and supportive guide to my professional growth and career. I am ever grateful to have known him.”

DeBoer, who earned his bachelor’s and master’s degrees from State in 1978 and 1980 and is now with Advanced Engineering and Environmental Services in Sioux Falls, said, “I was not at all interested in chemistry until I took his water supply engineering class. He showed how chemistry was practically applied in water quality and the water treatment processes, and suddenly chemistry was relevant and interesting.

# ENGINEERING HALL



Left: Dewey Rollag, center, gathers with colleagues Delvin DeBoer, left, and Jim Dornbush, early 1980s.



Above: Civil engineering faculty members Dewey Rollag, second row, far left, Chuck Tiltrum, third row, far left, Delvin DeBoer, third row, far right, and Jim Dornbush, top row, far right, gather with graduate students on the steps of Crothers Engineering Hall, circa 1984.



Dewey and Helen Rollag at a spring training game in Phoenix in March 2019.

“He ignited a passion for chemistry that caused me to choose water supply engineering over geotech and structural disciplines.”

## MENTORED HIS SUCCESSOR AT STATE

Rollag taught at SDSU from 1965 to 1999, minus a three-year sabbatical in 1968-71 to pursue a doctorate at Purdue University.

He became a full professor in 1977 and replaced the retiring Emory Johnson as department head on July 1, 1979. He retired at age 69 in 1999 and was replaced by Vern Schaefer, whom he had been mentoring for the position.

Schaefer, who had a geotechnical emphasis when he earned his bachelor’s degree at State in 1978, joined the SDSU faculty in 1988. “In the last few years he was chair, he mentored me through some of what to expect in becoming a department head and let me go to ASCE department head meetings,” said Schaefer, who retired from Iowa State in June 2022.

As a professor, Rollag was a “stickler for learning things. He always had closed-book tests, and you really had to study hard. ... He was an excellent classroom instructor,” said Schaefer, now of Silver Lake, Minnesota.

As a supervisor, “he was one of the best bosses I ever had. He let you have a free hand as long as you stayed within the rules.”

## LED PLANNING FOR STRUCTURES LAB

Rollag’s supervisor, Dean Duane Sander, noted that it was during Rollag’s later years at SDSU that the planning was done for the renovation of Crothers Engineering Hall and the construction of Lohr Structures Lab.

Dedication of the \$6.95 million project was Oct. 4, 2002, and included the 24,000-square-foot structures lab on the southeast corner of Crothers.

Arden Sigl, who wrote one of the first justifications for the lab, said Rollag was known for personally visiting with the faculty and gaining an array of information before tackling a project.

Sander, who served as dean from 1987 to 1999, said Rollag was a “well-liked department head and professor who was easy to get along with. He helped a lot of students as their adviser and with his connections gave them an opportunity to get some of their first jobs.”

## CAME TO ENGINEERING BY CHANCE

Rollag’s own entry into the engineering field was somewhat by chance. He was born June 18, 1930, in Steen, Minnesota. At age 6, he moved to Rock Rapids, Iowa, where he graduated from high school and then enrolled at the University of South Dakota as a music major, following a lifelong love for music.

But late in his college education, he took a summer job as a surveyor and discovered his passion for engineering. He transferred to the University of Minnesota and earned a civil engineering degree in 1959.

Before joining the SDSU faculty, Rollag spent six years working for Mohr and Associates, consulting engineers in Luverne, Minnesota.

His doctorate, which he earned in 1975, was in sanitary engineering.

## TAUGHT LIFE LESSONS OUTSIDE THE CLASSROOM

A colleague of Rollag was Jim Dornbush, a nationally recognized wastewater engineer who retired from full-time faculty service in 1990 but continued to teach part time for several years.

DeBoer recalls, “Dr. Rollag (Dewey) and Dr. Dornbush (Doc) and their wives, Helen and Maxine, met for breakfast/coffee most Saturday mornings at Ione’s Café on main street in Brookings. On occasion they invited grad students to join them.

“It was such a pleasure to learn of their lives outside of the classroom. I feel this was one of their ways to help us see how ‘life’ can be lived and help us grow personally as well as professionally.”

## FUNERAL PLANNED FOR SUMMER

A celebration of life service will be planned for this summer. Burial of cremains will be at the Maplewood Cemetery in Luverne. In lieu of flowers, the family requests that memorials be directed to the Dwayne and Helen Rollag Scholarship Endowment in Civil Engineering at SDSU in care of the SDSU Foundation, 815 Medary Ave., Brookings, 57006 or online at <https://givenow.sdstatefoundation.org>.

Dave Graves

# BASU TO DEVELOP TESTING PLATFORM FOR NASAL SPRAYS, ORAL INHALERS



Saikat Basu, an assistant professor in mechanical engineering, has received grant funding to develop and design a digital platform that will assess the targeted delivery of a wide range of nasal spray and oral inhaler products.

The one-year, \$99,710 grant comes by way of the recently established Haarberg Center for Drug, Disease and Delivery Exploratory

Grant Program, housed in SDSU's College of Pharmacy and Allied Health Professions.

The Haarberg 3D Center is funded by the South Dakota Board of Regents, with a goal of advancing research commercialization of biomedical technologies through university, industry and clinical collaborations. Recently, the center received a \$1.1 million gift from Kevin and Lorie Haarberg and a planned gift of \$10 million.

Basu, who was awarded the grant Feb. 6, plans to create a digital platform that will be the first of its kind and will calculate the efficiency of nasal sprays or oral inhalers for drug delivery to clinical target sites along the nose, nasal cavity, mouth and throat.

Basu said it will take his previous work on modeling particle transport along the respiratory pathway to the next level by creating a digital interface that can quickly predict respiratory drug delivery for a wide range of drug formulations and delivery devices.

The underlying research behind Basu's project is that commercially available airway drug delivery devices have different features that can impact where their particular drug is delivered inside the respiratory cavity. Basu's previous research understands that the size of the sprayed particles, the

density of the drug formulation, the angle of the device, and the speed at which the drug droplets and aerosols are released all can affect where the drug gets deposited.

## COMPANIES WOULD PAY TO USE

By building upon previous research and utilizing state-of-the-art, experimentally validated computational fluid dynamics modeling, Basu will gather parameters from a wide array of nasal sprays and oral inhalers. He will use that data to create a digital platform where pharmaceutical companies can test their formulations and devices by inputting their own product-specific numbers.

The outputs from the platform will be predictive estimates for targeted drug delivery for a wide variety of respiratory diseases.

As Basu notes, there are a large number of drug delivery companies for nasal sprays and oral inhalers on the market. This new platform would be accessible to them for a fee.

"The companies will be able to plug in their numbers, and then the platform will be able to figure out what the targeted delivery should be for their product and whether it is going to be therapeutically effective or not," Basu explained.

## STRONG MARKET FOR PRODUCT

The global market for nasal spray and oral inhaler products was valued at \$17.5 billion in 2021. With a rise in chronic respiratory diseases globally, the annual market growth rate is projected at 8.96%, with a forecasted market size of \$38.4 billion by 2030.

"The market for this work is there and will continue to be there," Basu said.

Three pharmaceutical companies—Aptar Pharma, Dr. Ferrer Biopharma, LLC and Fractal Therapeutics—have already committed their support to this project.

Basu will work with two graduate-level students to assist with the simulations, experiments and testing needed to acquire baseline information. Basu expects that the research team will have a viable digital platform ready for use after the 12-month grant funding is complete. Further, he said there may be opportunities for federal-level funding to improve this platform in the future.

*Addison DeHaven*



# GENT NAMED OUTSTANDING RESEARCHER



Stephen Gent, a professor in the Department of Mechanical Engineering and director of the North Central Regional Sun Grant Center, was named the college's outstanding researcher at the university's Celebration of Faculty Excellence Feb. 21.

Gent's research team has secured funding from the National Science Foundation, the U.S. departments of energy, commerce, transportation, defense and agriculture as well as private industry. Gent has advised dozens of students in his research lab whose core focus is the development and implementation of high-fidelity simulations to realize products and processes in engineered and biological systems.

His research portfolio includes high-energy particle physics, tissue engineering, renewable energy, implantable medical devices, water treatment facilities and agricultural systems. Gent's team has published more than 75 peer-reviewed manuscripts and one textbook.

## KEYNOTES



**PROFESSOR ZHONG HU**, mechanical engineering, delivered a keynote speech at Material Science and Nanotechnology 2022, a Dec. 1, 2022, virtual webinar delivered by ISGMP International, which conducts webinars and conferences on a large gamut of science medical technology research topics.

Hu's talk was "Characterization of materials, composites, nanomaterials by nanoindentation."

Hu also gave a keynote speech at the 2nd Material Science Nanotechnology Congress organized by ISGMP International, a Feb. 24 virtual event. The title of his keynote was "Review on functionalized CNTs, hydrogen bonding, and CNT modified polymeric nanocomposites."

## NEW STAFF



**JESSICA WINGLE**, a native of Arlington, joined the Department of Civil and Environmental Engineering in June as a senior secretary.

Prior to coming to SDSU, Wingle worked temporarily in Northwood, North Dakota, as the live-in manager for the Northwood Inn and North Brew Coffee Shop, Laundry Mat & RV.

She worked as an administrative assistant at Brookings Health System from 2014 to 2021 and worked at the Arlington Inn for 18 years.

Wingle has two daughters, MaKayla, a 19-year-old sophomore at Mayville State, Mayville, North Dakota, and MaKenna, a 13-year-old eighth grader in Brookings.

In her free time, Wingle enjoys spending time with family and friends as well as enjoying lake life, which is good since she lives at Lake Campbell.



# SMALL GIFTS, BIG IMPACT

## TARGETED DONATION COMES AT RIGHT TIME FOR ME LAB

Mechanical engineering department lab coordinator Todd Letcher punched in the numbers for replacing the eight computer numerical control machines being used by the lab.

The total came to \$84,000. It may as well have been \$840,000. There was no way the department could swing that, Department Head Yucheng Liu said. Letcher then looked at buying used CNC machines to do milling, lathe work and grinding. That \$30,000 price tag was still beyond the budget, Liu said.

But Letcher and lab manager Tyler Hanks knew status quo wasn't acceptable. The CNC machines were about 25 years old and were difficult to repair because spare parts weren't available. So they devised a plan to refurbish the machines by purchasing updated software, controls and sensors for \$4,000.

Thanks to an anonymous gift of \$10,000 per year for the next five years to support the department's lab, this was an option the department could handle.

Liu, who learned of the news in October 2022, said the donation "is very helpful and provides us some security. I'm very grateful for our friends and many loyal alumni."

The CNC machines are integral to the freshmen-level Production and Fabrication Processes class and lab as well as for other students who use the lab to design, manufacture and test their prototypes, including parts made by the department's competitive teams, such as Formula SAE, Baja buggy racing and the human-powered vehicle team.

### BANDSAW, SHEET METAL BRAKE PURCHASED

Letcher, an associate professor, said the funds also have been used to purchase a new horizontal bandsaw to "replace our old saw that barely worked anymore. We also made a significant upgrade to our capabilities in the shop by purchasing a sheet metal brake to bend metal parts."

He added, "With the upgrades in shop equipment, our ME 121 course, which is usually taken by students in their first semester

on campus, will see immediate upgrades. The very first piece of equipment that the students use each semester is the bandsaw, which is used to cut aluminum stock down to size for their first project.

"In the next section of the class, the students will spend about half the semester using the newly refurbished CNC machines.

"The last project of the semester will be new and will involve bending and welding. We are hoping that with the new additional bending equipment and a little bit of experience bending sheet metal in ME 121, students can make parts for projects in new ways for things like senior design projects and some of the competition design teams."

Any remaining funds from this year's donation will be used to buy lab supplies, Liu said.

### MORE LABS IN NEED OF UPGRADING

In future years, Letcher said, "We will shift the focus of the funding to make upgrades to teaching labs to enhance the experience in all our upper-level mechanical engineering labs. The timing of the funding is perfect because our department recently finalized a plan to modernize our labs, which means completely revamping our lab curriculum from top to bottom.

"Labs are being rearranged to better coordinate with the lecture courses taken at the same time. In addition, we are modernizing all aspects of the labs to include modern methods, techniques and concepts. Our students will be even more prepared with the new lab curriculum, the new experiments and the new equipment.

"In each future year, we will use the funding to upgrade the next batch of labs. During this phase, we'll use a combination of newly purchased lab equipment and senior design teams to upgrade and modernize old lab experiments."





Adam Cowl, a junior mechanical engineering major, operates the new bandsaw in the production lab in the Chicoine Architecture, Math and Engineering Hall.

Zac Bergjord, a senior mechanical engineering major, operates the sheet metal bender in the production lab in the Chicoine Architecture, Math and Engineering Hall.

## SCHOLARSHIP GROWTH HIGH PRIORITY

In addition to lab equipment upgrades, Liu said a high priority of his is increased scholarships.

Looking at enrollment numbers, Liu said mechanical engineering had 394 students in 2021-22, and this year there are 367 students. In late January, the department had admitted 234 students.

“My job is to convert admitted students to enrolled students. A lot of students just need a little nudge, and I think a scholarship would do that,” Liu said.

The department currently has 45 scholarships providing \$84,000 worth of aid each year. He would like to see growth both in the number of scholarships and their amounts. Liu believes the department is heading in the right direction. He noted that One Day for STATE produced \$4,115 for the department in 2021 and \$13,660 in 2022.

Liu attributes that to increased communications with alumni and supporters through a monthly email and newsletters each semester.

*Dave Graves*



## AGGIO SEEKS TRUCK FOR ENGINE, TRANSMISSION STUDY

With the building of the Raven Precision Agriculture Center, the agricultural and biosystems engineering department has obtained a state-of-the-art chassis and PTO dynamometer for classroom instruction and research. The main goal of the dynamometer is to better teach engines and transmissions to students.

Repeatable power performance is desired to provide predictability and uniformity for teaching. Agco has generously loaned the use of a Massey Ferguson each year for use on the dyno. The tractor typically features 150 to 190 HP and a continuously variable transmission.

We'd like to enhance the instruction of the dyno by utilizing a diesel-powered manual transmission truck for permanent use and instrumentation. This would aid in the instruction of power transmission, drivetrains, power efficiency, turbo machinery, thermodynamics and heat transfer.

The truck is preferred to be a 1995 or newer Dodge Ram Turbo Diesel truck with a manual transmission. This is requested because it has an OBD (on-board diagnostics) II port for obtaining engine data, a manual transmission to lock the vehicle into gear to obtain true engine performance data, the renowned Cummins engine that is popular across the commercial and ag industries and would be a reliable drivetrain for years of academic use.

Aside from a truck, the department would also request a cutaway of the truck's drivetrain for gear ratio and efficiency analysis. The coupling of both the truck and cutaway will allow for students to make theoretical predictions of engine performance and compare those predictions to actual test results. This will give visual demonstration of a multitude of topics in power transmission, diesel engine performance, heat transfer and more.

This will be a great aid to academic instruction in the ag engineering and mechanical engineering classes. The truck wouldn't have to be in roadworthy condition. The department's main use for the vehicle would be for less than half a dozen dyno tests a year. Therefore, the main goal is that the driveline of the truck is sound for testing. The body would be welcome to have character to aid in memories for the students.

The provision of this equipment would provide years of consistent powertrain performance teaching material to our students, better equipping them for their future careers in the workforce.

Potential donors are asked to contact lecturer Douglas Prairie at [douglas.prairie@sdstate.edu](mailto:douglas.prairie@sdstate.edu) or 605-688-5658.

*Paul Schlotman*

*Senior agricultural and biosystems engineering major*

# SDSU ROBOTICS RECEIVES \$10K GRANT

The robotics club at South Dakota State University was better equipped to enter a collegiate combat robotics contest this spring after receiving a \$10,000 grant.

The SDSU Robotics Club received notice Jan. 27 that it was among 100 college robotics organizations receiving a \$10,000 award from the Norwalk Havoc Robot League in Norwalk, Connecticut. The grants are designed “to help inspire innovation and provide robotics teams with resources they need to reach their full potential,” the league stated on its website.

Hailey Gruber, president of the SDSU Robotics Club and a mechanical engineering major from Richmond, Minnesota, said the funds were used to purchase materials and pay competition costs for a March 18 contest in Norwalk.

SDSU entered teams in the 3-, 12- and 30-pound divisions. In the contests, robots go head-to-head with another team’s robot for three minutes in an enclosed cage with the goal of advancing to the league’s final four.

All told, there were more than 200 entries and SDSU didn’t have a final four contestant. However, “we did gain a lot of knowledge on what changes are needed to make next year’s robots better and stronger,” Gruber said.

The club is a regular participant in the Norwalk Havoc Robot League. In fact, at a May 2022 contest, SDSU’s entry in the 30-pound division qualified for the championship in December. However, a winter storm prevented the team from attending.



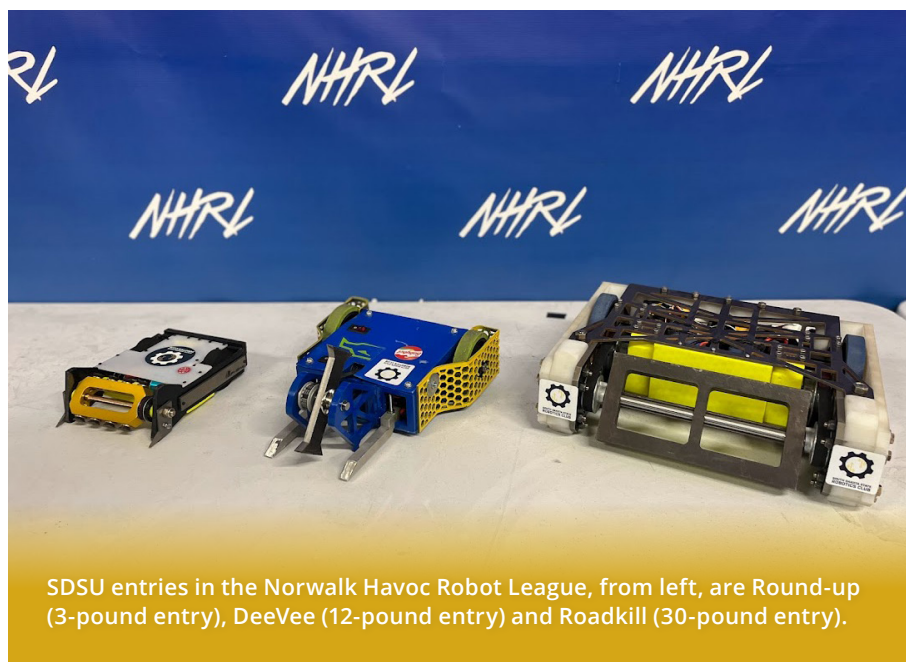
SDSU Robotics Club members, from left, Keegan Visser, Connor Olson and Maverick Beckmann work on the assembly of a 30-pound robot, nicknamed “Roadkill,” which they entered in a collegiate combat robotics contest March 18. The club has received a \$10,000 grant to help its robot-building efforts.

“That made this next trip much more exciting,” Gruber said. Because the contest was during spring break, students left Wednesday, March 15, and stopped in Chicago to tour downtown and Shedd Aquarium before completing the 22-hour drive to Norwalk on Friday evening.

The SDSU Robotics Club has 25 active members. Students from any major are welcome.

In addition to collegiate combat robotics, the club is working for an alumnus to build an autonomous sprayer to spray pesticides to control Japanese beetles in a vineyard.

*Dave Graves*



SDSU entries in the Norwalk Havoc Robot League, from left, are Round-up (3-pound entry), DeeVee (12-pound entry) and Roadkill (30-pound entry).



## SDSU'S LUNAR PROJECT CATCHES EYE OF NASA JUDGES

Members of the Break the Ice Lunar Challenge team gather around the aluminum dump truck that will haul "lunar" soil. Front row, from left, are Elaine Hines, Eric Derr, Devin Lundberg, Justin Dicks, Tate Mueller, Brock Heppner, Ben Louwagie and Dante Tarabelsi. Back row, Allea Klauenberg, Max Selbach, Mike Gross, Austin Lohsandt, faculty members Todd Letcher and Jason Sternhagen, Tom Neumeister, John Ziegelski, Parker Brandt, Carter Waggoner and Zac Bergjord.

Judges from NASA and other experts have selected a proposal from a group of SDSU engineering students to compete with 14 other teams in the next stage of the \$3.5 million Break the Ice Lunar Challenge.

Most of the SDSU students are seniors completing their final semester.

"Only 15 teams from around the world were accepted. It looks like about three or four teams are from universities, and the rest of the teams are established aerospace engineering companies or startups," Todd Letcher, an associate professor in mechanical engineering, said.

"Of all the teams, we're probably the only team primarily consisting of undergraduate students. We have one mechanical engineering graduate student, 12 mechanical engineering undergraduate students, two electrical engineering undergraduate students, one recent mechanical engineering alumnus helping outside of his regular full-time job and two faculty members (electrical engineering's Jason Sternhagen and Letcher).

"I'm very proud of our team's accomplishments so far. It's exciting to be in the mix with experienced professional full-time engineers and scientists."

### SDSU BUILDS ON TOP FINISH IN 2021

On Dec. 14, NASA announced the 15 teams it had selected to move on to build and test full-size prototypes. The list includes teams from India and the Netherlands as well as Redwire Space of Jacksonville, Florida, a publicly traded corporation with 522 employees in eight locations that focuses on space commercialization. In 2021, Redwire won the \$125,000 top prize in the first phase of the NASA competition.

SDSU was one of 10 finalists in that competition (teams finishing fourth through 10th weren't ranked) and received a \$25,000 prize.

In the second phase of the NASA competition, the 13 U.S. teams

will receive equal shares of NASA's \$500,000 prize purse. Letcher said that \$38,500 will be paired with the \$25,000 from 2021, the majority of an earlier \$10,000 grant from the South Dakota Space Consortium and smaller sponsor contributions to build an excavator, a dump truck, a battery-swapping rover and a battery charging station.

Twenty-five teams competed in the Phase II Level 1 contest. Teams were tasked with designing a robotic system for digging and moving large quantities of icy moon dirt, or regolith, which is found in the coldest, darkest places on the lunar surface.

In Level 2, the teams have until early fall to build and test their prototypes. The team's equipment must be able to run 15 days straight and excavate 1,760 pounds (800 kilograms) of icy lunar soil per day and transport it to the drop site about one-third of a mile away, Letcher said.

### TEAM INCLUDES 3 RETURNEES FROM '21 SQUAD

Three members of the SDSU team were part of the successful 2021 team—Ben Diersen, a May 2022 mechanical engineering graduate from Brookings; Austin Lohsandt, a mechanical engineering graduate student from Madison; and Brock Heppner, a mechanical engineering senior from Crookston, Minnesota.

Lohsandt has worked with Letcher since spring 2021 on the Break the Ice Lunar Challenge and in summer/fall 2021 worked on a Moon to Mars Ice & Prospecting Challenge in which the space agency sought ideas from college students on how to collect water from underground ice deposits on Mars. SDSU was a top 10 finalist in that contest, too.

His experience in designing equipment to operate in low-gravity environments was helpful in Space Trajectory's design work for the current project. "I understood the ins and outs of what would work and what wouldn't work and understood the need for time management and creating project goals so little things don't come back to bite you," Lohsandt said.

*Dave Graves*

# THE BALANCING ACT: FOOTBALL & ENGINEERING



Mark Gronowski had an eventful semester last fall at South Dakota State University.

A third-year mechanical engineering student, Gronowski completed a rigorous academic schedule in the Jerome J. Lohr College of Engineering, culminating with a 3.71 GPA—quite the accomplishment for any student.

Ask any mechanical engineering major studying in Crothers Engineering Hall and they'll tell you the workload keeps them very busy. Gronowski will say the same thing: mechanical engineers are busy with labs, homework and classes. What makes Gronowski unique amongst the rest of the mechanical engineering students is the other thing that kept him busy last fall: quarterbacking the SDSU football team to its first-ever national championship.

Each accomplishment on its own—3.71 GPA and an FCS National Championship—is impressive, but together, by the same guy in the same semester, is borderline unprecedented. How does Gronowski do it?

It's a precious balancing act between academics and athletics—both areas in which Gronowski is very competitive. Take, for example, last year when one of his professors put out a class ranking. Gronowski immediately made it a goal to be No. 1 in the class.

"I always think that how you do anything is how you do everything," Gronowski said. "If I'm going to be competitive on the football field, then I'm going to be competitive in the classroom. If I want my best there, then I have to do my best at everything I do."

## BECOMING AN ENGINEER

When Gronowski first came to SDSU in fall 2020, he thought he wanted to go into something business related. Only after talking to some of his high school science teachers back in Naperville, Illinois, did he decide to explore some of the other majors SDSU offers.

"They told me I should try engineering since I liked math and was pretty good at it," Gronowski explained. "I've always loved math and I've always loved science, so I decided to give it a shot."

Within his first few weeks on campus, Gronowski declared as a mechanical engineering major and has stuck with it ever since.

"As I've slowly started to go through all of the classes, I've

started to really enjoy them and have found a lot of interest in what I'm doing," Gronowski said.

"Mark was a student of mine for four courses over two years, and he never gave the impression of someone with split priorities," said John VerSteeg, a lecturer in the college. "He showed up to class, gave his full attention and completed all his work on time. He would regularly participate in class discussion and distinguished himself by thoughtfully demonstrating his concern for internalizing the meaning of the content of the courses, rather than attempting to memorize facts and move on."

As quarterback, Gronowski is expected to be a team leader, attend film sessions, show up for practice, weight rooms and conditioning, fulfill media obligations and even volunteer his time—all on top of a full course load. How does he manage to successfully balance academics and athletics?

"The biggest thing is using my time management skills successfully," Gronowski said. "In high school, I played three sports, so it was kind of an all-year-round thing. That really helped me develop the time management skills I have now."

The most important skill Gronowski points to is using any free time he gets to study. This is especially important during the fall.

"If I get 30 minutes open, I'm going to try and knock out homework," Gronowski explained. "Every chance I get, I'm trying to use that time for something I can benefit from, either in the classroom or on the football field."

Other strategies he has developed include finishing all homework and academic obligations early in the week, so the final day or so leading up to a Saturday game can be focused solely on football. This is especially important because the team has to miss class on Fridays to travel to games.

"The professors and instructors are so understanding, and they know I'm going to miss maybe five or six Fridays every fall," Gronowski said. "They do a really good job of keeping me informed about what's going on and helping me out with things as they come up."

"If it weren't for the occasional absence for an away game, you'd never know he was juggling an intense athletic schedule alongside his academics," VerSteeg added.

Sundays are the team's days off, so Gronowski will usually





spend them catching up on classes. When he is absent, the lectures from the classes he missed will often be sent to him. During the fall, this means that Gronowski's Sundays resemble most students' Mondays.

Gronowski isn't the only student-athlete to follow a schedule this rigorous. As of last fall, there were 10 football student-athletes who had an engineering major. Among the 10 are Mason McCormick and Bo Donald, two offensive linemen who were instrumental in keeping Gronowski healthy during the Jackrabbits' national title run.

Of course, it's not all analyzing opposing defenses and working through engineering problem sets for Gronowski. There are some moments to be a "normal" college student. In the Jacks' team room, there is a ping-pong table that gets used throughout the season. Who, according to Gronowski, is the best player on the team?

"Zach (Heins) is by far," Gronowski said without hesitating. "I'm good, but him, Regan Bollweg and the rest of the tight ends are the guys running the ping-pong table."

### 2023 AND BEYOND

The past few months have been a whirlwind for Gronowski and the rest of the football program. First, the Jacks claimed their first national championship in dominant fashion, handling rival North Dakota State University 45-21. Days after the victory, the winningest—and longest tenured—coach in SDSU football history, John Stiegelmeier, announced his retirement. Longtime assistant Jimmy Rogers was promoted to the head position shortly thereafter.

Now that the dust has settled, Gronowski and the rest of the Jackrabbits can focus on the task at hand: repeating as national champions. While most of the previous year's team returns, Rogers at the helm will add a new element to the program that is exciting for both the players and the SDSU faithful.

"Rogers has been here for 17 years, and he's learned a lot from Stig," Gronowski said. "He's

going to keep all the same values that Stig had, but I think he's going to bring us to a whole other level by pushing every single day.

"I'm excited," Gronowski added. "He's a big energy guy."

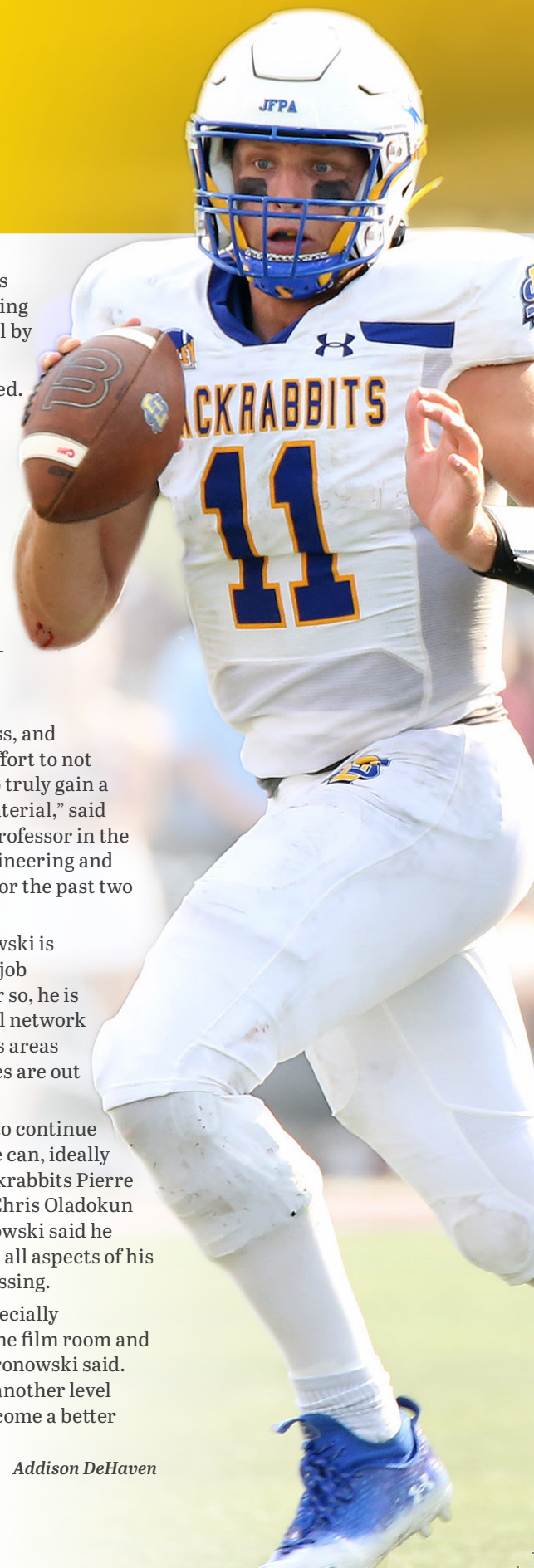
As for Gronowski's future plans, that is to be determined. Currently, he is on track to graduate in four years, but with more than two years of eligibility remaining, Gronowski is considering pursuing a master's degree in an engineering or management-related field.

"Mark is an excellent student who asks great questions in class, and I can tell that he is making an effort to not only get good grades, but also to truly gain a strong understanding of the material," said Gregory Michna, an associate professor in the Department of Mechanical Engineering and Gronowski's academic adviser for the past two years.

Outside of academics, Gronowski is weighing his options for future job prospects. Over the next year or so, he is looking to build his professional network in the Brookings and Sioux Falls areas to determine what opportunities are out there for his particular field.

Of course, Gronowski wants to continue playing football for as long as he can, ideally at the level to which former Jackrabbits Pierre Strong Jr., Dallas Goedert and Chris Oladokun have climbed. To do that, Gronowski said he needs to continue to improve in all aspects of his game, but particularly in his passing.

"Spring ball is going to be especially important, but so is getting in the film room and studying different defenses," Gronowski said. "That's going to help me get on another level mentally, which will help me become a better passer."



Addison DeHaven

## ACADEMIC ALL-DISTRICTS

Among the eight SDSU football student-athletes named as members of the 2022 Academic All-District Football Team, four are from the Lohr College of Engineering. They are:



**Mark Gronowski**  
Junior quarterback  
Naperville, Illinois  
3.71 GPA  
mechanical engineering



**Ryan Van Marel**  
Graduate defensive tackle  
Sheldon, Iowa  
3.5 GPA  
mechanical engineering



**Mason McCormick**  
Senior offensive lineman  
Sioux Falls, South Dakota  
3.55 GPA  
construction management



**Adam Bock**  
Senior linebacker  
Solon, Iowa  
3.82 GPA  
mechanical engineering



On the basketball court, **HALEIGH TIMMER**, a 4.0 mathematics major, was one of two SDSU players named to the five-player Summit League Women's Basketball Academic All-League Team.

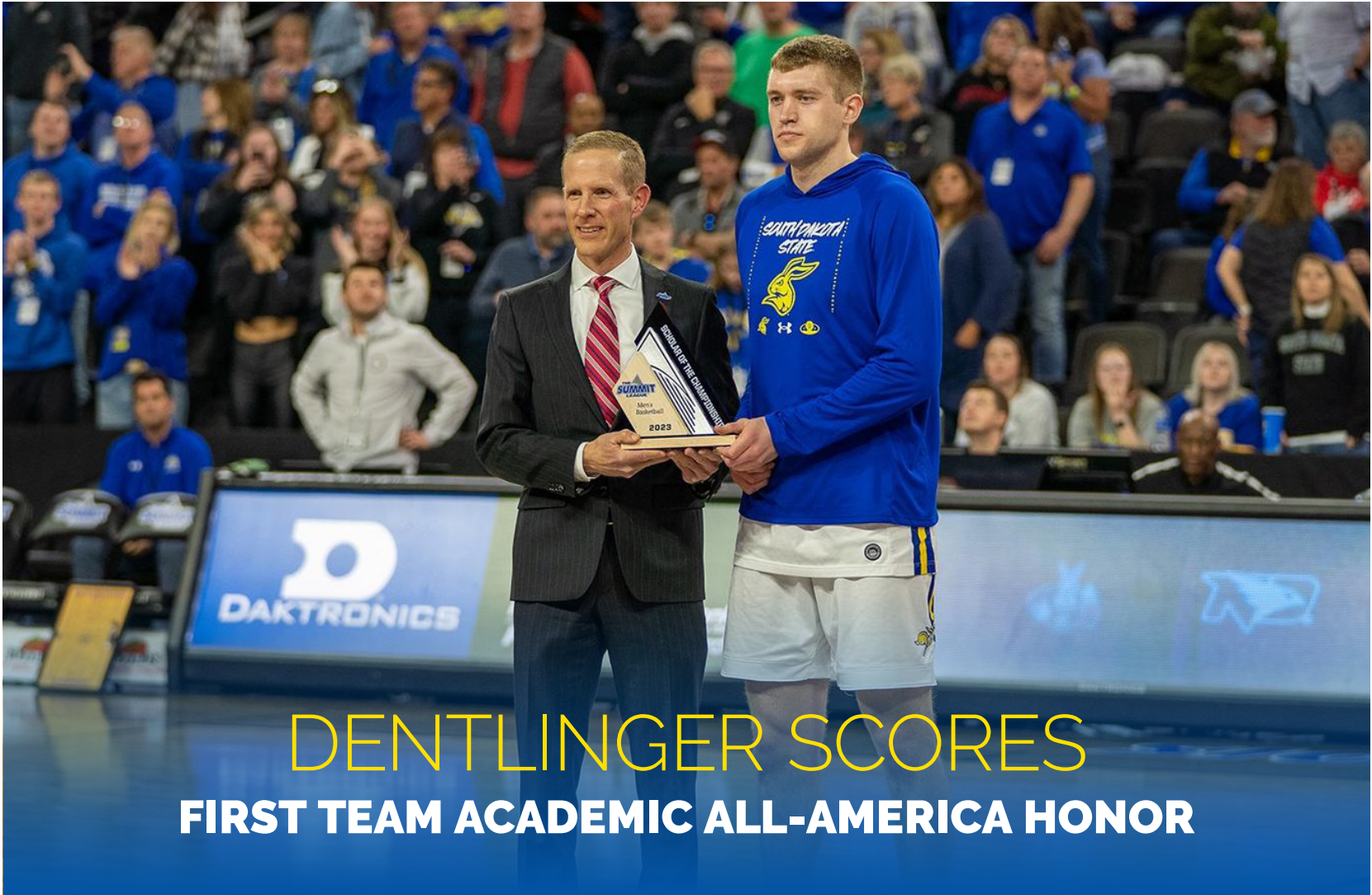
Timmer was SDSU's second-leading scorer this year with 12.1 points per contest to go with 3.6 rebounds and 1.6 assists, on average. Timmer earned a spot on the Summit League Second Team and was named the MVP of the Summit League Tournament.

To be eligible for the Academic All-League team, a student-athlete must have a cumulative GPA of at least 3.30, completed at least one full academic year at the current institution and participated in 50% of her team's competitions.

## BROOKINGS HOME SHOW

Members of the Construction Management Club and the concrete industry management program work the children's table at the Brookings Home Show Feb. 4-5. Pictured, from left, are Subashri Buck, Logan Prouty, Patrick Wilde and Brock Aleshire.





# DENTLINGER SCORES FIRST TEAM ACADEMIC ALL-AMERICA HONOR

Matt Dentlinger became the first person in South Dakota State men's basketball history to become a three-time Academic All-American when the College Sports Communicators announced their selections March 14.

Dentlinger, who arrived on campus in fall 2017, already has earned his bachelor's degree in mechanical engineering in 2021 with a 4.0 GPA and holds a 4.0 GPA as he completes a master's degree in electrical engineering.

Dentlinger is only the sixth Jackrabbit to be a three-time Academic All-American in SDSU Jackrabbits Athletics history. He's the third SDSU men's basketball player to ever be a first team Academic All-America selection and only second at the Division I level, joining Brayden Carlson in 2014.

Dentlinger also was honored prior to the team's quarterfinal game at the conference tournament as the Men's Scholar of the Championship.

The Arcadia, Iowa, native was one of six Division I men's basketball student-athletes to earn First Team Academic All-America honors. Dentlinger is one of seven players listed to earn repeat Academic All-America accolades.

His First Team Academic All-America honors in 2022-23 follow a second team selection in 2021-22 and third team selection in 2020-21.

Summit League Commission Josh Fenton presents engineering graduate student Matt Dentlinger with the Scholar of the Championship Award at the Summit League Tournament in Sioux Falls March 11. Photo credit: Ceara Lasley

Dentlinger was a Second Team All-Summit League performer on the court this season as he started in all 32 games for the Jackrabbits. He averaged 14.9 points and 5.8 rebounds per game in conference play while leading the league in 18 games in field goal percentage (62.4%). Dentlinger scored in double digits in 16 of the last 19 games of the season, which included two of his career-best 26-point efforts. He became SDSU's all-time games played leader with a total of 154 appearances in yellow and blue.

In 2020, he was part of a four-student design team competing against teams across the nation in a NASA-sponsored contest dubbed "Moon to Mars Ice and Prospecting Challenge." SDSU was among 10 teams chosen for final competition at Langley Research Center, Hampton, Virginia.

*Dave Graves*

# JOCELYN TANNER



“What do you think you’re more competitive in, soccer or math?”

Jocelyn Tanner, South Dakota State University’s goalkeeper and a graduate student pursuing mathematics, hesitates to answer. It’s a tough question for her. Being a 4.0 student in the Jerome J. Lohr College of Engineering while also being named the Summit League’s Goalkeeper of the Year two years in a row is no easy task. How does she do it?

“See, I’m a little competitive,” Tanner said. “I’ve always wanted to just be the best that I can be.”

It’s difficult to pinpoint exactly where Tanner’s competitiveness stems from, but she can remember when she became interested in mathematics. During third grade—back in her hometown of Ham Lake, Minnesota—her class was beginning to learn about multiplication. Rather than wait for her teacher’s instruction, Tanner taught herself.

“I finished the assignment before the teacher was done talking,” Tanner said. “I go to my teacher and said, ‘Look, my dad taught me how to multiply.’ Then I go to my dad and said, ‘Dad, I taught my teacher how to multiply,’ and he said, ‘I didn’t teach you that.’ I guess I must have taught myself.”

Tanner points to her parents’ guidance as to where her academic talent and passion comes from. Her mom, Melissa Christie, is a 1992 SDSU electrical engineering graduate.



Grade school was around the same time when Tanner began developing her other passion: goalkeeping. Originally, she didn’t want to play goalkeeper because she thought it was going to be boring and would rather play in one of the more “exciting” field positions, like striker. Her opinion on the position quickly shifted, however.

“I was like, ‘Why would I ever want to play goalie? That’s boring,’” Tanner explained. “They put me in once, and I realized how fun it was. I never stopped after that.”

Tanner continued her athletic and academic prowess throughout middle school and high school, eventually playing club soccer for the prestigious Minnesota Thunder Academy and becoming the top-ranked student in her graduating class. She did have one blemish on her otherwise exemplary record: an A- in her last math class of high school.

“I never looked at the grade because I didn’t want to know,” Tanner said. “I couldn’t tell you what my exact GPA was in high school.”

At SDSU, Tanner has excelled. After redshirting the 2019 season, she took over in net during the COVID-induced spring 2021 season, recording a 3-0-2 record in net and 18 saves. In 2021, she got even better. With 18 starts, she posted a 13-4-1 record, helped the Jackrabbits to the Summit League Championship and was named the Summit League’s Goalkeeper of the Year.

Outside of soccer, Tanner has been active on campus, working



as a research assistant under Thomas Brandenburger, an associate professor in the Department of Mathematics and Statistics. Their work investigates credit line management and will continue through the next six months.

Tanner has also helped her fellow student-athletes as a tutor for the athletic department.

“I have tutored a football player, a track and field athlete, a basketball players and then two of my teammates,” Tanner said. “I like being able to help people out.”

With so much going on, how does she keep everything straight?

“It’s being strict about your time commitments, especially when soccer takes up a lot of time,” Tanner said. “I prioritize school, soccer, family, faith and then the rest can fit in. Our coaches are really good about helping us prioritize, and my professors have always been really great, especially when I’m missing class during the fall.”

This past fall was Tanner’s best season yet and one of the best goalie seasons in SDSU soccer history. She finished the year first among all Division I women’s soccer goalkeepers in goals-against average (.316) and was second in save percentage (.897) while helping lead the Jacks to a 13-1-5 record. For the second year in a row, she was named the conference’s goalkeeper of the year and became the third-ever Jackrabbit to be named a Division I Academic All-American.

“The story of Jocelyn’s career is one that will be told often within the Jackrabbits Soccer program,” said Brock Thompson, SDSU’s head soccer coach. “She was essentially our third-string goalkeeper during her third year with our program and transformed herself into the two-time Summit League Goalkeeper of the Year and one of the best goalkeepers in the nation this past season. It’s a story that highlights what’s possible with the right mindset and a willingness to preserve through difficult moments.”

Because of the pandemic, Tanner has two years of eligibility remaining to play goalie for the Jacks. Currently, she is on course to complete a master’s degree after having completed her undergraduate degree in three years. Once her eligibility is complete, she is hopeful to continue playing soccer, likely in a professional soccer league overseas.

Her dream job is to someday work in sports as a data analyst.

*Addison DeHaven*

# STUDENT SUCCESS

SDSU’s **American Indian Science and Engineering Society** student organization received three top national awards at the organization’s annual national conference Oct. 6-8, 2022, in Palm Springs, California.

It received the Chapter of the Year Award for overall achievement by a college chapter in the promotion of the principles and goals of the American Indian Science and Engineering Society. SDSU chapter President Cierra Sazue said the local group hosted a variety of events in the past year, including the 2022 Region 5 conference, various speakers, cultural events, fundraisers, community service and outreach, and community-building events.

The chapter received the Recruitment and Retention Award for a large increase in members as well as retention of current members. The SDSU chapter grew from six members to around 40 in one year.

The chapter received the Partner Service Award for providing exceptional support for AISES staff and the organization. Sazue said the SDSU chapter was honored for supporting minority students on campus through outreach, vocalizing concerns and bringing awareness to various issues.

The mission of the American Indian Science and Engineering Society is to increase the number of Native Americans pursuing degrees in science, technology, engineering and math.

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Computer science graduate students **Marisa Schulz** and **Emma Spors** and undergraduate **Kari Bates** co-authored the winning research paper “Spatial Analysis of Breast Cancer Mortality Rates in a Rural State” with associate professor Semhar Michael. It was published in the Centers for Disease Control and Prevention’s journal Preventing Chronic Disease and took a look at standardized incidence ratios for breast cancer in all 66 South Dakota counties.

It was selected by the journal as the winner in the 2022 master’s degree student research paper category.

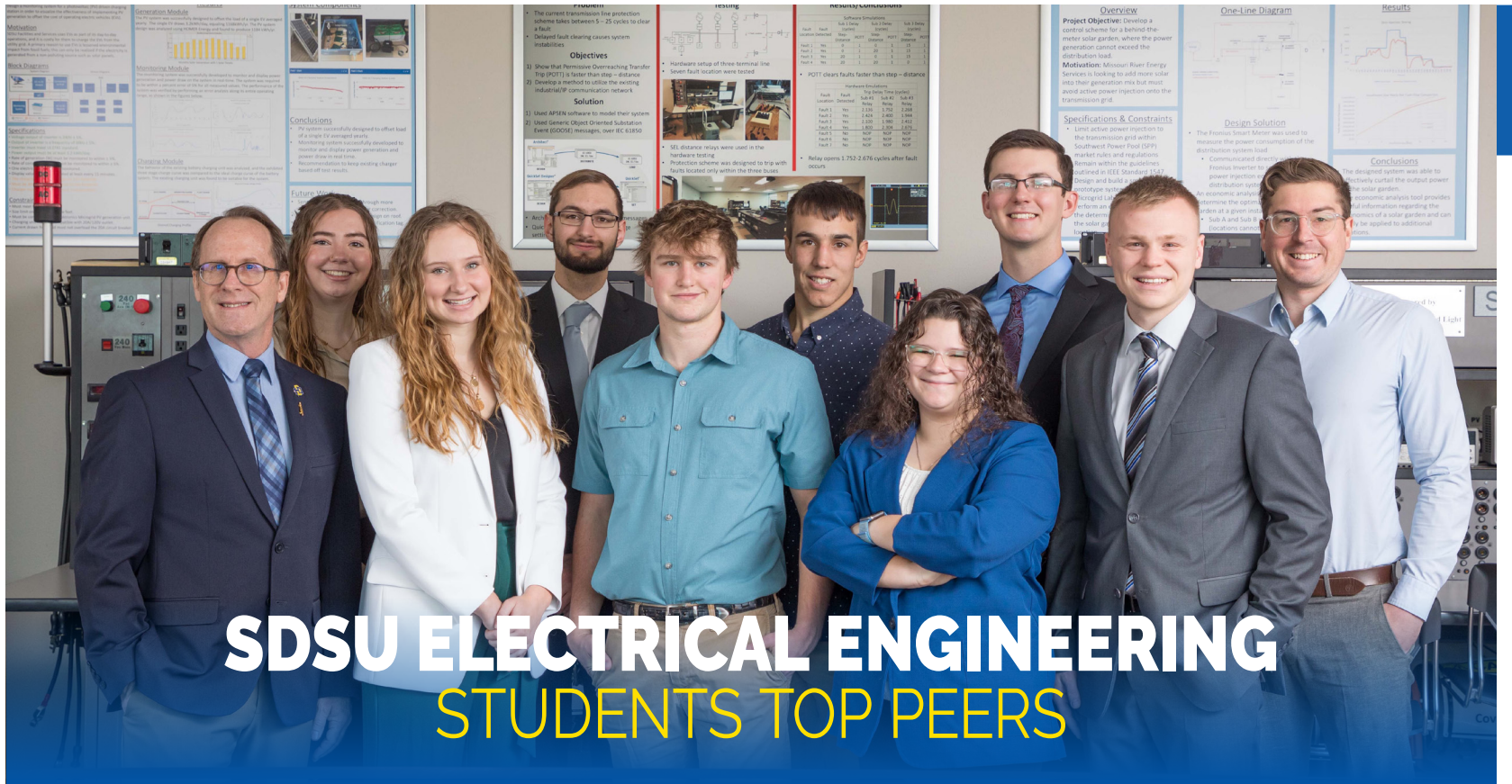
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SDSU doctoral student **Andrew Simpson** has been chosen as one of 15 students to present his poster at the Joint Statistical Meeting of the American Statistical Association in Toronto Aug. 5-10.

It is the largest gathering of statisticians and data scientists in North America with nearly 7,000 attendees, including 1,000 students.

Simpson, a first-year doctoral student in statistics, received a \$1,000 travel award to attend the conference for having the best paper in the Statistics in Defense and National Security section. Simpson, of East Bethel, Minnesota, explained that the American Statistical Association sponsors contests in about 15 subject areas. Winners are invited to make presentations at the international gathering.

Kurt Cogswell, head of the SDSU Department of Mathematics and Statistics, called Simpson’s honor “a remarkable achievement, particularly for a person in the first year of a Ph.D. program. This bodes well for an outstanding career employing statistics to have high impact on matters of national security.”



## SDSU ELECTRICAL ENGINEERING STUDENTS TOP PEERS

Electrical engineering students at SDSU continue to stand out among their peers.

In the fall, the Institute of Electrical and Electronics Engineers, the world's largest technical professional organization, announced the winners of its Power and Energy Society Scholarships. Eight of the 20 recipients from the 10-state Midwest region are from SDSU as is the Estey Outstanding Scholar Award winner, which goes to the top electrical engineering student in each region.

This year marks the fourth time in five years that an SDSU student has won the Estey Award, which provides a \$5,000 scholarship, a \$1,000 travel allowance to the IEEE Power and Energy Society general meeting and 12 months membership in IEEE.

The 2022-23 Estey Outstanding Scholar Award winner is Tyler Fogelson, a 4.0 senior from Fairmont, Minnesota. The 2021-22 winner was classmate Kade Griesse, a 4.0 scholar from Rock Rapids, Iowa. The other SDSU students to be named Power and Energy Society regional student of the year were Matt Stoel, Sioux Falls, 2019-20; and Grant Metzger, Rock Rapids, Iowa, 2018-19.

Fogelson and Griesse also were among the eight SDSU students to receive PES scholarships, which are \$2,000 awards.

The other recipients were Sarah Aman, a junior from Aberdeen; CheyLee Arnold, a sophomore from Spencer, Iowa; Cody Decker, a senior from Centerville; Kalen Meyer, a sophomore from Rock Rapids; Shelby Mueller, a junior from Watertown, Minnesota; and Luke Rasmussen, a sophomore from Rock Rapids.

### MOST SCHOLARSHIPS OF ANY MIDWEST SCHOOL

Professor Steve Hietpas, who directs SDSU's Center for Power Systems Studies, noted that eight scholarship winners is the best SDSU has ever done. In comparing SDSU's performance to other Midwest schools, Iowa State had five recipients. No other school had more than one.

Nationwide, there were 75 PES scholarships awarded. That means SDSU students secured more than 10% of the total scholarships awarded.

Hietpas said the SDSU scholarship selections reflect "the high caliber of students attending SDSU and the strength of the power and energy faculty, resources and curriculum within the electrical engineering and computer science department as well as the strong connection between the 27 industry members of the Center for Power Systems Studies in our students.

"The numerous internships provided by Center for Power System Studies members provide valuable field experience for our students, who are then able to do better in the classroom. In turn, these industry members have very well-trained students to hire upon their graduation."

Hietpas also gave a shout-out to associate professor Tim Hansen for his active promotion of this scholarship and writing letters of support.

### KUDOS TO A COUPLE 4.0 SCHOLARS

Focusing on Fogelson and Griesse, Hansen said, "Both students are exceptionally talented electrical engineers with a focus on power systems, and both have had internships now for each year of their undergraduate experience in the power field.

Power and Energy Society Scholarship winners and their faculty advisers gather in the Undergraduate Energy Lab Dec. 7, 2022. The eight awards are the most SDSU has ever received and is by far the most for any Midwest school. Pictured, back row, from left, are Sarah Aman, Cody Decker, Kalen Meyer, Tyler Fogelson and associate professor Tim Hansen. Front row, professor Steve Hietpas, Shelby Mueller, Luke Rasmussen, CheyLee Arnold and Kade Griesse.

“Both Kade and Tyler excel in each of the award categories and have done so since their freshman year. I have had them multiple times in classes over the years and in extracurriculars, which has allowed me, and I am sure other faculty and industry mentors, to write very strong and personal letters of recommendation for the award.

“Having such students in the program just makes everything go a little smoother. For example, Kade and Tyler are currently tutoring second-year students in fundamental circuit theory as that is one of the toughest courses in the program. Their impact goes beyond their individual talent and brings up the entire electrical engineering program through the outreach they do.”

### SCHOLARSHIP RECIPIENT PROFILES

• **FOGELSON** has been the chair of IEEE, president of Eta Kappa Nu, treasurer and vice president of administration of the Joint Engineering Council and team lead for robotics. Fogelson has worked at Missouri River Energy Services since May 2021 and has taken part in the mentorship program through IEEE Power and Energy Society.

After graduation, he will work as a resource engineer with Missouri River Energy Services.

• **GRIESSE** was president of Tau Beta Pi (all engineering professions) honor society and vice president of Eta Kappa Nu (electrical engineering) honor society. Griesse also is a past officer for the robotics club and Joint Engineering Council.

He has been a summer intern with DGR Engineering in Rock Rapids for the past three years. Upon graduation, he will join DGR Engineering full time as an engineer in training.

• **AMAN** holds a 3.3 GPA and is president of the robotics club after having served as vice president of communications from January to December 2021. She is vice chair of the student chapter of IEEE and was marketing and media coordinator from January to December 2021. She also is a member of The Pride of the Dakotas Marching Band.

Summer internships include working in the system operations department at Otter Tail Power Company in 2021 and at Missouri River Energy Services in 2022.

This summer, Aman has an internship with Burns & McDonnell’s energy group in Denver. After graduation, Aman hopes to either be an operations engineer working to operate the grid or work as a generation engineer working to implement renewable energy in rural areas.

• **ARNOLD** holds a 3.1 GPA and is communications and marketing executive with IEEE as well as being involved in Robotics Club, Joint Engineering Council and Oasis Christian Fellowship.

This summer she will intern at Blattner Energy in Avon, Minnesota. After graduation, she hopes to find a job in renewable energy.

• **DECKER** holds a 3.57 GPA and is president of the chess club, secretary of the rock-climbing club and active with IEEE and the robotics club. This summer he interned at Malloy Electric in Sioux Falls. Postgraduation plans are undecided.

• **MEYER** holds a 4.0 GPA and is a member of the wrestling team. For the past two summers, he has interned at DGR Engineering of Rock Rapids. Postgraduation plans are to find a job in the power industry in the Midwest.

• **MUELLER** holds a 3.3 GPA and is secretary of the student chapter of IEEE. Last summer she interned at Burns & McDonnell in the Transmission and Distribution group, in the networks, integration and automation department. This summer she will be back at Burns & McDonnell interning in the substation department. Postgraduation plans are to find a job within the power industry.

• **RASMUSSEN** holds a 4.0 GPA, is active in IEEE and serves as recruitment/retainment officer for the robotics club. In the summer he interned with DGR Engineering in Rock Rapids. Postgraduation plans are undecided.

*Dave Graves*

# ENROLLMENTS BY DEGREE (FALL 2022)

UNDERGRADUATE MAJORS (FALL 2022)	FEMALE	MALE	TOTAL	PERCENT*
Agricultural & Biosystem Engineering	16	45	61	5%
Civil & Environmental Engineering	34	178	212	16%
Computer Science	24	120	144	11%
Concrete Industry Management	2	6	8	1%
Construction Management	7	162	169	13%
Data Science	15	53	68	5%
Electrical Engineering	10	79	89	7%
Electronics Engineering Technologies	3	30	33	2%
General Engineering	1	3	4	0%
Mathematics **	35	76	111	8%
Mechanical Engineering	49	317	366	28%
Operations Management	12	44	56	4%
<b>TOTAL</b>	<b>208</b>	<b>1113</b>	<b>1321</b>	<b>100%</b>

COMPARED TO	FEMALE	MALE	TOTAL
Total 2021*	199	1179	1378
Total 2020*	187	1352	1539
Total 2019*	207	1273	1480
Total 2018*	216	1310	1526

MASTER OF SCIENCE MAJORS (FALL 2022)	FEMALE	MALE	TOTAL	PERCENT*
Engineering ***	2	12	14	8%
Agricultural & Biosystem Engineering		5	5	3%
Civil & Environmental Engineering ***	5	18	23	13%
Computer Science ***	4	5	9	5%
Electrical Engineering	3	10	13	7%
Operations Management	9	16	25	14%
Data Science	18	19	37	20%
Mathematics & Statistics **/**	11	21	32	18%
Mechanical Engineering	6	18	24	13%
<b>TOTAL</b>	<b>58</b>	<b>124</b>	<b>182</b>	<b>100%</b>

COMPARED TO	FEMALE	MALE	TOTAL
Total 2021*	46	124	170
Total 2020*	27	105	132
Total 2019*	37	128	165
Total 2018*	45	171	216

DOCTORAL MAJORS (FALL 2022)****	FEMALE	MALE	TOTAL	PERCENT*
Agricultural & Biosystem Engineering	4	8	12	18%
Ag & Biosystem Engineering/Mech Engr	1	4	5	8%
Civil & Environmental Engineering	2	5	7	11%
Computer Science	4	7	11	17%
Computational Science & Statistics	1	6	7	11%
Electrical Engineering	3	12	15	23%
Mechanical Engineering	3	6	9	14%
<b>TOTAL</b>	<b>18</b>	<b>48</b>	<b>66</b>	<b>100%</b>

COMPARED TO	FEMALE	MALE	TOTAL
Total 2021*	9	38	49
Total 2020*	6	50	56
Total 2019*	11	47	58
Total 2018*	13	45	58

\*Note: There is some duplication because of students who have more than one program in the same college and totals might not equal 100% due to rounding.

\*\* Includes Math, Math with Data Science Specialization and Math with Teaching Specialization

\*\*\* Includes accelerated options

\*\*\*\* No gender listed for two majors.

# DEGREES CONFERRED

UNDERGRADUATE MAJORS	FEMALE	MALE	TOTAL
Construction Tech (A.S.)	1	3	4
Engineering Tech (A.S.)	0	1	1
Ag/Biosystem Engr (B.S.)	1	10	11
Civil Engineering (B.S.)	5	35	40
Computer Science (B.S.)	6	21	27
Construction Mgmt (B.S.)	1	24	25
Data Science (B.S.)	4	3	7
Electrical Engineering (B.S.)	2	17	19
Electronics Engr Tech (B.S.)	0	11	11
Math-Data Science (B.S.)	3	7	10
Mathematics (B.S.)	4	9	13
Mathematics-Teaching (B.S.)	1	6	7
Mechanical Engineering (B.S.)	7	88	95
Operations Management (B.S.)	1	11	12
<b>TOTAL</b>	<b>36</b>	<b>246</b>	<b>282</b>

CERTIFICATES	FEMALE	MALE	TOTAL
Management Foundation (C.G.)	0	2	2
Data Science (C.G.)	0	4	4
<b>TOTAL</b>	<b>0</b>	<b>6</b>	<b>6</b>

MASTER OF SCIENCE MAJORS	FEMALE	MALE	TOTAL
Ag/Biosystem Engr (M.S.)	2	2	4
Civil Engineering (M.S.)	5	8	13
Computer Science (M.S.)	3	3	6
Electrical Engineering (M.S.)	5	2	7
Engineering (M.Eng.)	0	2	2
Mechanical Engineering (M.S.)	2	8	10
Operations Management (M.S.)	0	1	1
Data Science (M.S.)	5	8	13
Mathematics (M.S.)	1	1	2
Mathematics-Stats (M.S.)	1	2	3
Statistics (M.S.)	4	5	9
<b>TOTAL</b>	<b>28</b>	<b>42</b>	<b>70</b>

DOCTORAL MAJORS	FEMALE	MALE	TOTAL
Ag/Biosys/Mech Engr (Ph.D.)	0	2	2
Civil Engineering (Ph.D.)	1	1	2
Electrical Engineering (Ph.D.)	0	2	2
Computation Sci/Stat (Ph.D.)	1	2	3
Mechanical Engr (Ph.D.)	0	1	1
<b>TOTAL</b>	<b>2</b>	<b>8</b>	<b>10</b>

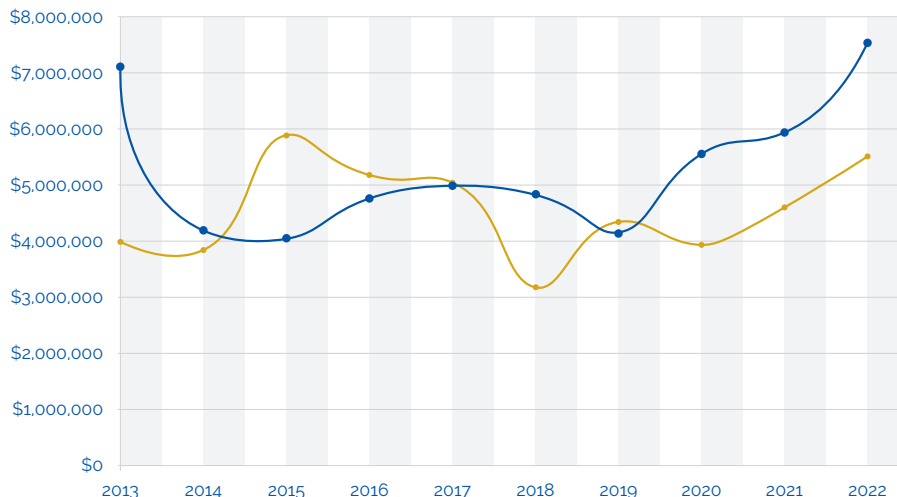
# OTHER STATISTICS

JACKRABBIT GUARANTEE SCHOLARSHIP RECIPIENTS 2022-23	FEMALE	MALE	TOTAL
First Year	881,100	302	
Second Year	583,875	176	
Third Year	532,850	153	
Fourth Year	443,175	112	
<b>TOTAL</b>	<b>\$2,441,000</b>	<b>743</b>	

COLLEGE OF ENGINEERING FACILITIES	SQ. FT.
Crothers Engineering Hall	89,960
Daktronics Engineering Hall*	73,464
Solberg Hall	55,735
Chicoine Architecture, Mathematics & Engineering*	62,000
Raven Precision Agriculture Center *	123,000
<b>TOTAL</b>	<b>4,045,159</b>

## COMPARISON OF EXTERNAL AWARDS AND EXPENDITURES

FY2013-FY2022



INTERNATIONAL UNDERGRADUATE STUDENTS	PERCENT CHANGE	
Fall 2022	95	-11.2
Fall 2021	107	-27.7
Total 2020	148	-7.5
Total 2019*	160	-14.0
Total 2018*	186	-12.7

● COE External Funding  
● Expenditures

# TENACITY, OBSERVATION PAVE WAY FOR INNOVATION

## ENGINEERING UNDERGRADS FORM COMPANY, READY TO MANUFACTURE PRODUCT



Nick Degen learned a lot during his first summer working on an asphalt crew in Rapid City four years ago. Now he and three of his engineering buddies plan to convert that knowledge to money-making innovation.

The story starts in summer 2019. Degen had just graduated from high school and took a summer job with Western Construction, a local asphalt paving firm, to earn some cash before starting college at SDSU.

He explains the process of laying down asphalt on a long stretch of road: “A guy walks along the belly dump pushing a button as he visually judges if the spread rate is too small, too great or just right. There is a lot of room for human error.”

Should the trailer have to be stopped to make an adjustment, it creates a bump in what is supposed to be a smooth new road. When paving has to stop to deal with spread rate issues, that idles a 10-person crew for a half-hour, Degen, a senior mechanical engineering major, said.

In addition, the guy working the button on the belly dump has a tough, hot job.

“I had a guy suffer heat exhaustion because he was working so hard,” Degen recalled. He was working as project manager on the job. Despite his lack of experience—“I was thrown into the deep end”—he could see where automizing the job would make it more efficient for the company and safer for the employee.

### FROM IDLE TALK TO BUSINESS PLAN

Fast forward to school year 2020. Degen, Kade Griesse, Ben Diersen and Rick Kittelson are all engineering students active in the SDSU Robotics Club.

Degen said, “We talked in robotics club about starting a business. I brought the idea about potentially expediting the (paving) process to the group.”

They enjoyed their work in robotics club, but Griesse noted, “You’re investing all this time building robots, but you don’t get paid for that. We decided to solve a real problem that could have a pay day.”

That pay day may come soon. After winning the 2022 Brookings

Student Business Plan Competition and finishing second in the South Dakota Governor’s Giant Vision Competition April 14, they have continued to develop their prototype. The students took what they learned during an April 2022 field test and modified a design that will be heavily tested this spring and summer.

“We hope to have three or four (devices) operating for the course of the summer,” said Degen, who will join Western Construction on a full-time basis after graduation in May.

### POTENTIAL TO SMOOTH ROADS, BOTTOM LINES

What they have created is a product called “Spreadrite,” which has “an array of laser sensors to measure the amount of asphalt being deposited to get the correct spread rate. All the sensors and opening and closing can be controlled from the cab. Opening and closing is based on the spread rate, eliminating the stoppages,” Griesse said.

Western Construction owner Tom Lien said, “The Spreadrite truck unloader eliminates human error in an environment where accuracy is paramount. Today’s tight specifications and high building costs make being precise the difference in profitability. The Spreadrite truck unloader would eliminate waste and keep our projects in spec.”

The students envision selling Spreadrite for \$5,000 per unit. If a company has 10 rigs, that is a \$50,000 outlay. On the other hand, it eliminates one person on the crew. Degen said the Department of Transportation reports the average hourly wage on a paving crew is \$21. When overtime is figured into the cost, the Spreadrite could be paid for on labor savings alone in one year, Degen said.

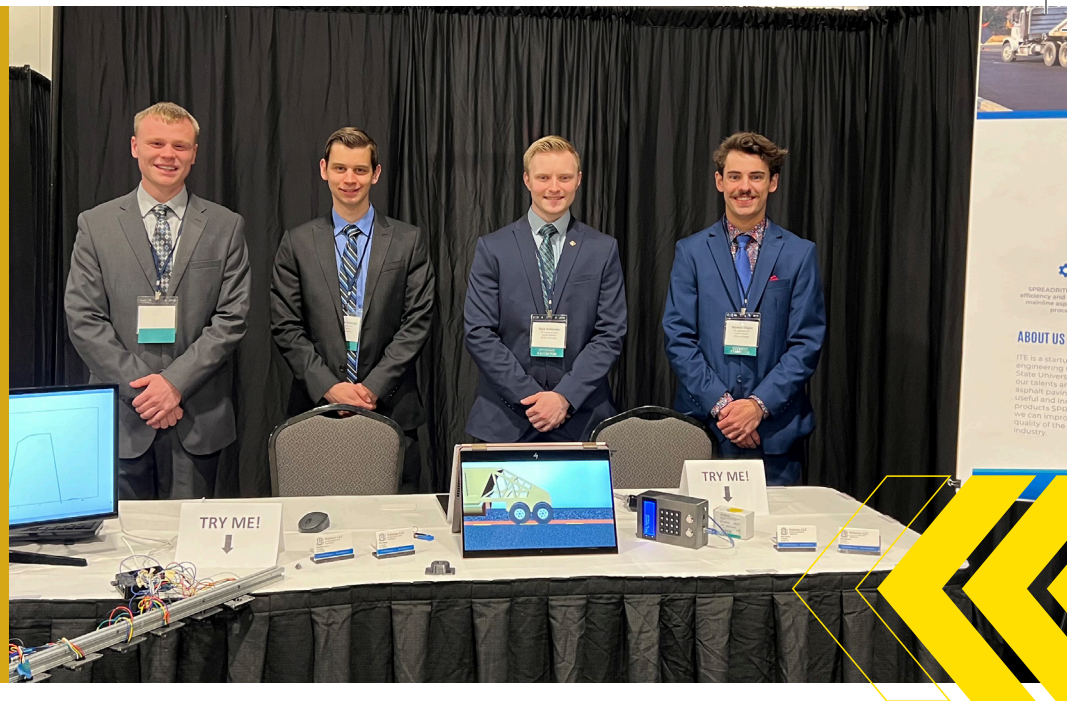
### ITE SOLUTIONS FORMED IN 2021

The guys formed the limited liability company ITE Solutions (Innovative Technological Engineering) in April 2021. Degen said they developed a name for the South Dakota corporation before they developed a product. They have talked about a patent but want to wait until their concept is proven and money is flowing into the banking account.

In addition to developing the product, Degen said there have been a lot of lessons learned on the business side.

Left: Kade Griesse holds a beta testing unit for ITE Solutions' Spreadrite device before it is mounted onto a belly dump at Bowes Construction in Brookings. The young entrepreneurs plan to test the array of sensors on a number of belly dumps in Brookings and Rapid City this summer and be actively manufacturing their product next winter.

Right: Members of ITE Solutions pose at the South Dakota Giant Vision competition April 14, 2022, when they placed second. Pictured, from left, are Kade Griesse, Ben Diersen, Rick Kittelson and Nick Degen.



All four have an entrepreneurial spirit, and it's a good thing. "There is a certain tenacity you have to have in you. A lot of times you've looked at your product and thought, 'How are we going to make this product work?' The next time you have a breakthrough and are as excited as ever. You're forever riding that rollercoaster," said Degen, who realizes that ride isn't over.

But they are already looking at a new market for Spreadrite. It could also be used on the hundreds of belly dumps dropping gravel on county roads, Degen said.

### PRIZE MONEY FUNDS ITE FOR NOW

To date, ITE Solutions has been able to finance product development from earnings received in the business plan competitions. There was a \$3,000 prize for winning the Brookings competition and a \$4,000 prize for being the state runner-up. Degen's future employer, Western Construction, also has offered to be an investor if needed, he said.

It was finishing state runner-up that got the guys thinking their product really did have market potential, Degen said.

He said, "Everyone tells us we've got a successful product and we should stick with it." Griesse adds, "At the state competition, one of the judges came along, and he had developed automated closers for grain trailers. He was impressed with our product. I thought, 'This thing is pretty easy to sell. We haven't even started talking to asphalt companies.'"

Designing and modifying the product is a different story. "There's a lot of stuff that can go wrong. Troubleshooting is a nightmare," Griesse said.

He said, "In the design process, we realized sensor technology had successfully been used in other areas. We considered using

wireless communications (to operate the device) but ended up going with radio frequency for cost reasons and ease of installation. The product can easily be taken off and on the belly dump with just four bolts."

Degen said they have looked at ease of manufacturing throughout the design process and are looking at a Chinese firm to produce the wiring harness.

### NEW CAREERS AWAIT GRADS

So far, production has been taking place in one of their garages and on a dining room table. On May 6, Griesse (electrical), Kittelson (electrical) and Degen (mechanical) all earned their diplomas. Diersen earned his mechanical engineering degree in May 2022 and is working as a software engineer for Vermeer in Pella, Iowa.

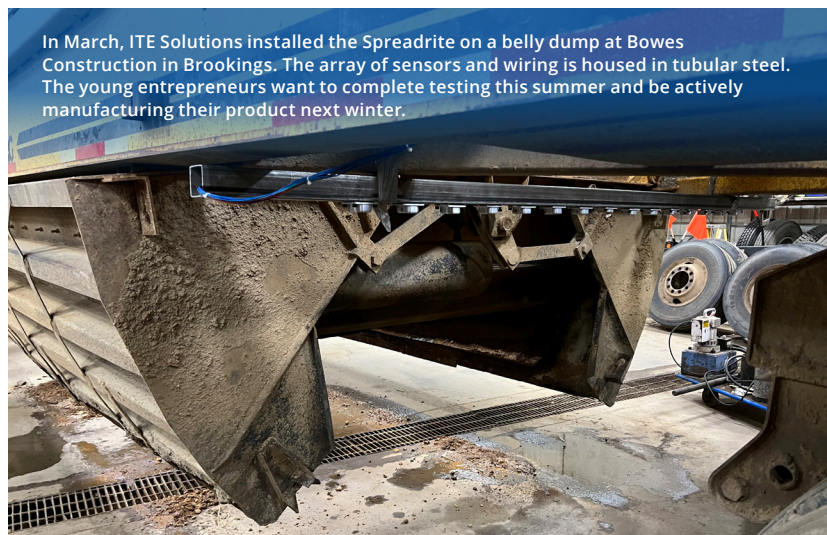
The three 2023 graduates all have jobs lined up—Degen with Western Construction, Griesse with DGR Engineering and Kittelson with Raven Industries.

Nonetheless, they are committed to not letting Spreadrite fade into a college memory. Making ITE Solutions a successful business remains a priority. They credit Dwaine Chapel for providing the wide-eyed sophomores with sound business advice. Chapel is executive director of the Research Park at South Dakota State University.

They connected with him there through robotics club because its design lab is in the research park.

After a summer of testing their asphalt-spreading regulator, they envision the possibility of approaching Chapel again—this time to ask to rent space.

*Dave Graves*



In March, ITE Solutions installed the Spreadrite on a belly dump at Bowes Construction in Brookings. The array of sensors and wiring is housed in tubular steel. The young entrepreneurs want to complete testing this summer and be actively manufacturing their product next winter.

# ENGINEERING A FAMILY

## AFFAIR FOR MOTHER, DAUGHTER

A daughter is following in her mother's footsteps as she pursues a degree in civil and environmental engineering at South Dakota State University.

Laurie Carrette Zook, mother of SDSU senior Rachel Zook, earned a degree in civil engineering from State in 1984, when female engineers were rarer than they are today. Laurie originally started college unsure of what major she wanted to pursue.

"I didn't really know what engineering was, but I knew that I liked math and science," Laurie said.

Laurie didn't consider a career in engineering until talking to the girl next door in her freshmen dorm who was majoring in electrical engineering.

Laurie told herself, "If she can be an engineer, then I can, too."

Growing up on a farm in southwestern Minnesota, she was accustomed to working with men, which made her comfortable pursuing a male-dominated career. Although there are a lot of challenges being in the minority, she didn't feel at a disadvantage.

"As a woman, you need to be strong technically and bring your perspective and personal skills into each project. That is true in any career, but especially a male-dominated one," Laurie said.

Laurie always wanted either Rachel or her older sister Natalie to be an engineer.

"We would laugh it off and say, 'No, Mom, that's not what we want to do,'" Rachel said.

However, in high school, Rachel found she also had a love for math and science, and during her junior year, she began to seriously consider a career in engineering. After taking a few engineering classes, she knew she was going to be a civil engineer just like her mom.

"I told my mom, 'You know what, I want to be a civil engineer just like you,'" Rachel said.

Laurie's husband Mike is a retired schoolteacher. Both parents have contributed to their two daughters' future endeavors as

Natalie attended Northwest Missouri State to pursue a degree in elementary education.

"She followed in Mike's footsteps, and Rachel is following me by becoming a civil engineer, so it's kind of funny how it all worked out," Laurie said.

As a senior, Rachel has a 4.0 GPA and was one of nine students nationwide to receive the Samuel Fletcher Tapman ASCE Student

Chapter Scholarship for 2022-23. An SDSU student last received this award in 2013. Last year, her chapter received the Ridgway Award, for which she wrote the annual report. Rachel has been able to serve three different officer terms during her time with the American Society of Civil Engineers and most recently served as the club's president.

"I have really loved my experiences through ASCE," Rachel said. "It has given me wonderful networking opportunities and has helped me grow my professional development skills."

Laurie was also the president of the ASCE chapter during her time at South Dakota State.

Laurie has been retired since April 2022. After 37 years of consulting work at HDR Engineering Inc., she is looking forward to traveling with her husband and continuing to volunteer with different organizations.

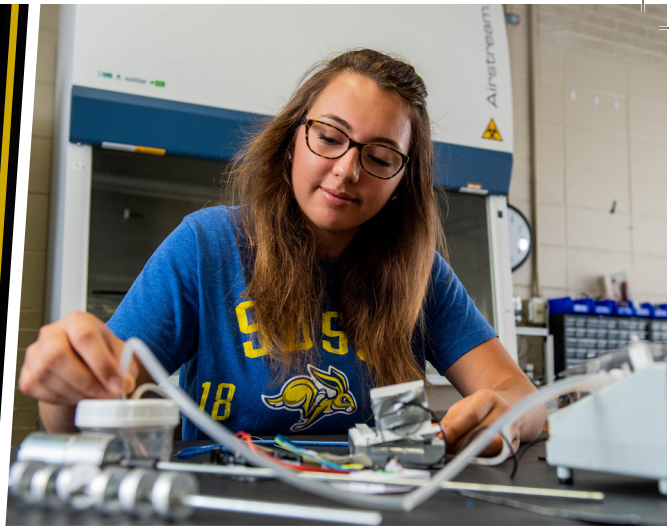
Rachel is currently in the accelerated master's program and will continue her education at SDSU to earn her master's degree in civil engineering with an emphasis in environmental engineering. Afterward, she plans to go into the consulting field with a focus on drinking water treatment.

"I'm really proud of Rachel and all she has accomplished at SDSU. I'm happy she picked SDSU after looking at several other universities. I knew SDSU would give her the most opportunities," Laurie said. "It's great that she's creating her own path as she becomes a future engineer, and I am very proud of her."

*Abby Theisen*







# SCHOLARSHIPS

AT SOUTH DAKOTA STATE UNIVERSITY

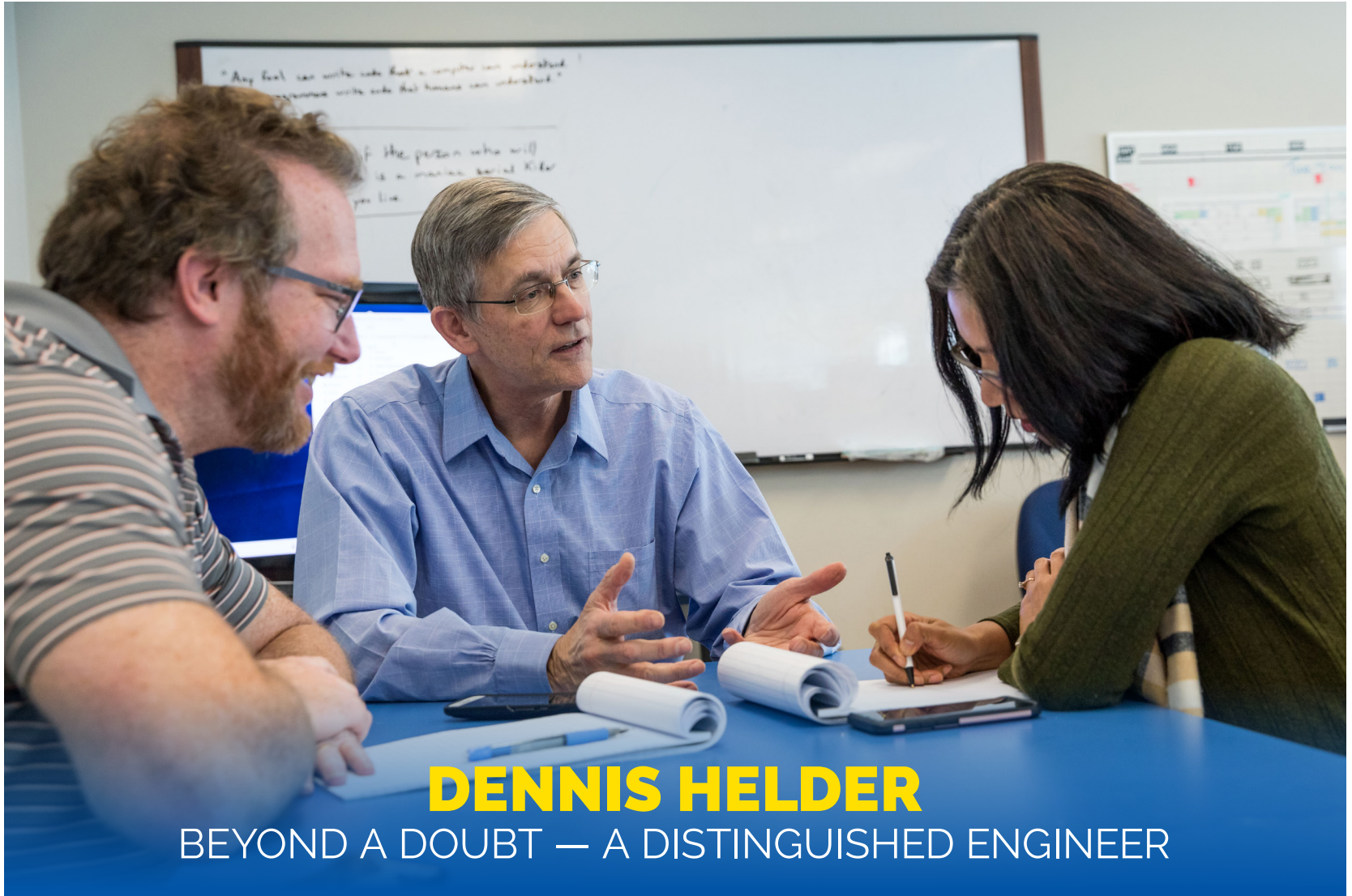
**OUR STUDENTS HAVE BOLD DREAMS  
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815 Medary Avenue, Brookings, SD 57006



## DENNIS HELDER

### BEYOND A DOUBT — A DISTINGUISHED ENGINEER

The picture couldn't have been more clear for this year's Distinguished Engineer committee: Dennis Helder has far exceeded the requirements to be added to the college's hallowed hall.

Helder will become the 146th inductee into the Jerome J. Lohr College of Engineering's list of Distinguished Engineers since Dean Junis O. Storry began the award in 1977. He was honored at an April 26 engineering banquet at Club 71 in Dana J. Dykhouse Stadium.

Helder was nominated by one of the 2022 awardees, Lew Brown, who served as dean from 2001 to 2018 and also nominated Helder for the rank of distinguished professor in 2012. The Distinguished Engineer nomination also was supported by two other previous Distinguished Engineers, Virgil Ellerbruch and Duane Sander, both of whom preceded Brown as dean.

Helder began work at SDSU as an undergraduate research assistant in 1978 and was on campus full time from 1983 until retirement in 2019, except for a brief sabbatical to earn his doctorate.

It was what Helder did during those 35 years that made him worthy of being a Distinguished Engineer.

#### PREEMINENT IN IMAGERY CALIBRATION

Helder remains a world-class expert in the field of calibration and validation of satellite imagery and during his SDSU career brought in more than \$27 million in research funding. "This is extraordinary and well above anyone else in the history of the Jerome J. Lohr College of Engineering and likely any individual ever at SDSU," Brown said.

Brown noted that Helder's expertise is recognized as such by NASA, the U.S. Geological Survey's Earth Resources Observation and Science Center (EROS), the Department of Interior, Jet Propulsion Labs, and virtually all leading scientists and labs worldwide who are also involved in calibration and validation of satellite imagery.

In 2012, he was awarded the rank of Distinguished Professor, the first and only person within Lohr College of Engineering to be so awarded.

In 2004, the U.S. Geological Survey honored Helder with the John Wesley Powell Award, the highest civilian honor that the USGS can bestow. In retirement, SDSU awarded him the permanent title of Distinguished Professor Emeritus of Electrical Engineering.

In 1990, Helder founded the SDSU Image Processing Lab, which is the oldest and most successful laboratory in the college and has an international reputation as an innovator in satellite calibration. Virtually every optical satellite in orbit bases its calibration on techniques developed by the Image Processing Lab.

### NOT FULLY RETIRED

So what has Helder done since retiring June 21, 2019, besides shoot whitetails, dabble in portrait photography and perform magic tricks for his 15 grandkids?

The business card says “senior technical adviser, engineering systems for KBR,” which is the Houston-based firm that contracts with the USGS for the operation of EROS Data Center near Baltic.

“In a nutshell, I solve problems no one else has the expertise to solve,” said Helder, who also gave a deeper explanation.

“These are related to the calibration of optical remote sensing satellites (especially Landsat), atmospheric propagation, validation of surface reflectance products, estimation of bidirectional reflectance distribution functions, derivation of interoperability metrics, definition of uncertainty metrics for products, developing new approaches to all of these things and providing expertise on new satellite systems.

“I am also technical lead on a couple of projects. But, the best part is that I also mentor many of the young engineers in the EROS Cal/Val Center of Excellence, which I was tasked to develop when working part time for SDSU and EROS.”

Sounds like a full-time job for most folks, but Helder keeps a retiree’s perspective—working one day a week in the summers and two days a week in the winters.

### A HALL OF FAME CAREER?

One could say it has been a hall of fame career. In fact, Sander has nominated Helder for induction into the South Dakota Hall of Fame.

The effort has been supported through letters from Pete Doucette, acting director of EROS, and Jeffrey Masek and Kurtis Thome, both NASA Landsat 9 project scientists at Goddard Space Flight Center.

Masek and Thome wrote, “Helder is one of a handful of people throughout the world who is known for ensuring satellite-based imagery is consistent and of the quality needed by its users. The fact that the SDSU Jackrabbit appeared on his presentations also meant that he is known as Dr. Helder from South Dakota ...

“Optical remote sensing is a niche specialty, and NASA and USGS rely on a few key training programs (such as SDSU) to provide the expertise that maintains U.S. leadership in the field.

“Helder has been instrumental in improving the quality and science applicability of U.S. land remote sensing. In the process, the user community that relies on Landsat and other remote sensing systems has grown exponentially.

“Remote sensing now underpins scientific studies and operational land management and represents a growing commercial opportunity both internationally and domestically. Dr. Helder’s career contributed substantially to this evolution with tremendous benefits not just to South Dakota but internationally.”

### STARTED AS ANIMAL SCIENCE MAJOR

It’s not the career Helder planned. The Canton farm boy started out in animal science and did receive a bachelor’s degree in that in 1979. He also added a bachelor’s in electrical engineering in 1980 and worked as an undergraduate research assistant under Sander.

He worked as a radio frequency design engineer for E.F. Johnson Co. in Waseca, Minnesota, from 1980 to 1982; and then farmed in the De Smet area and operated Agritronics, his own two-way radio sales and service business geared toward farmers.

In fall 1983, Helder decided the time was right to add a master’s degree in electrical engineering. He also was working as a grad assistant on an electric tractor.

“I asked Dr. (Virgil) Ellerbruch, (head of electrical engineering then), if I could teach a class to see if I liked it.” He was assigned EE211, the foundation circuits class, not as a lab instructor but as classroom teacher. “I found I really liked teaching.” Ellerbruch also told him if he was going to stay in education, he needed a doctoral degree.

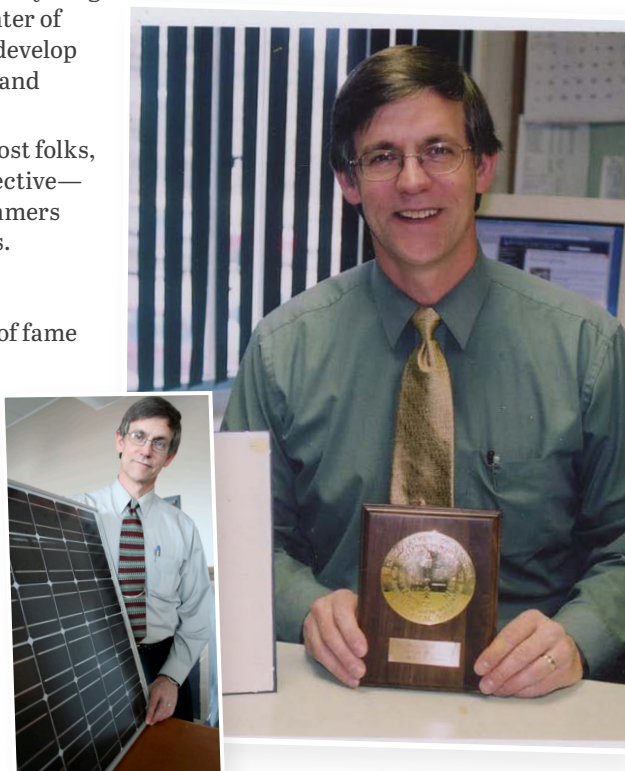
### ONE BOOK THAT CHANGED HIS LIFE

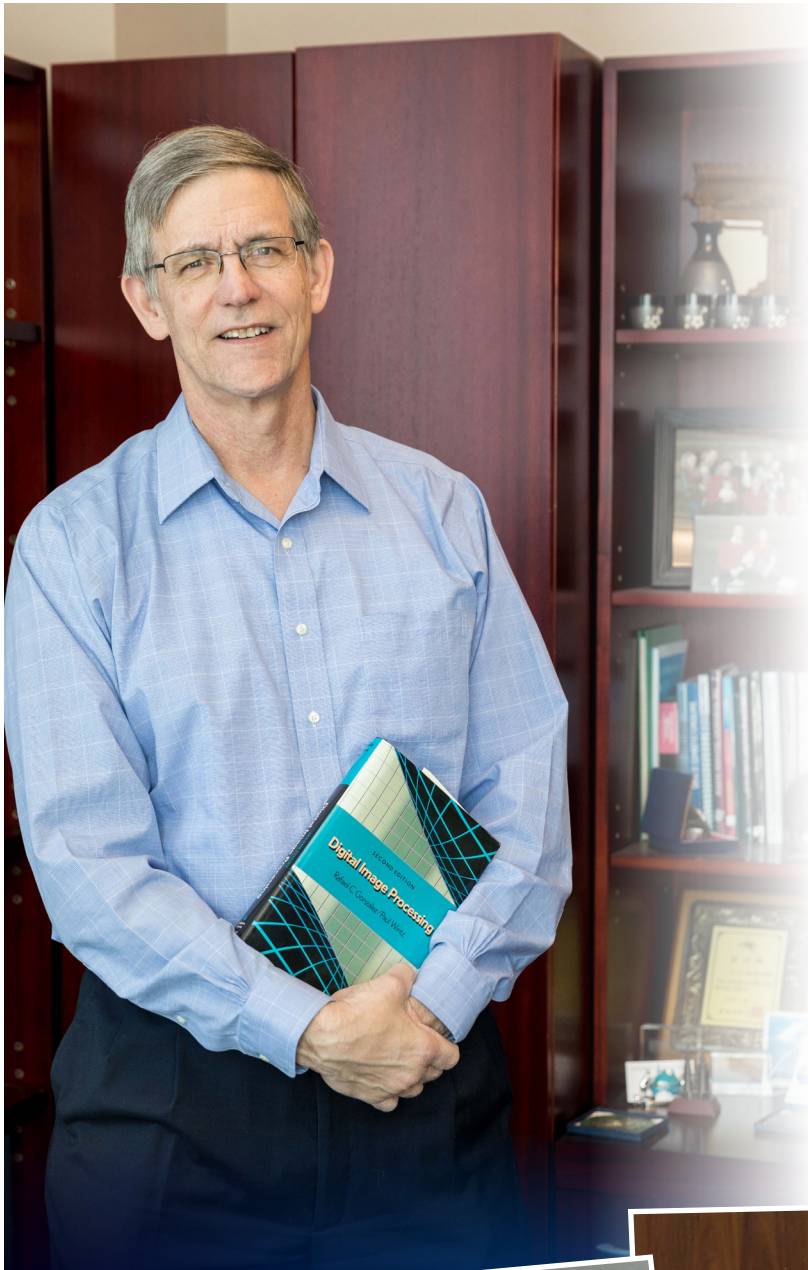
That meant he would need a doctoral dissertation.

So in fall 1988 as he searched for a topic, he recalled the book he’d seen on a colleague’s shelf in 1986—“Digital Image Processing.”

“I looked at that book and thought this has got to be cool. I read it and thought, ‘My goodness. You can look at pictures as signals and process them as signals. That’s what I got excited about. It tripped my trigger,’” Helder said in an earlier interview.

The next stop was EROS Data Center.





There he met June Thormodsgaard, the image mapping and research development section leader. She gave Helder a problem that neither NASA nor EROS could fix.

Recalling that first meeting, Thormodsgaard said, "I'm sitting at my desk; all of sudden there's this lanky body that fills up my entire door. He said he is from Canton, which is my hometown, and that he was looking for a dissertation topic. It was just then that the Landsat Thematic Mapper had started dropping scan lines. We were looking for a fix. There were people around the world who hadn't been able to correct it.

"Dennis was definitely an electrical engineer ... Gee, I thought maybe he could find an approach to fill in these missing lines."

### **SOLVING ONE PROBLEM AFTER ANOTHER**

She introduced him to her staff and checked on Helder with a university research leader, but she didn't thoroughly investigate this stranger. "He just struck me as somebody I could trust," Thormodsgaard said.

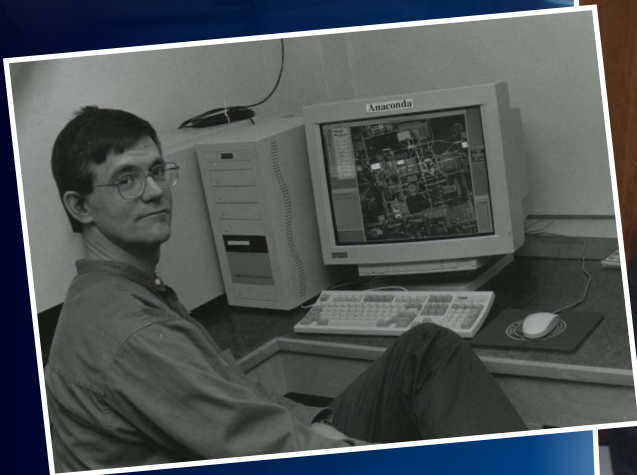
Helder proved himself not only trustworthy but also bright. Using a university computer, he figured out an algorithm to remove lines, or bands, from satellite images of the Earth that were created by the camera.

So happy was Thormsgaard with Helder's work that she sent another assignment his way in about 1990. An unspecified client needed an algorithm to fix satellite images of Saudi Arabia. When the first Gulf War broke out, Helder realized his work had helped the Department of Defense.

"I owe most of my career to that lady," Helder said.

Meanwhile, the now-retired Thormodsgaard, said, "It's a small, narrow group of people who have the expertise Dennis has. He didn't need anybody. He just needed his hard work and his mathematical brain."

*Dave Graves*



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Persona



**ANDY CARLSON**, '07/'10 agricultural and biosystems engineering and ag engineering, was promoted in March to plant engineer for Gevo Net-Zero 1, which is Gevo's first net-zero facility that will be built near Lake Preston.

Gevo's mission is to transform renewable energy and carbon into energy-dense liquid hydrocarbons that can be used for gasoline, jet fuel and diesel fuel that when burned have the potential to yield net-zero

greenhouse gas emissions when measured across the full life cycle of the products.

He had been serving as plant engineering leader since joining Gevo in June 2021. Prior to that he had been with South Dakota Soybean Processors.

The Department of Agricultural and Biosystems Engineering named him outstanding alumnus in 2022.

Gevo Net-Zero General Manager Tony Wells said, "Andy has been with Gevo for nearly two years and has made a great impact on project development and our collaborative culture. Andy's project ownership and rapport with local and state officials are second to none."

A groundbreaking ceremony for the \$1 billion plant was in September 2022, front-end engineering is substantially complete, detailed engineering is in process, and the operational start-up for NZ1 continues to be expected for 2025.



**ADAM DEJONG**, '17 civil engineering, a structural engineer with TSP in Sioux Falls, has passed the Principals and Practices of Engineering (PE) exam to become a licensed civil engineer specializing in structural design.

To become an engineer, an individual must complete a four-year degree from an accredited engineering school, then pass the Fundamentals of Engineering exam, which is usually followed by four years of

post-college work with a licensed engineer to gain experience. Passing the PE exam is the ultimate step to earning licensure from a state board.

DeJong graduated from Edgerton (Minnesota) High School. He also holds a master's degree from Iowa State University in civil engineering with a structural engineering concentration.



**ALFRED FURTH**, '09 Ph.D. in computational sciences and statistics, was promoted in January from executive vice president/portfolio chief at Capital Services in Sioux Falls to president and chief executive officer.

He joined Capital in 2007 as a portfolio analyst while pursuing his doctorate. He began his data science career at Mayo Clinic, providing support to the Cancer Research Center.

Furth replaces Chuck Hendrickson at Capital Services, which provides portfolio management and card outsourcing solutions.



**COLE JORGENSEN**, '18 mechanical engineering, and **TANNER SOLBERG**, '19 construction management, were named to Sioux Falls Business's inaugural "30 under 30" list Feb. 20.

Jorgensen, a Hartford native, in 2016 became the first U.S. Air Force ROTC cadet at South Dakota State University to earn the prestigious Legion of Valor Bronze Cross for Achievement. Today, he is the aircraft maintenance officer with the South Dakota Air National Guard. He is responsible for the training, equipping and readiness of 60 airmen in his section.



Jorgensen also recently gained additional engineering roots, taking on the unit's civil engineer post and assumed responsibility for facility sustainment, restoration and modernization with a \$700,000 annual budget. He is now the director of a \$1 million airfield upgrade

project, addressing compliance issues and managing the base-wide infrastructure and real property planning actions.

Jorgensen's nominator said, "He is being groomed to take command of our organization and will no doubt continue to build on his legacy of excellence."

Solberg, a native of Dell Rapids, is a project manager with Journey Construction.

His nominator said, "From the start of his very first internship to his current position ... Tanner has advanced quickly in his career. Throughout the years, he has immersed himself well in the culture of Journey Group, getting to know and support each department and division on a personal and professional level, while also living out Journey Group's core value of positively impacting lives by building community."

Solberg was credited in 2022 with working closely with human resources to redesign their project engineer internship program, which has since been copied by two other Journey divisions.

The 30 selections came from 150 nominations and were chosen because of early career achievements and promise for future leadership, strong engagement in the community beyond their workplace and innovative passion projects, according to Jodi Schwan, founder of Sioux Falls Business, a locally owned digital news organization serving the Sioux Falls business community.





**LUCAS LORENZEN**, '08 civil engineering, was named to Prairie Business Magazine's "40 under 40" list in December.

Lorenzen grew up on a family farm near Pipestone, Minnesota, and the problem-solving opportunities that go together with farm life influenced his decision to pursue a career in engineering. He concentrated on structural engineering at State.

Lorenzen also served in the Minnesota Army National Guard from 2000 to 2009.

Now a project leader at TSP engineering in Sioux Falls, Lorenzen provides leadership across the firm's priority areas of health and wellness, education and community/government.

Lorenzen has held volunteer roles at his church, is a member of the Harrisburg Economic Development Corporation and has been instrumental in the success of high school internship and shadowing programs at TSP. He and his wife, Kellie, live in Harrisburg and have four children.

The annual "40 under 40" list recognizes top business professionals under the age of 40 from South Dakota, North Dakota and western Minnesota. Honorees have made significant impacts in their chosen professions and continue to help make the region a better place to work and live.



**CHRIS MAKs**, '14 mechanical engineering, has rejoined the multidisciplinary design firm TSP and will work from the firm's office in Rapid City.

Maks specialized in sustainable energy systems at SDSU. At TSP, Maks provides expertise across the firm's priority areas of health and wellness, education and community/government.

He was previously employed at TSP in Rapid City from January 2015 to June 2022.

Maks is a licensed professional engineer in South Dakota, Wyoming, Nebraska, North Dakota, Montana and Idaho.



**JIM MORGAN**, '69 electrical engineering, received the Lohr Awards from the SDSU Foundation for his involvement and support of the SDSU Foundation.

Morgan, president and CEO of Daktronics from 2001 to 2013, has served on the SDSU Foundation's Council of Trustees since 2007 and has funded numerous projects, including Daktronics Engineering Hall, which houses the electrical engineering department, and the

Van D. and Barbara B. Fishback Honors College.

Morgan, who was responsible for the design of Daktronics' first scoreboard, the Matside, in 1971, also served on the South Dakota Board of Regents from 2015 to 2021.

Morgan joins Daktronics co-founders Aelred Kurtenbach and Duane Sander as recipients of the award, which was begun in 2004. The 2022 award was presented Oct. 28 in conjunction with the foundation's fall Council of Trustees meeting.



**KARI SEBERN**, '02 civil engineering, founder of Vector Collaborative in Des Moines, Iowa, joined forces with Gäbl Media to create the new podcast Unstruct. The podcast began in 2022 to raise awareness of the built environment for non-engineers and inspire experienced engineers to look at things a little differently. This new podcast brings the spotlight to great structural engineers and projects around the world.

Typically a weekly podcast, Sebern talks with industry-leading design engineers as they dissect the structural design of building. Sebern, who has 20 years of commercial engineering experience, is also the Region VII Assembly Delegate for the Iowa section of the American Society of Civil Engineers.



**Showing Jackrabbit pride are alums**, from left, Mike MacPherson '01 ME, Tim Amert '83 EE and Joel Poppen '87 EE, after the IBM Rochester, Minnesota, employees posted an SDSU National Championship banner on the company's banner wall.



## ALUM HELPING POWER CHANGE THROUGH NEW FELLOWSHIP

Dick McComish stayed close to home when he decided to pursue a degree in electrical engineering at SDSU, but his investment has paid dividends both near and far.

Over the past three-plus decades, he and his wife, Karen, have built companies that employ hundreds of people across the United States and help them give back to their alma mater.

Their most recent gift has created new fellowships at SDSU: the Richard McComish Fellowship in Energy Infrastructure and the Karen McComish Undergraduate Research Fellowship in Sociology and Rural Studies.

Karen's fellowship aims to encourage and support undergraduate research for those working with faculty in sociology and rural studies, honoring the research opportunities she enjoyed as a sociology undergraduate.

The energy infrastructure fellowship is specific to the United States electric grid and increasing the reliability, resiliency and security of the nation's electricity delivery system.

### IMPACT MADE AT STATE

Dick and Karen were acquainted growing up in their early school years in Estelline, but the couple credits State for bringing them together.

Dick said his father owned and operated an auto body shop in

Estelline, so he grew up learning that business. Dick liked tearing apart and putting together electronics from a young age, and he always wanted to be an engineer.

For his postsecondary education, SDSU was close to home, allowing him to work at the auto body shop and pay his way through school. It was longtime electrical engineering professor Wayne Knabach's influence and some of his coursework that drew Dick to the power side of engineering.

After graduating in 1975, Dick and Karen moved to Montana, where he started working for a small consulting firm in Billings, learning the engineering business for high-voltage electrical. That led to an interest in business development and contract relationships with larger utilities.

In August 1990, Dick went to work at Electrical Consultants Inc. as its fifth employee. He bought a majority interest in 1993, and the company kept growing from there. In 2000, he formed EPC Services, a wholly owned subsidiary of ECI providing nationwide project management for the power delivery industry.

"The time was right. It was when renewables were starting to become high profile. EPC is the complete one-stop contract from concept through all the construction, under one contract and turn over the facility," Dick said. "So it's focused on construction with engineering support and lots of other services."





LEFT: The McComishes were on the South Dakota State University campus in October 2016 for the naming of The Richard and Karen McComish Power and Energy Systems Lab. The couple are big supporters of SDSU, where Richard earned his engineering degree and Karen earned a degree in sociology, both in 1975.

RIGHT: Karen (center) and Richard McComish are joined by Judy Alickson, Karen's sister, at a South Dakota State University Jackrabbits football game at Dana J. Dykhouse Stadium.

The companies now employ 860 people, with many over the years from SDSU, in 24 offices across the U.S. Dick serves as president of ECI and president and CEO of EPC Services.

"It's just about giving back. I've been lucky and had a great career, but it all comes from hard work, too. We believe in supporting the university," Dick said of giving back to State.

### GIVING BACK

During a 2021 campus visit, Dick toured the power system labs and saw firsthand how Ph.D. students at SDSU are working to solve important challenges with the electrical grid, explained Tom Becker, director of development for the Jerome J. Lohr College of Engineering. "Dick saw how he could impact their work and decided to help," Becker said.

Dick saw a need to support the power industry as well.

"On the power side, there aren't enough engineers in the U.S. There aren't enough contractors like us to build the stuff that people want to build. There's just a shortage of people, and the only way it's going to change is through students being interested in renewable energy in the power side and having those opportunities," he said.

Supporting electrical engineering students in the U.S. can also aid in the manufacturing, understanding and reverse-engineering of equipment here rather than abroad, he added.

"We hope this will be a little piece in helping SDSU attract some of the students who are really looking for high-level learning. It's a value to the industry and something I enjoy doing," Dick said.

The fellowships were formalized with a five-year memorandum of agreement, which includes guidelines on what the recipient would be focused on, Becker explained. That aligned well with Dick's interest area, but also gave the university the flexibility to follow its needs and support graduate and Ph.D. students. The fellowships will also help attract electrical engineering students to State.

Applications for the Richard McComish Fellowship in Energy Infrastructure are accepted in the spring, and fellows can renew up to two years, with two awardees per year.

SDSU electrical engineering doctoral students Pooja Aslami and Tara Aryal were selected as the first two recipients.

Aslami is doing research in state and parameter estimation in microgrids. Microgrids are smaller electricity grids that can be self-sufficient if there is a blackout in the main electric grid. Her work ensures that even during extreme weather conditions, such as blizzards in South Dakota and Alaska, or hurricanes in Puerto Rico and Florida, that critical infrastructure will still have the lights on.

Aryal's research interests include state estimation and optimization of power systems. By harnessing machine learning methods, her work is able to simplify complex physics equations governing the operation of energy infrastructure to improve the electric grid reliability.

Both topics are of increasing importance to grid security and reliability as the nation moves toward more wind, solar and battery resources, explained Timothy Hansen, associate professor in SDSU's electrical engineering and computer science department.

"If we're successful, basically the power's going to go out less. In places like Puerto Rico and Florida, we can't stop a hurricane, but what we want to do is mitigate it so less damage occurs and improve our response to a disaster. Things are going to go down. We can't stop that, but we can get people's power on quicker," Hansen said.

*Jill Fier*



## DEAN'S ADVISORY COUNCIL PROFILE BENDER FAMILY COMMITMENT CONTINUES

At the family-held Brookings manufacturing business Falcon Plastics, it's all about molds. With four U.S. manufacturing facilities, a manufacturing partnership in China and more than \$60 million in annual sales, Falcon's 300 employees are constantly creating new molds for its 120 molding machines.

However, there are some molds that the 48-year-old business hasn't reengineered. One of them is community involvement.

Jay Bender, chief executive officer and former president, said that is a mold created by his father, Don, who founded the company in 1975, and one which he maintains today. While Falcon is deep into the transition to a third generation of leadership, Bender said community involvement is as integral to the business as the plastics it shapes.

"Every town we have a facility in, we join the chamber. My father believed businesses are responsible for helping communities grow in a responsible way," Bender said.

In Brookings, a large part of what defines the community is South Dakota State University.

Bender, a December 1982 graduate of the mechanical engineering program, has served on the Jerome J. Lohr College of Engineering Dean's Advisory Council for at least 10 years. Falcon's connection with the university precedes that. It has been a contributor to several building projects, and more recently scholarships were created in the names of Don and Carol Bender in engineering and entrepreneurship.

### BACKING COMMITMENT WITH DONATIONS

Between Falcon Plastics and the Bender family, combined lifetime giving climbs beyond the \$500,000 mark.

In addition to the two Don and Carol Bender Scholarships, gifts have also targeted The Pride of the Dakotas Marching Band, Dana J. Dykhouse Stadium/Jackrabbit Club, the Chicoine Architectural, Mathematics and Engineering Hall, the Duane Sander Endowed Professorship in Engineering and Entrepreneurship, the Alumni Green, STEM Partnership/BEST Robotics, and First Bank & Trust Arena.

Bender said years ago the company financed Jackrabbit Guarantee Scholarships, and it has an informal internship program in its tooling, quality control and production areas.

### DEAN'S ADVISORY COUNCIL COMMITMENT

He was heavily involved in community service when former Dean Lew Brown reached out to Bender about serving on the Dean's Advisory Council. "My reason I got involved is I really appreciate it when any school reaches out to business. ... The idea of asking industry what is important and how schools can better prepare students is critical.

"The Dean's Advisory Council is a really good tool to make that happen. The last two deans have asked to see our facility. I was really impressed with that. It's an opportunity for the colleges to get closer to the customer, the entity that hires their students. Getting that temperature of what is happening outside of the walls of college makes total sense," Bender said.

He added that he appreciates college administration actually taking to heart what is shared by the Dean's Advisory Council.

"I know the advisory council isn't the only entity they have to pay attention to. But the Dean's Advisory Council can be an ally for the dean and department heads in making things happen. I feel good that it has been helpful. The time investment by

Principal owners of Falcon Plastics are, from left, Guy Bender, chairman of the board; Jenn Barlund, president; Kyle Bender, executive vice president; and Jay Bender, chief executive officer. Jenn is the youngest daughter of Guy. Kyle is the oldest child of Jay. Jenn, Kyle and Jay are all SDSU grads.

the businesses has helped move the college in a positive direction,” Bender said.

### LEADER OF RESEARCH PARK BOARD

In addition to the Dean’s Advisory Council, Bender has devoted many hours to another entity closely connected to the Lohr College of Engineering—the Research Park at South Dakota State University.

Located off campus, the research park isn’t a campus facility, but university and SDSU Foundation officials were key leaders in the park’s formation and development. Bender has been there since the public-private partnership was launched in 2004 as the South Dakota Growth Partnership. Research park construction started in 2006.

Bender serves as chairman of the South Dakota Growth Partnership, a role he has held since May 2010.

As Bender transitions toward retirement, he is trying to cut back on his community service roles. His ties with the research park may be among the last he cuts because the connection has been there so long.

Bender’s other community connections include the Brookings Economic Development Corp. and Vision Brookings, which is an offshoot of Brookings Economic Development Corp. and is just wrapping up its fourth major, five-year fundraising effort. He expects contributions will total \$3.2 million to \$3.5 million to support business development infrastructure and matching grant funds.

Bender also is on the boards for the SDSU Foundation, Valley Queen Cheese, East Brookings Business and Industry Group, and Falcon subsidiary Arctic Ice.

### FOLLOWING DON’S EXAMPLE

His penchant for getting involved came from watching his father, he said. “He was on the state chamber board. He and Al (Kurtenbach, co-founder of Daktronics) helped join state manufacturing board with the state chamber board.” To this day, it bears the name South Dakota Chamber of Commerce and Industry.

Jay Bender’s continual connection with Falcon Plastics dates to January 1987, but his first taste began in summer 1977, right after high school graduation. When fall came, he worked at Falcon and was a part-time student at SDSU. Thinking he wanted to become an architect, Bender and a friend headed to Arizona State University the next fall.

Winter 1979 was nice in Tempe, but Bender decided neither the school nor the architectural program was a good fit for him.

He returned to Brookings mid-semester, worked for his dad and enrolled at SDSU in fall 1979 as a mechanical engineering major. “I took full loads, took classes every summer, worked and took out some student loans, but

I completed the 132 credits in 3 ½ years. I learned to be a tool maker at Falcon Plastics. I learned about tool designing and machining. It helped me in school and really helped me when it came time to apply for jobs,” Bender said.

### 1987 BROUGHT MAJOR GROWTH TO FALCON

He spent four years working outside of Falcon before the company landed a big contract with the Toshiba plant in Mitchell to make toner cartridges.

“We had to build 24 molds in four months. I managed those builds. The company really grew. Toshiba was our first really big customer. After two years, Toshiba was two-thirds of our business and we started looking for more work so we wouldn’t be so reliant on one customer.

“In 1989, we started doing business with Daktronics. My dad and Al Kurtenbach were friends. That’s when Glow Cubes were developed. It was their first big product that needed a lot of molds. That was really fun to be part of Daktronics’ growth. We still do a lot of business with Daktronics,” Bender said.

Just like scoreboards and other projects that have improved over the decades, so has his alma mater, he said.

“I’m humbled to have had a small role in helping it happen.”

*Dave Graves*



# DEAN'S CLUB

FROM OCTOBER 1 THROUGH MARCH 30, 2023

*Dean's Club membership consists of alumni and friends who have contributed \$500 or more annually to the Jerome J. Lohr College of Engineering. Dean's Club members are recognized as devoted friends of the college who make significant impact on the college's future. They also receive invitations to special college and university functions as well as updates from the dean.*

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**Tom Becker**  
Development Director  
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Tom.Becker@SDStateFoundation.org

## MAKING A DIFFERENCE

“Nobody has ever hugged a goal post.”

Coach John Stiegelmeier made that comment at a staff meeting of the SDSU Foundation about two weeks after his football team’s FCS national championship win. To give it some context, he was referring to the emotional impact of people on our students. Not just Jackrabbits football players, but every single student who comes to South Dakota State. It’s truly human beings, not things, who make the SDSU experience so memorable.

Sure, the national championship trophy is a thing. Yet it serves more as a symbol of the cumulative effort put forth by members of a program, by an entire university and its supporters. It symbolizes that so many people were involved in so many ways and each one made a difference, which is another long-standing tenet in Coach Stig’s approach to coaching.

“We’re not just building football players,” he’s often said. “We’re building young men, many of whom will become husbands, fathers, employees and leaders. We expect each one to make a difference in life after football.”

Wherever you are, whatever your situation, you can make a difference. That’s your call to action today. Only you can decide how to make a difference based on your experiences and your circumstances. Our alumni and friends who support SDSU and the Jerome J. Lohr College of Engineering through philanthropy are great examples of making a difference.

We are grateful for all gifts of any size and amount from thousands of people. Each one makes a difference; each story is unique; and the cumulative effort yields championship outcomes.

### HERE ARE FEW RECENT EXAMPLES:

- Last year, two brothers established an endowed scholarship in engineering to honor their parents. While neither parent attended SDSU, these brothers were instilled with the importance of higher education and used their degrees from SDSU to launch them into successful careers in industry.
- An alumnus made the lead gift to initiate a “lab excellence fund” when he heard about the mechanical engineering department’s five-year plan to revamp and upgrade the teaching labs in the department.
- The second- and third-generation leaders of a local, family-owned business created an endowed scholarship to honor their parents and grandparents for their courage and sacrifice when starting the company so many years ago.
- Another alumni made a gift to name a room for a past faculty member who had a major impact on the students’ time at SDSU and the alum’s future success. This gift was used to complete renovations in the Civil Engineering Department of Crothers Engineering Hall.
- Hundreds of alumni and friends of the Lohr College of Engineering make gifts to the department’s and dean’s excellence funds. The discretionary funds are a tool available to Dean Sanjeev Kumar and each department head, allowing the college to make a difference for faculty members and students in a variety of ways.

Another cohort of students has just completed degrees from the Lohr College of Engineering. They’ll enter various industries, trained and prepared to make a difference wherever they go. We celebrated them and their accomplishments at the May 6 commencement with handshakes and hugs by the hundreds. There were hugs from family, friends, professors and faculty members, staff members, classmates, teammates, coaches ... the list goes on. Those hugs are a connection to the experiences and memories created by people, not buildings or labs.

Nobody has ever hugged a goal post, or a senior design project, or a robotic arm in the lab. Rest assured, there will be plenty of hugs for those who made a difference in the lives of those students.

Is this the year you will make a difference for our engineering students at SDSU?

*Tom Becker ’81*





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The 2022 national championship football roster included 12 engineering majors. This winter Dean Sanjeev Kumar joined most of them for a photo. They also were guests at the April 26 Engineering Banquet.

Back row, from left, are Ryan Van Marel, Bo Donald, Mason McCormick, Adam Bock and Mark Gronowski. Front row, Andrew Gustad, Aaron Kusler, Sanjeev Kumar, Davion Sterner and Kaden Johnson. Not pictured: Luke Fenton, Brennan Leines and Michael Morgan.