

# IMPULSE

JEROME J. LOHR COLLEGE OF ENGINEERING

CROTHERS  
ENGINEERING  
HALL



FALL 2019



**Bruce Berdanier**  
Dean, Jerome J. Lohr  
College of Engineering

## CONTINUATION OF ENGAGEMENT, INNOVATION AND SUCCESS

Greetings from Jerome J. Lohr College of Engineering,

I am in the midst of my second year as dean of the Jerome J. Lohr College of Engineering.

The fall traditions of South Dakota State seem familiar and new again. When I walked into the fall convocation at Frost Arena for incoming freshmen, I was comforted by the familiar sounds and sights, but at the same time I realized that I had never experienced Frost Arena in quite this way.

When I spoke to the freshmen, I shared that the university experience is like that.

"Many of the experiences that you have over the next four years will be the first time and the last time that you will experience them in that way. Even if you return soon to Frost Arena, you will be a different, older student experiencing a different event."

I told them to engage as deeply and as quickly as they could in their career development and the Lohr College of Engineering community. I encouraged them to identify student mentors, professors and organizations to increase the richness of their experience, and I reassured them that we are their community, and we very much welcome them all and will share helping them pursue their success.

I encouraged them to pause, focus and consider the moment they are experiencing whenever they can over the next four years. Dive deep and experience the sites and sounds of the Jackrabbits experience.

It continues to be my privilege to lead the college, and I am impressed with the engagement and success of our student clubs and teams. They have risen above expectations and have shined a national spotlight on SDSU as they compete across the country demonstrating their technical expertise.

Please know that I will continue to support these teams financially. I believe the high-impact activities are one way that students are set on a successful career path, and I think our employers agree. Your support has been amazing and we thank you all for the contributions that you made to One Day for State, which are used to help support our competition teams and student engineering clubs.

Marv Peterson said that to have a great college of engineering you need to get great students. (See story Page 12.) We continue to grow and expand our scholarships to recruit and retain the greatest students. The market is so competitive and the workforce development needs of our region for engineering graduates are high and sustained. We welcomed more than 150 companies to our fall engineering career fair in the Dana J. Dykhouse Stadium Oct. 8.

Also on Oct. 8, the Center for Power Systems Study recognized the career of Jim Edwards with the Knabach Award. (See story Page 2.) Jim's career was also recognized this fall at the East River Electric annual meeting. Jim has had an outstanding and distinguished engineering career and a long history of participating in the Electrical Engineering Industry Advisory Board and the Dean's Advisory Council.

As I reported to you last year, we completed a study and hoped to finalize conceptual plans and initiate construction for the civil and environmental engineering administrative offices in Crothers. The final design for that work is nearly completed, and we are working with SDSU Facilities and Services to establish the construction schedule. If you have been on campus, you know there is a lot of ongoing construction and maintenance. I continue to push for the prioritization and start of this remodeling in the near future.

We continue to address our main challenges in the areas of undergraduate enrollment and retention as well as increasing research productivity. Our analytics predict that the credit hours in the college will be down about 4% this year.

This undergraduate credit hour drop reflects the competitive environment and demographics up and down I-29 to recruiting engineering students along with large graduating classes the last two years.

Additionally, our international student enrollment continues to be lower. We are working to contact students more often in the social media platforms they are accustomed to as well as strengthening all of our traditional recruiting events. Our internal budgets will continue to tighten as we deal with the declining overall enrollments.

Foremost in our minds at all times is our mission to increase access to engineering education, create new knowledge and support economic development in the region. We are embarking on new plans with the Dean's Advisory Council for comprehensive support and plan to report on that in our next issue.



**SDSU PRESIDENT**  
Barry H. Dunn

**PUBLICATIONS EDITOR**  
Andrea Kieckhefer

**EDITOR**  
Matt Schmidt

**PHOTOGRAPHER**  
Emily Weber

**DESIGNER**  
Rachel Fritz

**CONTRIBUTING WRITERS**  
Christie Delfanian  
Landon Dierks  
Dave Graves  
Matt Schmidt

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**SOUTH DAKOTA STATE  
UNIVERSITY**  
University Marketing and  
Communications  
Brookings, S.D. 57007-1498  
(605) 688-6161



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*Jerome J. Lohr  
College of Engineering*

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**ABOUT THE COVER**

Twenty-five years after they graduated with master's degrees in engineering, eight natives of India who found careers in the United States returned to Brookings and South Dakota State for a weekend reunion. *See story Page 4.*

# IMPULSE

FALL 2019



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Senior Ryan Fouts received the prestigious SMART scholarship, which covers his education and living expenses beginning in fall 2019. *See story page 18.*



Jim and Rita Edwards pose on a May trip to Russia.



# EXCELLENCE IN POWER

## KNABACH AWARD GOES TO FORMER STUDENT EDWARDS

Winner of the 2019 Wayne Knabach Excellence in Power Award is a man well acquainted with the award's namesake.

Jim Edwards, who retired in April as the chief operations officer at East River Electric Power Cooperative in Madison, said the former SDSU electrical engineering professor was instrumental in him entering the power industry.

He was a sophomore at State in 1979 when he took a class from Knabach, who was on the faculty from 1957 to 1995. Knabach would talk with him during and after class about the opportunities in the power industry. "He was my mentor in college," said Edwards, a Brookings native. Knabach also made available two scholarships from the Center for Power Systems Studies.

"It wasn't much money, but I always remembered that. He remained in contact with me until he passed away," which was in 2014, said Edwards, a 1982 electrical engineering graduate.

Knabach directed the Center for Power System Studies from 1971 to 1997 and the Knabach Award was created in 2010. This year's award was presented Oct. 8 at the fall banquet in Volstorff Ballroom.

Current coordinator Steve Hietpas said of Edwards, "Jim's dedication to SDSU and to the Center for Power Systems Studies has been exemplary. He always gave unselfishly of his time to help strengthen our programs and maximize opportunities for our students. I will always be grateful for his service, and he will be greatly missed."

Edwards exited the Center for Power Systems Studies board when he retired from East River after 21 years.

### EAST RIVER—A GROWING OPERATION

He served as chief operations officer throughout that time. That meant he oversaw all the construction, operation and maintenance of the transmission system—250 substations and 2,800 miles of lines serving 24 distribution cooperatives and one municipal utility in eastern South Dakota and western Minnesota.

"It was the same job, but the operations division expanded quite a bit. We had 40 more employees than when I started—from 90 to 130. We went from about a 400-megawatt load to a 700-megawatt load. A lot of that was from industrial growth—ethanol plants. We're a member-owned cooperative system, a few more distribution cooperatives joined us," Edwards said.

Before East River, he served 16 years with electric utilities in Texas, Maryland and Oregon. After taking the Madison job, he was asked to serve on the Center for Power Systems Studies board because of his experience with the group as a student. He did and never left.

### ALSO SERVED ON OTHER SDSU BOARDS

"I enjoyed getting to work with the students and networking with others. I would promote the power industry to students, giving my viewpoint of what they could do in the power industry. Students would come to the meetings to present senior projects to us and explain what they are doing. In turn, we would help sponsor many senior projects," Edwards said.

He noted he also served on the Dean's Advisory Council for the Jerome J. Lohr College of Engineering and the Industry Advisory Board for the Department of Electrical Engineering and Computer Science.

In retirement, Edwards and his wife, Rita, a 1981 speech and theater graduate who retired in September from the Sioux Falls law firm Davenport and Evans, are spending a lot of time on the road. Excursions included two weeks in Russia in May and a week in British Columbia in September.

But they made a point to be back in time for the Center for Power Systems Studies to receive the award named after his mentor.

"I'm very honored. It's an award given based on what your peers think of you. It's a strong honor," he said.

*Dave Graves*



Jim Edwards, center, is presented the Wayne Knabach Excellence in Power Award at the fall banquet of the Center for Power Systems Studies. He is flanked by Steve Hietpas, the center's director, and Western Area Power Administration's Mark Buchholz.

## KNABACH EXCELLENCE IN POWER RECIPIENTS

- 2010 — Ed Cannon,  
Cannon Technologies, Plymouth, Minnesota
- 2011 — Rod Scheel,  
Otter Tail Power Co., Fergus Falls, Minn.
- 2012 — Wanda Reeder,  
S&C Electric Co., Chicago
- 2013 — Jeff Nelson,  
East River Electric, Madison
- 2014 — Steven Arbach,  
Northwestern Energy, Huron
- 2015 — Richard McComish,  
Electrical Consultants Inc., Billings, Montana
- 2016 — Robert Zavadil, EnerNex,  
Knoxville, Tennessee
- 2017 — Jim Wilcox,  
Xcel Energy, Sioux Falls
- 2018 — John Kappenman,  
Storm Analysis Consultants, Duluth, Minn.
- 2019 — Jim Edwards,  
East River Electric, Madison



# 25 YEARS LATER

## SDSU-TRAINED ENGINEERS FROM INDIA RETURN TO CAMPUS

Twenty-five years after they graduated with master's degrees in engineering, eight natives of India who found careers in the United States returned to Brookings for a weekend reunion.

The men from the southern India provinces of Karnataka didn't know each other before arriving on the Northern Plains, but they quickly bonded. Many were mechanical and environmental engineering students so they were in the same classes. They also shared a common native language and cuisine. Eventually, some became roommates.

Most arrived in 1992. Navin Shetti, who served as group spokesman, arrived in December 1991. All but one graduated in 1994. There were only a few dozen students from India on campus then, he said.

Shetti said there are 10 in their group but two couldn't make the reunion. They remained in contact through cards and phone calls, but didn't gather as a group until 2017, when they held a reunion in Las Vegas. The following year they were in the Atlanta area. With 2019 marking a quarter century since their graduation, Brookings seemed appropriate for this year's gathering.

While in Brookings, the group received an update from Dean Bruce Berdanier and Tom Becker, the college's development director, on college activities and a full tour of the Jerome J. Lohr College of Engineering. They then toured the campus, visited the University Bookstore, socialized and attended the football game against Long Island University.

### IMPRESSED BY CURRENT UNIVERSITY

Shetti said, "The university is really beautiful—manicured lawns and gardens and very impressive Jackrabbit Village. It's really modern. Management has really thought through what the current needs are, and they are changing to meet today's expectations. The football stadium is great, but for me, the most important thing is education.

"I love the majors that are offered today: biotechnology, data engineering, computer engineering ... I would have jumped on that. What Tom (Becker) showed us was really impressive."

The welcome the men received in 2019 matched the one they received 25 years earlier.

Becker said, "On multiple occasions, they commented on how they still remember how they felt very welcomed by the SDSU/

Brookings community when they arrived on campus from India."

Shetti recalled that Brookings "was the town with the nicest people. First time in my life we never bothered to lock the homes. If you do that in Los Angeles, your house would be robbed in no time. During our first week in Los Angeles, our car was broken into." Now of Torrance, California, Shetti has lived in the LA area for 23 years.

Math professor "Bob Lacher had a vegetable farm that operated on the honesty system. I don't think there is any place on Earth that lets you weigh the produce and pay for what you think is worth," said Shetti, noting that most of their group came from large Indian cities so Brookings was a totally different experience.

### FACULTY MEMBERS RECALLED

He remembers Lacher as a "brilliant teacher. He taught us in a way we could all understand. His approach was the most practical and with examples. It was really a pleasure to learn. I still use a lot of his teachings from statistical classes." Shetti now is director of engineering with Honeywell Aerospace.

Other memorable faculty members were Hassan Ghazi, who taught thermo dynamics, and Alex Moutsoglou, who taught an air pollution class.

"Ghazi was really level-headed, really calm ... just the opposite of Dr. Moutsoglou. He was difficult. He would give us a tough problem. But all were kind and reasonable," Shetti said.

Another person who stood out to the group was international administrator Margaret Jenkins. "She felt like family. She embraced us the first time we landed in this county. She was like a big motherly figure for all of us. Anything we wondered about, we would ask her," Shetti said.

One thing the men weren't prepared for was winter. "We underestimated the cold. Wind chill, minus 40," Shetti said with emphasis.

They haven't decided on the 2020 reunion location but left their alma mater believing State was in good hands.

"We thank the management for doing such a phenomenal job on the university," Shetti said.

*Dave Graves*



# INDIA ENGINEERING REUNION

They are, from left, on p4

- **RAVI RUDRAPPA** '94 M.S. mechanical engineering, Detroit, Michigan, American Axle;
- **MAHANDRA URS** '94 M.S. mechanical engineering, Columbia, South Carolina, Blue Cross and Blue Shield of South Carolina;
- **SANTOS RAJVALOO** '94 M.S. industrial management, Houston, Texas, Creative Tech Inc.;
- **VIVEK HEGDE** '93 M.S. mechanical engineering, Boston, Massachusetts, Ameresco;
- **NIRANJAN TUMKUR** '94 M.S. environmental science, Raleigh, North Carolina, MetLife;
- **NAVIN SHETTI** '94 M.S. mechanical engineering, Torrance, California, Honeywell Aerospace;
- **SRI RAJN** '94 M.S. environmental science, San Antonio, Texas, CPS Energy;
- **PRADEEP MYSORE** '94 M.S. environmental science, Chesterfield, New Jersey, Randeep Inc.

## UNABLE TO ATTEND

- **PARTHA RAMASASTRY**, '97 Ph.D. Biology, Westlake Village, California, Journal of Life Sciences; and
- **GIRISH REDDY** '94 M.S. environmental science, Monmouth Junction, New Jersey, SAP.

# CAREER FAIR



Brothers Chad '13, left, and Brian '17 Albertson discuss the opportunities provided at IBM in Rochester, Minnesota, to a student who visited the booth during the Oct. 8 career fair in Club 71 at Dana J. Dykhouse Stadium. Both are electrical engineering graduates. It was Chad's first year to recruit at SDSU and Brian's second year. They are Brandon Valley High School graduates.



A record number of companies filled Club 71 (shown here) as well as Coughlin Lounge and fifth-floor suites at Dana J. Dykhouse Stadium for the college's fall career fair Oct. 8. The attendance of 151 firms breaks the old mark of 128. There were 20 first-time firms participating. Nearly 700 (691) students participated. The college sponsors the fair with the Joint Engineering Council helping to coordinate. The next career fair is Feb. 11, 2020.



Preparing the load tester for an ultimate strength test on an aluminum panel are, from left, graduate student Ibin Amatya, Zach Gutzmer, who oversees the Lohr Structures Lab, and Junwon Seo, an assistant professor in civil engineering. The May 28, 2019, test was being done to gather data for a Daktronics product innovation.

# PARTNERING IN THE STRUCTURES LAB

Daktronics, the Brookings-based electronic sign manufacturer, utilized the Lohr Structures Lab this summer in order to improve product efficiency.

The company's goal is to use adhesives rather than welding on its dynamic message system, the programmable message boards found along highways that warn drivers to merge left, prepare for a lane or exit closure, or be prepared for construction. Regulations governed by state transportation departments require that the pieces of the message board be welded.

However, using adhesive would be a less expensive option and would avoid a bottleneck on the assembly plant floor, engineer Toby Pulscher said.

To prove that the adhesive would still meet the needs of industry, Daktronics provided samples that were welded and constructed with adhesive.

Junwon Seo, an assistant professor of structural engineering, and Ibin Amatya, a graduate research assistant, took it from there.

## TESTING DESCRIBED

An ultimate strength test was conducted May 28. A 15-inch by 15-inch square 3/8th-inch thick steel plate was placed between the hydraulic actuator and the message board to evenly distribute the force. The adhesive bond failed under a load of just over 17,900 pounds per square foot (about two large elephants), which exceeded the strength of the aluminum frame, Pulscher said. "We certainly weren't expecting those numbers. We weren't expecting the adhesive to be stronger than the aluminum."

Two days later, Seo and Amatya began five days of fatigue testing, which mimics wind load.

The actuator was set for a load of 500,000 cycles, which is the equivalent of about 137 cycles per day, for 10 years. Or in layman's terms, being exposed to pressure equivalent to a 150 mph wind (a category 4 hurricane) for 365 consecutive days, Pulscher said.

He compared the process to having a piece of wire that is bent back and forth. Eventually it breaks. After the five days, a visual inspection was done to look for cracks and none were found on either the adhesive or welded pieces, Pulscher said.

The adhesive is a two-part acrylic that is used primarily for bonding metal to metal. Its manufacturer also makes products used to glue skins on aircraft wings.

## NEXT STEPS

Seo and Amatya could also do seismic loading (a lateral force) to simulate an earthquake, which Daktronics is considering because it is looking to get into the West Coast market, Pulscher said.

Data from the May and June testing are to be detailed in a report to be completed in February by Seo. That will give Daktronics the evidence it needs to approach state Department of Transportation officials for a change in regulations. Those conversations may begin before the report is finalized, he added.

Seo said to prepare for the testing, they did small-scale testing on 248 1-inch by 8-inch specimens with assistance from Todd Letcher, an assistant professor in the mechanical engineering department.





Ibin Amatya, graduate research assistant, examines the load stress on an aluminum sign from Daktronics. The May 28 testing in Lohr Structures Lab within Crothers Engineering Hall was done to examine the effectiveness of a new manufacturing technique using adhesives versus welding.



Assistant Professor Junwon Seo, center, inspects a weld with graduate students Euseok Jeong, left, and Ibin Amatya in the Lohr Structures Lab on campus. The inspections preceded a stress test on a welded panel for a digital marketing system transportation sign built by Daktronics of Brookings.

Seo said the \$182,000 project included \$74,000 from the Mountain Plains Transportation Consortium and \$48,000 in in-kind match by Daktronics (materials and engineering hours) as well as \$40,000 cash. The funding supported Amatya's graduate work. The second-year student is to publish his thesis and graduate in May 2020.

#### VALUABLE ASSET FOR INDUSTRY

Pulscher said Daktronics appreciates the convenience of having the structural expertise and testing equipment in its own backyard.

"Otherwise, we'd have to find third-party testing elsewhere, likely traveling to the (Twin) Cities or much further or have a lot bigger expense to bring equipment here. One of the reasons we haven't (equipped the Daktronics facility with the equipment) is it's so convenient to have SDSU to do the testing. It's just one more example of a good relationship between us," he said.

The Lohr Structures Lab was constructed in 2002 during a major renovation of Crothers Engineering Hall. However, full-scale testing didn't begin until 2006.

"In the past five years, the Lohr Structures Lab has partnered with 10 industry partners from around the nation as well as China and Thailand," said Mostafa Tazarv, who is in his fourth year as lab coordinator. "The lab provides an economical testing site for industry and an excellent opportunity for learning by our graduate students and research development by our faculty."

*Dave Graves*

## NEWS ROUNDUP

### TOP 10 RANKING FOR ENGINEERING TECHNOLOGY

The college ranked 10th nationally in engineering technology degrees awarded with 79 among the 133 reporting institutions, according to the American Society for Engineering Education profiles book for 2018.

The Lohr College of Engineering was also 16th of 130 institutions in engineering technology degrees awarded to female students and 35th of 56 reporting institutions in engineering technology enrollment.

Teresa Hall, who heads the Department of Construction and Operations Management, said, "Ranking 10th in the nation for degrees awarded was a pleasant surprise. Retention is a high priority for our department and our college. While the number of graduates was a little higher than normal, much of the reason for these rankings is our suite of program offerings that meet the demand in the local and regional workplace."

In September 2017, SDSU's bachelor's degree programs in construction management, operations management and electronics engineering technology were accredited.

### SDSU PART OF DOT AWARD

South Dakota State University researchers will develop innovative techniques to repair and construct bridges and roadways through a new U.S. Department of Transportation-funded research center, according to Mostafa Tazarv, assistant professor of civil and environmental engineering.

SDSU is part of a consortium of 11 universities working to improve the durability and extend the life of transportation infrastructure through the National Center for Transportation Infrastructure Durability and Life-Extension.

The center is one of seven national university transportation centers created through the 2015 FAST Act—Fixing America's Surface Transportation, which provided \$350 billion in funding for transportation research.

The new center, which involves 30 researchers, will receive \$7.5 million through the three-year U.S. DOT grant. South Dakota State researchers will get \$140,000 per year in federal funding that will be matched with regional and state transportation funding. Tazarv, who leads the SDSU team, estimated the project will provide research funding for three civil engineering faculty members and three graduate students.

"Our focus will be on developing techniques to repair and replace bridges, roads and even pipelines," said Tazarv. His research examines ways to enhance the performance of bridges and bridge components by using innovative materials that reduce damage due to severe events, such as earthquakes and flooding.



# LEIGH LANDS TOP POST

## AT IMAGE PROCESSING LAB

Larry Leigh's future seemed clear. He was a semester away from finishing his master's degree in mechanical engineering and had a job offer from NASA.

Leigh, a Sioux City, Iowa, native, had already spent a couple of summers as an intern at the Marshall Space Flight Center in Huntsville, Alabama, and after completing his degree was to begin work as a vibroacoustics engineer. "It would have been putting rockets on a shaker table to see if I could break them," he said from his corner office at Daktronics Engineering Hall.

When the semester was over in May 2001, NASA imposed a hiring freeze. Leigh, who earned his bachelor's three years earlier, thought he could wait it out.

He started work on a master's in physics and served as the teaching assistant for Dave Aaron, who also had a role in the university's Image Processing Lab. Leigh helped set up calibration "tarps" in the field used by the lab to calibrate satellite images. Later he was trained to run the field instruments for the project overseen by lab director Dennis Helder.

With the hiring freeze still in place at NASA, Leigh continued to work on his second master's degree and joined the lab as a graduate research assistant. Leigh learned to do the atmospheric modeling used in conjunction with the field data to evaluate on orbit performance of satellite imagery.

"I became the in-house expert using the software package MODTRAN, which is an Air Force-developed means for modeling light as it propagates through the atmosphere. No graphical interface. I had to make connections with the Air Force to learn how to use it. It's an antiquated and complicated

program, but it's still used and updated today. I began to take more of Dave's (Aaron's) responsibilities as he neared retirement and then Dennis (Helder) offered me a position," Leigh said.

### OFFICIALLY JOINS LAB

That was January 2002. By that time, he had enough credits for a master's in physics and a master's in math, but still no offer from NASA.

Leigh jumped on the chance to become a full-time image engineer with the Image Processing Lab. His loyalty and skills produced dividends when he was named assistant lab director in June 2016 as Helder spent more time in his role as associate dean for research. When Helder retired June 21, 2019, Leigh stepped up to director.

In the months that followed, there hasn't been much change at the lab, which was founded in 1988 and is one of only three such university labs in the nation.

Leigh said he has been more aggressive in developing corporate partnerships with firms like Lockheed Martin and Raytheon. All of the lab's nearly \$1 million budget comes from contracts. NASA and the U.S. Geological Survey top the list. Attracting more business from private firms diversifies the lab's income picture, Leigh said.

### WORKS WITH HALF THE WORLD'S SATELLITES

While NASA's Landsat satellites have become more accurate, there will still be a need for calibration and at a lower cost. Private satellites, which lack onboard calibration equipment, are flooding the market.



Leigh estimates there are 500 Earth-imaging satellites now in place. “We work with half of them,” Leigh said. In addition to the NASA and USGS satellites, the Image Processing Lab also has a contract with Planets Labs, a private firm that owns about 200 smaller satellites, Leigh said. The lab has had contracts or working relationships with governments and commercial operations in Great Britain, Germany, Brazil, Thailand, Vietnam and South Korea.

The lab is a good fit for Leigh, who has an avid sense for international travel. After earning his bachelor’s degree, he spent a month wandering Europe, and continues to spend a month each year traveling some part of the world.

Through his position at the lab, Leigh has traveled across the USA, Turkey and Thailand. The reason for these trips is satellites measure the amount of energy reflected from Earth, but engineers must routinely calibrate them to ensure the images they transmit are accurate, Leigh explained. Engineers go to a site and take measurements, which they then compare with satellite images of the same site.

#### **IDENTIFYING CALIBRATION SITES**

SDSU engineers have located remote places, such as deserts and dry lake beds, where the surface properties and therefore, the reflectance, do not change over time.

Leigh hopes to find more stable calibration sites. Through a contract with Google Earth Engine, the lab has access to all of the Landsat images. With the use of super computers and petabytes of data, the lab is able to search the world on a 30- by 30-meter scale for ideal calibration sites. So far 19 sites have

been designated. “Having a wide range of sites gives the lab a better handle on how the satellite is performing across its entire operating range,” Leigh said.

Right now, the work is done by three full-time staff members and six graduate and undergraduate students with retirees Aaron and Helder still working part time.

“I’d like to hire two or three more full time and another half dozen graduate students,” he said. One full-time position as well as some students are to be added next year. Filling the full-time position can be challenging. There just aren’t many people worldwide who have the skillset. The same would be true of students, but Leigh puts the bar at a different height.

“The last batch of students I hired, the most critical thing I looked at was their ability to communicate. I can teach anybody the material. I try to find people who are self-starters, someone who is not afraid to reach out to me on an email,” Leigh said.

It is the teaching phase of the job that he enjoys most about his work.



“Our field is such a niche field. These students come in with no expertise and I have a chance to get them excited about doing this kind of work.” There is no training manual. “It’s really me just checking in with the students every day. It’s a lot of face time.”

#### TEN YEARS FROM RETIREMENT

He could be training his replacement.

Leigh, now 45, plans to work until 55 and then retire to Thailand, where his wife and co-worker Morakot Kaewmanee hails from. They met in 2010 as part of an international calibration team at a salt lake in Turkey. Kaewmanee was working for the Thailand Space Technology Development Agency. Two years later they married.

In March 2012, she had accepted a one-year visiting scientist position at the lab. That has evolved into a permanent position. Helder said Kaewmanee “is the leading person in the world on what you can do with PICS (pseudo-invariant calibration sites, deserts and dry lake beds) these days.”

The lab’s other full-time member is Cibele Pinto, a Brazilian native who has worked at the lab since January 2017.

She came out of Brazil’s National Institute for Space Research, which is responsible for the calibration of Brazil’s imaging satellites. Pinto, who has taken over the field work started by Aaron and Leigh, is the lead in developing uncertainty budgets for all the analysis done and does the formal classroom teaching of the students in the lab.

*Dave Graves*



# HELDER

## CAMPUS DAYS HAVEN'T ENDED

#### DENNIS HELDER’S FAREWELL FROM SDSU WAS A SHORT ONE.

He officially retired June 21 after 35 years as a state employee. But you can still find the professor emeritus on campus Mondays and Wednesdays teaching an image processing class and helping out in the image processing lab. He also is working one day a week with EROS, the U.S. Geological Survey facility near Baltic.

Other than that, he is fully committed to chasing after grandchildren, shooting pheasants, teaching Sunday school and working on his De Smet farm.



# AI's IMPACT

David Staley, author of “Alternative Universities: Speculative Design for Innovation in Higher Education,” spoke to the Jerome J. Lohr College of Engineering’s Dean’s Advisory Council regarding artificial intelligence, trends in higher education and workforce development. It was one of three talks Staley made when on campus in early October.

The director of the Humanities Institute and director of the Center for the Humanities in Practice at The Ohio State University, Staley spoke about the impact of the artificial intelligence economy on higher education.

“I don’t think higher education—or, really, even society at large—is ready for the AI economy,” he said. “In many ways, the autonomous intelligence economy has already started but we in higher education aren’t or haven’t been prepared for it yet. There will be changes in higher education that will be precipitated by AI.

“The first will be upskilling—where companies like Starbucks and Amazon—will be upskilling their workforce. A big question remains whether higher education will play a role in that process,” Staley continued. “Starbucks and Arizona State, for example, are partnering. I anticipate—but cannot guarantee—that higher education will be called upon to work with upskilling.

“AI is going to take a lot of jobs, but there are also going to be a lot of jobs where we’re going to have to work together with AI. We don’t have the education infrastructure around teaching or training people how to interface with AI,” Staley said. “Another dimension to this: while there will be many tasks that AI will take away from human workers, there will continue to be some attributes that only human beings will possess: imagination, curiosity, wonder, play, awe, the ability to ask questions ... It is possible that cultivating these attributes rather than training of skills becomes the chief purpose of higher education.”

Kevin Moe ’88 is an IT solutions architect for KBRwyle and a member of the Dean’s Advisory Council. He appreciated the opportunity to hear from another point of view in this global economy and possible impacts on higher education.

“Dr. Staley’s talk on AI was an angle I had not previously contemplated. He raised a number of issues that will require industry and higher education to transform in order to meet the workforce demands of the future,” Moe said. “I see a future that requires a highly educated workforce, which will drive the demand for additional engineers. I personally believe that the limited supply of engineers will be a limiting factor on how soon the world will become an AI economy.

“I have been on the council for the past decade and have always been concerned about the relatively flat enrollment in engineering,” Moe continued. “I see a future where council members will need to be more active in their respective communities in order to promote the value of a degree in education. It may involve educating high school students, assisting high school STEM teachers, or volunteering at STEM-related activities on university campuses.”

Staley said incoming freshmen are looking at well-defined, safe paths for careers.

“One originally went to college to acquire knowledge,” he said. “In the 1980s, there was a shift toward developing skills to land jobs, which has been called the human capital development stage. Many skills have already or will soon become automated so that stage is insufficient now.

“Students need to cultivate human attributes to future-proof their education,” Staley said.

*Matt Schmidt*

# MARVIN PETERSEN

## PUTTING HIS MONEY WHERE HIS HEART IS

“A great college starts with great students.”

Those words from former faculty member Marvin Petersen motivated him to create a scholarship in electrical engineering nearly 30 years ago and to grow it through time. Today, the Marvin E. and Carolyn W. Petersen Scholarship in Electrical Engineering provides an award to a sophomore, junior or senior majoring in electrical engineering.

“When I left there in 1990, Jeff Nelson (from the SDSU Foundation) came over and talked about setting up a small scholarship. I did so in 1990,” Petersen said.

The \$400 scholarship became a \$1,000 Jackrabbit Guarantee Scholarship when those were created in 2002. In 2017, the scholarship was put on long-term solid financial ground when he earmarked a bequest to endow the scholarship. Until that time, Petersen had been making contributions to continually fund the scholarship.

He created the scholarship due to his experiences teaching electrical engineering students at State from fall 1982 through fall 1989.

“When I was teaching, I found I had several students who were really interested in the material. I found out they were Briggs scholars (which is the top academic scholarship that SDSU awards). They made the class worth doing as far as I was concerned. It got me thinking that the future lay in getting good students.

“It was obvious to me you had to start with good students, who also would be your best source of new faculty,” Petersen said.

### A BOY AHEAD OF HIS TIME

The former Honeywell engineer said it was rather by chance that he became a faculty member. In fact, a number of unexpected events steered his career, he said.

The son of a De Smet farmer with a sixth-grade education, Petersen had his mind on science—high-level science—by the time he was 10. The precocious Petersen, who was born in 1926, had heard of nuclear experiments by people such as Enrico Fermi. Works by futurist writer H.G. Wells told of nuclear weapons, satellites and space travel.

“I had visions of working in nuclear energy and space travel,” Petersen said. After graduating from De Smet High School, he set off for South Dakota School of Mines and Technology with an initial goal of being a chemical engineer. But he became dissatisfied with those studies and switched to physics in his junior year.

Petersen graduated in 1948 and had plans to go to Cal Tech for graduate school but was told there was no room in the program.

### WAR INTERRUPTS CAREER PLANS

So Petersen, who had been working summers at Eastman Kodak Co. in Rochester, New York, went back East for full-time work for a couple of years. When the Korean War broke out, Petersen enlisted in the U.S. Navy.

He was assigned to electronics technician school and he went to Officer Candidate School, followed by an assignment at the Norfolk (Virginia) Naval Shipyard in the industrial manager’s office, which handled all of the naval contracts for that region. Petersen supervised installation of electronics in ships.

In 1954, when his military duty ended, “The only people that wanted to hire me were for jobs doing what I had done, which involved climbing up masts in the icy winter.”

That convinced him to get a master’s degree in electrical engineering. He showed up at the Massachusetts Institute of Technology in late 1954 and worked at MIT as a research assistant in Lincoln Laboratories while getting his advanced degree.

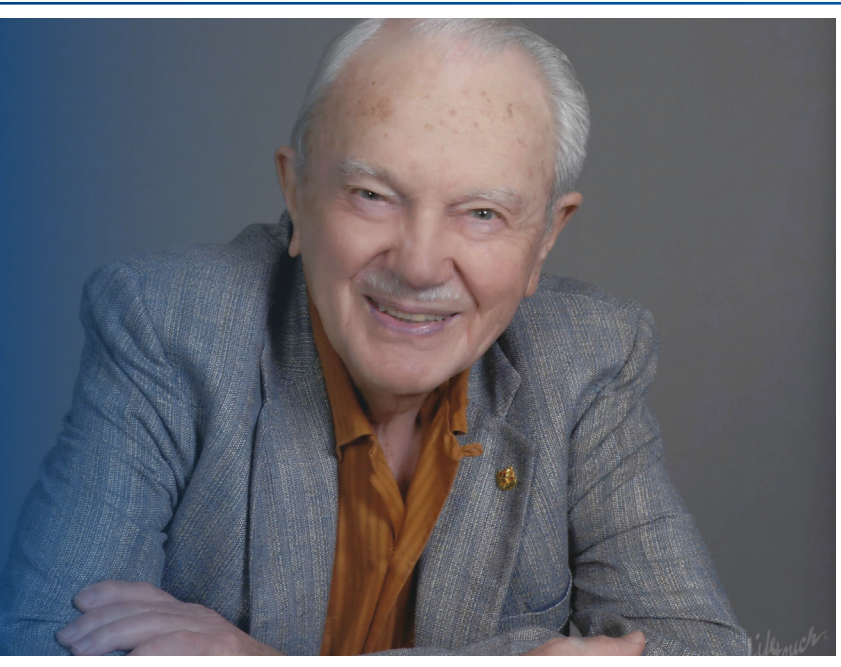
### QUARTER-CENTURY WITH HONEYWELL

He finished in 1957 and wasn’t interested in another New England winter. So rather than return to Kodak, he located in south Florida, where Honeywell was opening a new facility.

Petersen would spend the next 25 years there as an electronics design engineer and a projects engineer. Among his projects were working on an inertial navigation system for use in aircraft, spacecraft and missiles. Eventually, all civilian aircraft had inertial navigation systems.

The system used gyroscopes, accelerometers and a computer to direct crafts from their current location to their intended location, Petersen explained.

Also at Honeywell he did design work with the Atlas and



Minuteman missiles, guidance systems for underwater missiles and the U-2 and SR-1 spy planes as well as working with military aircraft in Sweden and a telephone system in Israel. For the last three years of his career, he also taught night classes at the nearby University of South Florida in Tampa.

#### **FINDING SATISFACTION IN THE CLASSROOM**

Petersen took early retirement in 1982 so he could return to South Dakota to help his mother, who didn't want to move from De Smet.

He had planned to work on an adjunct basis at State, but electrical engineering department head Virgil Ellerbruch was looking for full-time help. Petersen jumped in, teaching courses in circuit design and electronics materials as well as setting up an electronics material lab, which started out in an old shower room in Harding Hall.

They created a clean room and installed vapor disposition equipment and printers that processed thick films with networks of conductor lines and resistors embedded in them.

The lab, which eventually relocated to the basement of Solberg Hall and gained more equipment, had a contract with Control Data Corp. of Minneapolis to find materials that did not conduct electricity and could be used to insulate wiring between parts of digital computers. The research was an extension of what he had already done in industry.

#### **EARLY IMPRESSIONS OF STATE LINGER**

After 7 ½ years in his home state, Petersen was ready to return to Florida, but he enjoyed the camaraderie of his colleagues and Ellerbruch's comfortable style.

Though he never enrolled at State, he said he was always impressed with the school, recalling a senior day campus visit and touring "the student union building, which at the time was only a couple of years old." Pugsley Union was built in 1940. When it came time to think about allocating his estate, Petersen's mind again returned to State.

"I was thinking there were a lot of people in eastern South Dakota that were good students and their closest school was in Brookings. It was a case of thinking this is the best way to maximize the gift," he said.

*Dave Gravs*



## **FOUR JACKRABBITS EARN NATIONAL SCHOLARSHIPS**

Four electrical engineering majors at South Dakota State University have been selected for national scholarships from a leading professional organization.

Senior Tyler Jorgenson, of Fergus Falls, Minnesota, and juniors Jesse Kreutzfeldt, of Wentworth, and Matt Stoel and Kyle Weier, of Sioux Falls, each received Power and Energy Society (PES) Scholarships from the Institute of Electrical and Electronics Engineers (IEEE), the world's largest association of technical professionals. These scholarships aim to attract highly qualified engineering students to the field. They are among 135 recipients from 96 universities in the United States, Canada and Puerto Rico. There were 326 applicants.

Recipients are high achievers with strong GPAs, distinctive extracurricular commitments and are committed to exploring the power and energy field.

In addition, Stoel became the second SDSU student to be selected as one of six regional winners of the John W. Estey Outstanding Scholar Award, which is selected from the 135 Power and Energy Society Scholarship recipients. Last year, Grant Metzger became SDSU's first recipient of the Estey Outstanding Scholar Award.

Stoel, who was one of 13 students selected as a 2018-19 Schweitzer Meritorious Scholar through the IEEE, and Jorgenson are both two-time PES Scholarship recipients.

The award is funded by Schweitzer Engineering Laboratories to encourage engineers to focus on the power and energy industry, which is facing challenges such as making renewable energy sources cost effective and stepping into the shoes of retiring engineers. This scholarship celebrates recipients as among the most promising engineers in North America.



# BENEFACTOR

## MANSOUR KARIM

### DIES

**MANSOUR LINCOLN KARIM** '55/'61 died July 5, 2019, in Rapid City. A longtime resident of Pierre, he moved to Rapid City earlier this year to be closer to family.

A well-known philanthropist in his later years, he immigrated from Iran at age 22 with \$27 in his pocket and a desire for a good education.

As the family noted in his obituary, “Mansour’s journey through life was in many ways the epitome of the American dream, forged by dedication to God, determination, generosity of spirit and joyful service to his family and community.”

Karim was born Aug. 14, 1928, in Tehran, Iran, to parents who supported his desire for an American education. However, he had to borrow money from a family friend to make the trip. He spent his first semester at Huron College and then transferred to what was then South Dakota State College.

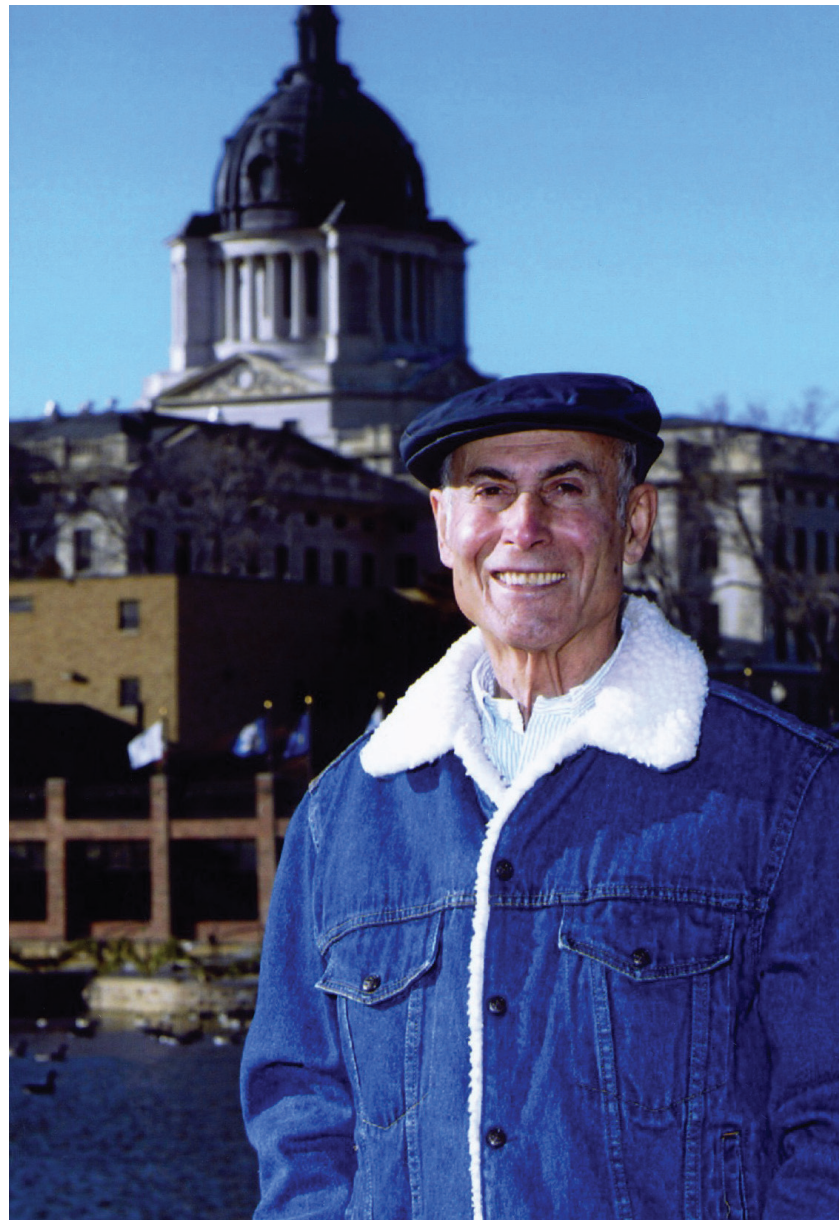
The wrestling program was just starting at State and coach Harold Holmes saw in Karim something the team needed—someone small enough to fit the 115-pound weight slot. Though he had no wrestling experience, Karim used the unstoppable combination of hard work and some natural ability. He made the traveling squad.

He earned his bachelor’s degree in agricultural engineering while working his way through college, including a 20-cent-an-hour job at the campus Seed Lab. After graduation, he took a \$3,500 per year job with South Dakota Department of Transportation. Meeting his future wife (Ruth Kempster) helped compensate for the low pay.

They married Dec. 31, 1959, in Huron. In 1960, Mansour proudly became a U.S. citizen. The state encouraged him to go back to school to study the effects of water movement on infrastructures. He spent 1960-61 earning his master’s degree in civil engineering and Ruth taught remedial English on campus.

They moved back to Pierre and Karim started the highway department’s first hydraulics section, overseeing erosion control, dams and culvert work. He remained its chief until his retirement in 1991.

In his 40s, Karim began to dabble in Pierre real estate, eventually becoming one of the city’s respected investors in residential properties. In 2011, Karim was named Pierre’s Philanthropist of the Year.



In fall 2004, Karim established a \$1.1 million charitable life income trust with the SDSU Foundation and placed seven apartment properties in the trust for eventual sale. That created the Mansour and Ruth Karim Scholarship Endowment to support scholarships for engineering students and wrestlers.

He was preceded in death by his wife of 53 years and his eldest daughter, Laura Kist.

He is survived by six children: Kiran Karim, Kailua Kona, Hawaii; Shane (Dan) DeWald, Seattle; Zahra (Todd) Pfeifer, Omaha, Nebraska; Monni (Karen) Karim, Custer; Soraya (Gordon) Anaple, Cincinnati; and Jafar (Jess) Karim, Rapid City; a sister-in-law Delores (Gordon) Mydland, Pierre; a brother, Houshang, Sweden; 17 grandchildren, 11 great-grandchildren and one great-great-grandchild.

*Dave Graves*





**DAVID LEE GILKERSON**, '76 electrical engineering, died June 14, 2019, at Avera Heart Hospital in Sioux Falls.

Gilkerson, 65, of Brookings, was an early employee of Daktronics. His work sent him to Asia and several Olympic venues. For the past 21 years, he was a project engineer with the Office of Finance and Administration at SDSU.

Survivors include his wife of 43 years, Deanna (Trenary); three children, Nathan (Melissa), of Whitefish Bay, Wisconsin; Lee, of Brookings; and Susan (Paul) Deutsch, of Sioux Falls; three grandchildren; three siblings, Jim (Kysa), of Brookings; Robert (Kristi), of Racine, Wisconsin; Jean (Joel) Pedersen, of Lincoln, Nebraska; and his mother-in-law, Edna Riley, of Brookings.



**HARLOW MINOR**, '53 mechanical engineering, died April 18, 2019, at Severna Park, Maryland, where he was a resident.

Harlow, 88, a native of Gregory, was recognized as a Distinguished Engineer by the college in 1999. He joined Westinghouse Electric after graduation and retired in 1994 after nearly 41 years with the firm. After initial training in Pittsburgh, he worked

in the aviation gas turbine division in Kansas City. In 1960, he transferred to the mechanical engineering department of Westinghouse Defense Center in Baltimore.

From 1962 to 1964 he designed and tested the cooling system for a large shipboard radar system and participated in the initial sea trials.

In 1965, Miner moved to radar surveillance and began a nearly 30-year career in tactical radar systems. He designed ground tactical surveillance radar systems for the U.S. military and foreign military and air traffic control radars, including the long-range enroute radars and the airport surveillance radars.

After promotion to advisory engineer, Miner was responsible for the preliminary mechanical systems design for a variety of ground-based, shipboard and airborne surveillance radar systems.

Survivors include his children, Steven (Cathy) and Cheryl Miner, all of Severna Park, and Harlow J. III (Trisha), of Orlando, Florida; six grandchildren, and five great-grandchildren. He was preceded in death by his wife of 66 years, Carol, and a son, James.



**MARSIA GELDERT-MURPHEY**, '92 civil engineering, was inducted into the Missouri Science and Technology Academy of Civil Engineers April 18. She holds her master's in civil from Missouri S&T (1997).

She is co-founder of Kaskaskia Engineering Group, a 100% women-owned entity that grew from two to 45 employees. She serves on the civil engineering advisory board at SDSU and Saint Louis University. She is Region 7 director of the American Society of Civil Engineers and is on the ASCE board of directors. In that role, she testified before Congress in April 2017 on the conditions of America's infrastructure and its impact on small businesses.

Most recently, she was named regional director for the Illinois and Missouri operations of Lochmueller Group, a Midwest consulting firm that emphasizes planning and designing of infrastructure improvements.



**JANE MCKEE SMITH**, '83 civil engineering, became the first member of the U.S. Army Corps of Engineers to be elected to the National Academy of Engineering.

Smith is the Army senior research scientist for hydrodynamic phenomenon stationed at the U.S. Army Engineer Research and Development Center, Coastal and Hydraulics Laboratory, Vicksburg, Mississippi.

Her research focus is coastal hydrodynamics, including nearshore waves and currents and storm surge. She was elected to the prestigious academy in February in recognition of her work in those areas.

She was selected as an SDSU Distinguished Alumnus in 2013 and a Distinguished Engineer in 2015.





## HANSEN NAMED IEEE TEACHER OF THE YEAR

Electrical engineering assistant professor Tim Hansen maintains a robust research portfolio, but he doesn't use that as an excuse to skimp on his teaching assignments.

Because of that commitment, Hansen has been named teacher of the year by the Institute of Electrical and Electronic Engineers, the world's largest technical professional organization. Officially called the C. Holmes MacDonald Outstanding Teaching Award, it is the only teaching award given by IEEE, which has numerous specialty societies.

Hansen is a member of the power and energy society and the computer society. His research has focused on computer applications to energy management and energy storage for electric power systems.

But in the classroom, Hansen's teaching load includes Digital Systems, Advanced Power Systems Analysis and Fundamentals of High-Performance Computing.

"I have always heard that faculty are hired because of their research and they don't have to be good teachers," said Hansen, who is in his fifth year as an SDSU faculty member. "I've seen the difference between those who put time into teaching and those who don't. I'm very active in research, but if you give me a class, I'm going to put time into it. If students are paying, I'm at least going to put effort into it."

### THAT IS ATTESTED TO BY HIS STUDENTS.

Senior electrical engineering major Joel Kocer, from Brandon,

said, "Dr. Hansen is one of the best professors I have had while attending SDSU. Dr. Hansen's preparation for each class is always very apparent. Not only does he have a well-prepared lecture, but he also prepares interactive in-class examples that benefit everyone within the class."

### AWARD GIVEN ANNUALLY SINCE 1972

Hansen's SDSU contract calls for 45% teaching, 45% research and 10% service. Because of staff vacancies, he taught three class sections in the fall semester. Normally, he teaches three classes a year. "By teaching three it allows me to put full time and effort into each one and I think that comes through, too," said Hansen, who will receive his award at the IEEE awards presentations Nov. 22 in Boston.

Hansen is the first SDSU faculty member to win the award, which originated in 1972 to recognize the central and crucial role of college professors in training and motivating future electrical and computer engineers.

Kocer adds, "He is very deserving of the award. Dr. Hansen does a really good job of ensuring the students enrolled in his class are getting the experience that is necessary from the class. He also makes sure students are learning current events within the respective topics.

"He also promotes writing within the two-column IEEE format, which is the format used in every IEEE research paper. This is a valuable skill to learn for every electrical engineer."



Timothy Hansen



## HANSEN'S PIVOTAL JUNIOR YEAR

Hansen's path to a career in academia began at the end of his junior year at the Milwaukee School of Engineering, where he graduated in 2011. Hansen was a founding member of a chapter of Eta Kappa Nu, the international honor society of the Institute of Electrical and Electronics Engineers. As part of outreach for the chapter, he helped host a graduate school fair there, and through the experience decided to attend grad school himself.

He chose Colorado State University, where his adviser convinced him to pursue a doctorate in electrical engineering rather than a master's degree.

That led to an internship at the National Renewal Energy Lab in Golden, Colorado. He found he appreciated the flexibility offered by academics as opposed to industry work where one's research area and weekly schedule is dictated. After graduating in 2015, Hansen accepted a tenure-track position in the Department of Electrical Engineering and Computer Science, which had just moved into the newly built Daktronics Engineering Hall a few years earlier.

At State, he has "taken a student-first approach to our curriculum," according to Steve Hietpas, the former department head who nominated Hansen for the award.

## MOVED AWAY FROM LECTURE-ONLY FORMAT

The California native revitalized the teaching approach for his course load. After attending the National Effective Teaching Institute, Hansen moved away from lecture-only teaching to active teaching methods to match the 10- to 12-minute attention span of students.

"I try to have an activity every 10 minutes, such as discussion with partners or groups. Two or three times per semester I will give a problem and students get in a group of five. I award points for the first done or the most innovative solution. Plus, we rotate groups so you're not always working with the same person.

"My first two years as a (college) student I was the one hiding in the back not participating. In my junior and senior years, I gained the confidence to ask questions. You really miss out when you don't participate," said Hansen, whose class sizes in Milwaukee were comparable to SDSU, about 30 students.

"I worked with the same people over and over. Eventually, I gained the confidence," he said.

By breaking students into groups, he shortens the time it takes for students to gain confidence. That's true even in a freshman lab.

"We're in it together. We help each other. Everybody can make life easier for everybody else by actively contributing," Hansen said.

He said two other major influences on this teaching were Cory Mettler, a former instructor now at Montana State, who did peer teaching evaluations for Hansen, and Russ Meier, one of his instructors at Milwaukee. "I still recall vividly how he taught us in class, and I try to model myself after him," Hansen said.

## LEVERAGES LEARNING WITH PEER SUPPORT

Peer support is the idea behind a mentoring program he oversees that pairs a junior and a freshman. Originally, it was a program funded by a National Science Foundation grant that paired a selected student with a faculty member. The grant ended but the peer mentoring program was picked up in its current form by the electrical engineering and computer science department in spring semester 2019 with assistance from the campus chapter of Eta Kappa Nu.

There are 15 pairs and students stay connected for two years, by which time the mentor will graduate and the mentee will be ready to become a mentor.

Another of Hansen's accomplishments is designing two new courses—Fundamentals of High-Performance Computing and Computer Analysis of Power Systems. The power systems course had been a graduate-only course, but Hansen made it a 400/500 level course and teams graduate and undergraduate students on projects.

High-performance computing is a cross-listed elective for electrical engineering and computer science students. It's drawn good interest from students in both majors, with the goal of having universitywide participation.

Working with Bob Fourney, associate professor in electrical engineering, Hansen also redesigned the computer engineering curriculum, moving it from a focus on central processing units to ARM (Advanced RISC Machine) processing. "ARM is the most common processor. It's used in cellphones. In fact, it's used in 85% of processors," Hansen said.

The switch also involved ditching a \$200, overly detailed textbook for a \$60 paperback book that covers both digital design and computer organization classes.

Students also are required to buy a \$70 field programmable gate array, which allows any type of digital hardware to be loaded onto it—a computer processor, vending machine mechanics, a traffic controller—and it's also used in both classes. The hardware allows students to do things normally you would need to do in a lab.

"It's more work for us to do it, but in the long term will benefit our students," which is the way you approach education when you're a teacher of the year.

*Dave Graves*

# FOUTS RECEIVES SMART SCHOLARSHIP



Ryan Fouts

When Ryan Fouts stepped onto the South Dakota State University campus four years ago, he knew he was in the right place.

“It felt like everyone here had my best interests in mind. Their goal was to help me achieve my goals,” recalled the senior mechanical engineering major from Merville, Iowa. What he did not know then was just how much he would accomplish.

Fouts received the prestigious SMART scholarship, which covers his education and living expenses beginning in fall 2019. The scholarship also gives Fouts an internship next summer and an engineering position at Whiteman Air Force Base, near Warrensburg, Missouri, after he graduates.

The U.S. Department of Defense established the Science, Mathematics and Research and Transformation scholarship program in 2005 to support undergraduate and graduate students pursuing degrees in science, technology, engineering and mathematics.

Fouts is the second mechanical engineering student to get the SMART scholarship; the first was Trevor Layh in 2011. “This is an extremely competitive scholarship program,” said professor Kurt Bassett, head of the Department of Mechanical Engineering.

“When I sent the text to my parents, my dad said he actually started crying,” Fouts said. His father, Lt. Col. Kevin Fouts, formerly of the 185th Air Refueling Wing of the Iowa Air Guard, is currently working at Andrews Air Force Base in Maryland. “I have always wanted to serve my country as my father has done. Now I have that opportunity.”

The scholarship will provide full tuition, a monthly stipend, health insurance and book allowance for Fouts’ last semester of undergraduate work and his master’s work. It provides about \$25,000 a year for an undergraduate and nearly \$33,000 a year for a graduate student. In addition, Fouts has the option to extend the funding another three years if he chooses to pursue a doctorate.

## CREATING OPPORTUNITY THROUGH HARD WORK

“This is a huge scholarship and a great opportunity for Ryan,” said assistant professor Todd Letcher, who encouraged Fouts to apply for the SMART Scholarship-for-Service Program. Fouts has been working on 3D printing with Letcher since May 2017.

“Ryan has done so much to help out with so many of my projects. He works hard every day and stays here all summer to work on our projects. He’ll jump in and help anybody who needs help any time,” Letcher said.

Assistant professor Jeffrey Doom, whose expertise is in aerospace engineering, oversaw Fouts’ work on an agricultural sprayer test bed. “Ryan is an excellent student and a tremendous help on the (Raven Industries) research project,” he said.

“I’ve been given opportunities that helped me succeed,” said Fouts, who credits his parents for the work ethic that has been integral to his success. “I was raised to do things right the first time. If you need something done that’s hard to do, I am willing to put in the time to make sure it gets done right.”

## PREPARING FOR SERVICE

Once he graduates, Fouts will work with the mechanical engineers in charge of heating, ventilating and air conditioning systems at Whiteman Air Force Base, which is home to the 509th Bomb Wing and the only B-2 Spirit bomber unit.

Next summer, he will do an internship there. Though he admits, “HVAC is not necessarily related to my research experiences,” he will be taking some courses to prepare himself for the job. After a visit to the base, Fouts said, “What got me the most excited is the people and culture—they take pride in what they do.”

*Christie Delfanian*



Ryan Fouts, a senior mechanical engineering major at South Dakota State University, captures high-speed video of the nozzles on the sprayer test bed he helped build in summer 2019.

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**ROBERTO PEÑALOZA**, EE22  
Hardware Design Student Employee



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# EVAN GREENE

To the most casual of spectators, the game of football is little more than hulking men bashing into one another for an hour. However, to those who know the game best, football is a cerebral game—just ask Evan Greeneway.

The civil engineering graduate student has turned himself into one of the premier offensive linemen in the Missouri Valley Football Conference by relying as much on his brain as his other physical attributes.

“I play to my strength, which is being able to see things better,” Greeneway said. “Being smart, seeing the field and noticing little things help me compensate for not being the strongest guy out there. But I do love knocking people on their butt—that’s a lot of fun, too.”

Greeneway grew up in Yankton, where he dabbled in many different sports throughout his youth. However, his height—he stands 6 foot, 7 inches tall—allowed him to excel most at basketball and football.

One of his coaches pointed out the possibility of playing college football when Greeneway was a junior—and it quickly became part of Greeneway’s plans. Not wanting to settle for anything less than the best, he set his sights on Division I competition and came to Brookings as a walk-on who already knew his field of study.

“In middle school, we had this project where we had to build a bridge out of Popsicle sticks,” Greeneway recalls. “My bridge didn’t win, and I was kind of mad about it. I started thinking ‘Oh, if I would have done it this way it would’ve been better.’ It just sparked a fascination in me that I kept with. Structures have always been something that interested me.”

That interest motivated Greeneway through his bachelor’s degree in civil engineering and continues to play a prominent role as he pursues his master’s with an emphasis in structures.

Academics have always been important, even through the transitions—and there have been a few. One constant through Greeneway’s football journey is his place on the MVFC Honor Roll. He’s a four-time honoree, with the possibility of a fifth to come following his final season in yellow and blue.

“To be a great student or a great football player, it’s not just showing up on test day or for games and having a great day—it’s all the work you do when no one’s watching,” said Jason Eck, SDSU’s offensive line coach and offensive coordinator. “Whether it’s training in the summer or studying alone in the library, I think Evan has a lot of pride in taking care of his business.”



Greeneway always performed in the classroom and on the field in high school, but would have to face some adversity before reaching the same point in college.

When Greeneway started on the Yankton football team that went undefeated and won the state title as a senior in high school, he was a tight end. He intended to continue playing that position until a conversation with Jackrabbits’ head coach John Stiegelmeier convinced him to move to the offensive line.

After a redshirt season in 2015, it took a full season for Greeneway to get to a weight suitable for playing offensive tackle, meaning he didn’t see the field in 2016 either.

Some may have got disheartened, transferred or quit football altogether, but Greeneway knew his time was

coming when he could step on the field for the Jacks.

“He’s worked hard over a period of time to reach long-term goals,” Eck said. “He didn’t get a lot of immediate satisfaction. I think that’s something that’s going to lead him to be very successful in life beyond football—just that persistence and grit.”

Things changed in 2017. Greeneway appeared in all 14 games, starting four, including the final two playoff contests. Last season, he took over as a full-time starter at offensive tackle and was named All-MVFC honorable mention. He’s back this season, only this time as a captain.

“When Coach Stig read my name, that was probably one of my favorite memories here,” Greeneway said. “Knowing that my teammates respect me enough to vote me as a captain and believe in me to make decisions for the team and lead this team was a special moment I won’t forget.”

# REENEWAY

For the moment, Greenway is focused on making the most of his final season in Brookings. He has his sights set on training for a shot at the NFL, but knows even if he makes it, there's life after football.

He took an internship at Civil Design Inc. in Brookings this past summer and it reaffirmed what he wants to do when he puts away his shoulder pads—something he's been interested in since middle school.

"Football doesn't last forever, so when I'm done with football, I plan to finish grad school and get a job as a structural engineer," Greenway said. "It's going back to the bridge made from Popsicle

sticks—I want to work on bridges. It's something that's really interested me."

No matter what he chooses to do, those who know Greenway expect him to succeed—it's just the way he does things.

"If you're smart, tough and work hard, you can have a lot of success—that's Evan," Eck said. "He's just a special kid and a great ambassador for what SDSU is all about."

*Landon Dierks*

## STUDENT ATHLETES

- **WYATT ANDERSEN**, baseball, electrical engineering
- **ADAM ANDERSON**, football, construction management
- **ALEXANDER AUCH**, cross country/track and field, mechanical engineering
- **BRET BARNETT**, baseball, operations management
- **PETER BATES**, track and field, mechanical engineering
- **JOSHUA BECKER**, cross country/track and field, agricultural and biosystems engineering
- **WILLIAM BIERSCHBACH**, swimming and diving, mechanical engineering
- **ADAM BOCK**, football, mechanical engineering
- **JESSICA BOESCH**, equestrian, mechanical engineering
- **MATTHEW BOROWICZ**, football, mechanical engineering
- **CALEB BRAY**, track and field, mechanical engineering
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- **BO DONALD**, football, construction management
- **ALYSSA ECKSTEIN**, swimming and diving, mathematics and mechanical engineering
- **ANNA FASEN**, cross country/track and field, mechanical engineering
- **EVAN FICK**, cross country/track and field, mechanical engineering

# ANNA FASEN

It's the Monday before the Roy Griak Invitational, one of the nation's largest cross country meets, but the competition is far from the only thing on Anna Fasen's mind.

Before the senior mechanical engineering major can shift her focus solely to the meet, she has five days filled with classes, homework, practice, club meetings and two exams—none of which will be compromised due to her status as a student-athlete.

It's nothing new, either. Being heavily involved is something Fasen has enjoyed each of her four years at South Dakota State.

"I think she's done a really good job balancing the demands of high-level academics and her outside interests, whether it be the human-powered vehicle or the Catholic campus parish and its activities or running up to 50 miles a week," said Rod DeHaven, Fasen's cross country and track and field coach. "She wants to have a very well-rounded experience as a student here at South Dakota State and has done a great job."

Though, if you ask DeHaven, there may be one thing on her jam-packed schedule that Fasen doesn't do quite enough—and she knows it.

"I sleep, too," Fasen said through a smile. "Rod tells us we need eight hours a night. I don't always get it, but I try."

Growing up in Monticello, Minnesota, a town halfway between St. Cloud and Minneapolis, Fasen tried almost everything once. She participated in several sports, was a member of the jazz band, earned a role in a musical and joined the math team. What was present in most of the activities she involved herself in, though, was competition.

Fasen is the third of six children, which only helped further her competitive drive.

"I grew up with four brothers, so we were racing each other and doing ridiculous contests—totally random, ridiculous things, but always competitions," Fasen said.

But when it came to the prospect of running in college, Fasen wasn't sure she wanted the added pressure of being a student-athlete.

"The competition of racing—I let it get to me a little bit sometimes. I put too much pressure on myself and I didn't want that to interfere with school."

When Fasen decided to pursue a degree in mechanical engineering with a minor in biomedical engineering from SDSU, there was a familiar face waiting.

Krista Steele, Fasen's high school friend, had come to SDSU the year before and was a member of the track and field team. Even after Steele introduced Fasen to the team, she remained unsure about competing, but received DeHaven's permission to train with the team.

"At first, I really just desired to spend time with the team and have that base of friendship and accountability," Fasen said. "It's so nice to have that group of girls that you can just talk to for an hour every day. Now, of course, competing has become fun again."

She may not be the fastest runner, but that doesn't matter much to Fasen. She's far more concerned about helping the team while steadily improving herself. Nowhere is this more prevalent than in her reflection of winning the distance medley relay at the 2019 Summit League Indoor Track and Field Championships.

"I was competing for my team, but especially for those three other girls running the three legs before me," Fasen said.

That determination and will to succeed has helped draw the admiration of her coaches and teammates.

"It's always tough to determine what someone's God-given ability is, but she, certainly when she's on the track, seems to be able to dig really deep and keep fighting when it seems like things might be lost," DeHaven said.

But it goes far beyond Fasen's athletic involvement. She is committed to maximizing her performance in every aspect of her life.

"I don't have a Netflix account. I don't have a Hulu account. I'm not watching TV. I'm getting my stuff done so I can do running and school and succeed in both," Fasen said.

The summer before her junior year, Fasen traveled around South Dakota as a missionary. This past summer, she took an internship in Valencia, Spain, working for a company that specializes in 3D printing and modeling.

With all that she does, Fasen strives to be the best she can be. Whether it's in the classroom, as the human-powered vehicle ergonomics team lead or as a runner, people take notice.

Perhaps DeHaven says it best: "From a coaching perspective, you'd like to have a lot of Anna Fasens—just maybe with a little more sleep."

Landon Dierks





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- **SPENCER HUBER**, wrestling, mechanical engineering
- **CALEB HUIZENGA**, swimming and diving, civil engineering
- **LUCAS IRA**, baseball, mathematics
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- **MACLAINE JOHNSON**, swimming and diving, computer science
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- **ZACHARY SCHROEDER**, track and field, mathematics
- **MARISA SCHULZ**, track and field, mathematics
- **TYLEN SMALL**, football, electrical engineering
- **ELIZABETH STANGER**, track and field, mathematics
- **SYDNEY STAPLETON**, women's basketball, mathematics
- **AUSTIN SUHR**, baseball, mechanical engineering
- **ERIK THOMPSON**, swimming and diving, civil engineering
- **ELISABETH TIMMER**, swimming and diving, mechanical engineering
- **LAUREN VAN DYKE**, cross country/track and field, mechanical engineering
- **RYAN VAN MAREL**, football, mechanical engineering
- **DAMON VENNER**, swimming and diving, mathematics
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- **ALEX WESTENDORF**, football, operations management
- **GAVIN WHEELER**, swimming and diving, computer science
- **MAX WHITE**, swimming and diving, civil engineering
- **SEVEN WILSON**, football, construction management
- **BLAKE WOLTERS**, wrestling, agricultural and biosystems engineering
- **SAMUEL ZENNER**, track and field, operations management
- **ANDREW ZIMMERMAN**, baseball, mechanical engineering



## 1 CONCRETE CANOE

The concrete canoe team finished third in the Iowa regional April 13, placing first in oral presentation, second in racing and fourth in design poster and aesthetics. Pictured, back row, from left, Thiwanka Deshapriya, Dylan Dulas, Cole Bungarden, Noah Zacher, Nick Fuhr and Spencer Gilk; middle, row Mykin Gunning and Selene Renes; and front row, Nathan Powell, Kaitlyn Hague and Taylor Fauth, who placed first in the Mead Paper Competition with her paper “The Value of Diversity in the Civil Engineering Profession.”

## 2 GEOWALL CONSTRUCTION

Civil engineering students Austin Frosig, Josh Nelson and Ben Hogen build a geowall at the national competition in Philadelphia in March. SDSU was one of 16 teams whose entry was accepted. Entries are accepted based on technical reports submitted in January. SDSU’s report was rated No. 1, meaning the team received a \$1,000 travel voucher. SDSU placed seventh in the construction contest. It was the school’s first trip to nationals. One side of the box has only craft paper to hold the load of sand and only three-quarters of an inch of deflection is allowed when 75 pounds are added to the box.

## 3 FORMULA SAE

The 2019 team poses at its competition at Michigan International Speedway. From left are: Molly Sullivan, Jordan Brown, Hassam Alreddadi, Tanner Wiese, Blake Geddings, Nick Heinrichs, Jason Hasse, Ross Wick, Brian Hidding, Ryan Fick, Noah Lanka, Hymalay Viera Pacheco, Aric Jensen and Peder Solberg (in the car). The team placed 60th (out of 76) at the Lincoln, Nebraska, contest and 83rd out of 108 teams at the Michigan regional after suffering mechanical issues. The entry did place third in the cost category at Lincoln. New adviser Marco Ciarcia said the team plans to compete in California in 2020.

## 4 QUARTER-SCALE TRACTOR

The Quarter-Scale Tractor Team earned reserve champion honors at the American Society of Agricultural and Biological Engineers International Quarter-Scale Tractor Student Design Competition May 30-June 2 in Peoria, Illinois. The runner-up award follows a national title in 2018. Pictured, from left, are Jeff Vander Schaaf, Megan Bodin, Mike Hansen, Brian Prechal, Jim Kellen, Ty Grone, Collin Endres, Tate Ketelhut, Luke Schemm, Logan Goslee, JJ Dooyema, Josh Irvin, Doug Prairie, Tia Muller, Joe DeBoer and Levi Wicks.

## 5 BAJA SAE

SDSU assembled its first entry in the Baja SAE California competition in many years in May. The team finished 79th out of 99 teams and adviser Greg Michna was happy with the results for a first-year entry. In the various judging criteria, SDSU scored best in sales presentation and cost, both 49th. Pictured, clockwise, from left, Jacob Gangelhoff, Jordan York, Skylor Hensch, Zachary Tucker (standing) and Nicholas Covington (kneeling).

## 6 BAJA SAE – ENDURANCE

SDSU competed in the endurance competition at the Baja SAE California contest in May. The first-year team finished 77th in the endurance portion and was 79th overall in the Society of Automotive Engineers contest.

## 7 AISC STEEL BRIDGE

For the first time in the 27-year history of the National Student Steel Bridge Building Competition, SDSU was among the entries. State qualified by placing second at the Midwestern Regional Competition. Competing at Carbondale, Illinois, SDSU finished 31st out of 41 qualifiers.



## ABOUELHASSAN EARNS NATIONAL SCHOLARSHIP

May 2019 graduate Ahmed Abouelhassan became the first South Dakota State student to receive a national Chi Epsilon scholarship since Deidre Beck in 2016.

Abouelhassan, a 26-year-old native of Cairo, Egypt, was one of 10 recipients nationwide to receive a \$3,500 award from Chi Epsilon, the civil engineering honor society, for the 2018-19 academic year.

“Ahmed was an excellent student in the classes he took with me,” assistant professor Michael Pawlovich said. “He was attentive and inquisitive in class and had no problem visiting to gain further insight outside class. He often assisted other international students, not just with class but with some navigation of SDSU administration.”

Abouelhassan completed his civil engineering degree in only 2 ½ years because he challenged 15 courses and was able to test out of taking them.

He interned for two years while completing a bachelor’s degree in architecture engineering from Misr International University in Cairo in 2015. Abouelhassan then moved to Los Angeles, where he studied options for civil engineering education. The first criteria was being accredited by the Accreditation Board for Engineering and Technology, which South Dakota State met.

He then looked for schools with an inexpensive tuition for out-of-staters that easily allow students to challenge out of courses, he said.

South Dakota State scored points on both of those areas and “Dr. (Suzette) Burckhard (assistant department head) was super helpful in my application process,” Abouelhassan said.

He said his time at State “was a good experience. I learned a lot. The professors were really helpful. So many professors were willing to help with not only the academic level, but also the personal level. I thought going to a small school in a small town would not really be that good.

“But knowledgeable, the faculty was the best. The labs were modern and had all the equipment they needed. Now I’m recommending it to a lot of my friends who are looking for a good school for engineering.”

He took electives in all four branches of civil engineering at State— transportation, geotech, structure and water resources.

Also while at State, the quiet scholar returned to competitive judo after a seven-year, injury-induced hiatus and won the Midwest Collegiate Judo Championship in 2018.

Since graduation, he has returned to the Los Angeles area and is working for Kiewit Infrastructure Company at its Santa Fe Springs district office. Abouelhassan is a field engineer on the new Van Nuys North Platform, a \$21 million project that is to be completed in November.

# DEAN'S CLUB

FROM JAN. 1 TO SEPT. 30, 2019

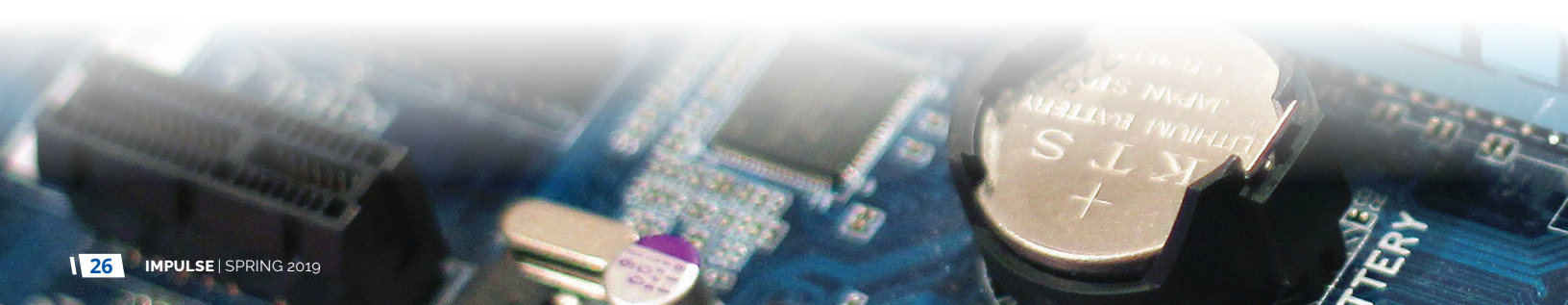
*Dean's Club membership consists of alumni and friends who have contributed \$500 or more annually to the Jerome J. Lohr College of Engineering. Dean's Club members are recognized as devoted friends of the college who make a significant impact on the college's future. They also will receive invitations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

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**Tom Becker**  
Development Director  
Jerome J. Lohr College of Engineering  
SDSU Foundation  
(605) 695-9250  
[Tom.Becker@SDStateFoundation.org](mailto:Tom.Becker@SDStateFoundation.org)

## EXCELLENCE IN THE MAKING

I was fortunate to witness the historic event that took place on the campus of South Dakota State University in late October. As you may have heard or watched, the very popular, national show “ESPN College GameDay” selected Brookings as its Oct. 26 broadcast location. The visit was a fantastic opportunity to showcase South Dakota, Brookings, SDSU and Jackrabbits football. SDSU and Brookings went all out to impress our guests and the national audience.

College GameDay is a three-hour show that is broadcast from a different college campus each week. Normally involving a great rivalry game of highly ranked teams, it has been described by others as a three-hour commercial for your university and city and did not disappoint. The coverage of SDSU, Brookings and Jackrabbits football successfully making the jump to Division I football was inspiring. As you would expect, there were interviews with the SDSU head football coach, John Stiegelmeier, as part of the College GameDay show. Interestingly, his comments were about the players (past and present) and how proud he is of their accomplishments in the classroom and the community. “Coach Stig” has stated he is not here to simply win games but build people and a successful program for the future. His message for his team and others is to be M.A.D. (Make A Difference).

Football is not the only area where Jackrabbits are succeeding on a national level. Our Jerome J. Lohr College of Engineering graduates have impacted industries and led companies around the world for many decades. Daktronics is one example of a Brookings-based company that was founded and developed with the plan of hiring SDSU graduates. These grads helped to create a vibrant company that is succeeding on the worldwide scale.

Whether it be the success of our engineering alumni, our student competition teams (i.e., Human-Powered Vehicle, Bot Shot or Quarter-Scale Tractor) or the move to Division I football; success like this requires a bold vision, committed leadership and strong support. A bold vision for the college was developed in late '90s and made real by the leadership and support necessary to transform facilities and grow enrollment over the past 20 years. Dean Bruce Berdanier has developed a strategic plan for the next 10 years. Making this bold vision a reality will require committed leadership and strong support from SDSU and all of our alumni and partners. Dean Berdanier and I look forward to sharing this vision with you in the coming months and asking for your support to make it a reality.

Like the Jackrabbits football team, we need to think how to M.A.D.

*Tom Becker '81*



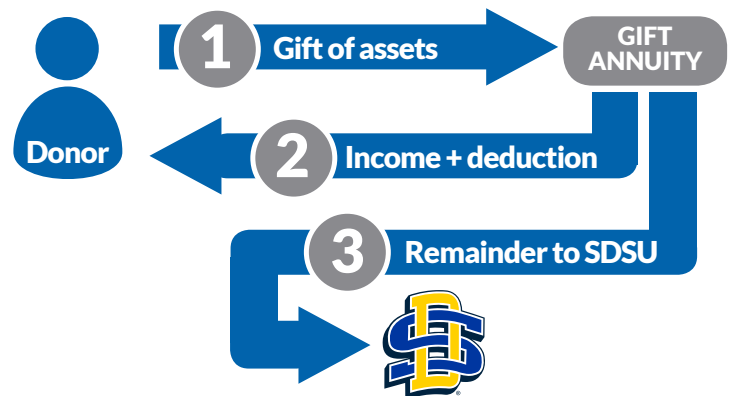


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# HOBO DAY



The human-powered vehicle team participated in the Hobo Day parade. The team won two regional contests in 2018 and was the best overall entry in the 2019 E-Fest competition in Los Angeles.