GO THE DISTANCE
NEBRASKA-BUILT EQUIPMENT EXPLORES ANTARCTICA

ALSO INSIDE:
BSE CENTENNIAL TRACK SPIKE INNOVATION
As we strive to further develop ourselves as a Big Ten college of engineering, we have a proposal in the works to merge the departments of Electrical Engineering and Computer and Electronics Engineering. The Computer Engineering and Electronics Engineering majors will remain in Omaha, and Electrical Engineering will be added as a major in Omaha.

After a comprehensive look at the college, we know we must unify our talents and resources (people, financial, technology, etc.) at our three locations to better connect all of our students in and out of the classroom. By combining these two departments, we can enhance current course offerings and provide more opportunities for collaboration and interaction for our faculty and students in both cities.

It is understandable that there is uncertainty among those involved, and our CEEN students are passionate about their program and the close community they experience in Omaha. That community will continue, and I know we can all work together to ensure all students feel valued and connected.

We hope to have the merger approved by Fall 2013. We are working to make this transition as smooth and productive as possible. We will keep our Nebraska Engineering communities informed as we move forward, and discussion is an important part of the process.

This recent proposal for the college caught the interest of the Omaha World Herald, which wrote a story and a follow-up editorial (Nov. 20, 2012), noting,

“The key concern, after all, should be what’s best for the students. NU should structure its engineering programs so the resulting degrees have the highest value possible for the students earning them.

The best way to do that is through a unified engineering program that uses sound strategic planning to lift itself to a level of excellence.

All faculty, whether in Lincoln or Omaha, need to be encouraged to see themselves as a single team working toward unified goals rather than as separate teams looking to parochial concerns. NU leaders have a responsibility to promote and facilitate that spirit.

… The more that Omaha and Lincoln cooperate in that effort, the greater the benefits for everyone.”

Thank you for your attention to the college as we work to advance our potential, our ideas and our impact.

~ Timothy Wei, Ph.D.
Dean, UNL College of Engineering
After a summer working with industry or seasoned agricultural producers, students in UNL’s Partners in Pollution Prevention program ended their experiences with presentations on their P3 accomplishments.

Bruce Dvorak, P3 program director and professor and interim chair of UNL’s Department of Civil Engineering, was in the audience adding up the potential benefit of this year’s P3 efforts.

“The 2013 P3 interns provided assistance to 17 clients and made 78 engineering-based source reduction suggestions,” said Dvorak. “If these suggestions are all implemented, they would provide the clients with over $250,000 in annual cost savings and annual reductions of 23 tons of solid waste, 150 million gallons of water, and 2,000 MT CO2 equivalent of greenhouse gases.”

The P3 program, which focuses on sustainability, just completed its 15th year. An outreach assistance program operated by the University of Nebraska’s Extension and the UNL College of Engineering, it is funded by the USEPA Region 7, the Nebraska Department of Environmental Quality, and a wide variety of businesses and industrial partners.

P3’s undergraduate student interns conduct one-to-one pollution prevention assistance with Nebraska businesses by performing waste assessments or other waste reduction and resource conservation projects, and providing each client with a written report detailing waste minimization suggestions. More than 200 P3 interns have worked in more than 80 communities, with more than 600 clients served including dry cleaners and auto body shops, large pharmaceutical and manufacturing plants, and agriculture producers.

One of the first students involved with P3 in 1997 was Brian Wanzennried, who is now director of Environmental Safety and Health for the Gavilon Group, LLC, in Omaha. Gavilon is a commodity management firm, and a wide variety of businesses and industrial partners.

Gavilon analyzed equipment, inputs and outputs for several farmers in areas of Nebraska. Using sensors for irrigation systems, the students were able to advise greater efficiency in powered machinery choices.

Dvorak said the P3 program helps both businesses and the interns to focus their efforts. “Based on past surveys, we know that our P3 students are much more likely to provide leadership on the job in implementing source reduction changes than other recent graduates,” said Dvorak. “We anticipate that the P3 students will be leaders in implementing practical measures as part of their work to improve the environmental sustainability of the business and the industry.”

A team from the University of Nebraska-Lincoln’s Surgical Robotics Lab won first place in the American Society of Mechanical Engineers’ 2012 Student Mechanism & Robot Design Competition, Graduate Student Robotics category, with their project: Miniature In Vivo Surgical Robot for Single-Incision Surgery.

Mechanical & Materials Engineering graduate students Jack Mondry, Thomas Frederick, Eric Markvicka, and Joseph Bartels presented their creation at the Chicago event in mid-August. Their platform for R-LESS (robotic laparo endoscopic single site) surgery aims to streamline the crowded operating table while still providing the dexterity necessary to perform general surgical procedures.

This is the first time a team from UNL’s Surgical Robotics Lab, led by Professor Shane Parritter, entered and won at the ASME Student Mechanism & Robot Design Competition. Recent Nebraska finalists have included David Miller, fourth in the 2007 graduate level Mechanism & Robot Design Competition, and Chi Min Seow and team, who won the 2010 graduate level Robotics division, both were students working in the lab of MME Associate Professor Carl Nelson.

The 2012 event was ASME’s 36th mechanisms and robotics gathering among its annual technical conferences.

“It’s one of the longest running and most prestigious events in student robotics, with international participation,” said UNL team leader Jack Mondry. This year’s Nebraska entry was Mondry’s design, nicknamed “Jackbot” in the lab’s tradition of naming robot iterations after their developers. Frederick and Markvicka collaborated on the robot’s mechanical components, and Bartels focused on the controls for the device. The team worked on the robot for six months as part of their lab projects.

“It’s easy for people to see the immediate impact this robot could have on their lives through less invasive surgical procedures,” Mondry said. “We hope to see a commercialized version of the robot within a couple of years.”

Students enjoy renovated study areas near Engineering Library

At the start of the Fall 2012 semester, leaders from the Engineering Student Advisory Board celebrated a ribbon cutting for upgrades including improved furniture and collaborative spaces.
ENGINEERS WITHOUT BORDERS-USA UNL STUDENT CHAPTER RETURNED TO MADAGASCAR FOR TWO MORE SUCCESSFUL PROJECTS

by Libby Jones

The solar power installation was just the first part of the work. The solar power team welcomed the water quality team to MadagascaR as they left to return home. Stacey joy (Master’s student, Civil Engineering), Amanda Dunekacke (Senior, Biological Systems Engineering), and Matt Pirog (Senior, Biological Systems Engineering) on the water quality project. The people of Kianjavato, Madagascar lack access to safe drinking water. A biosand filter is a point of use water treatment system that is sized for daily use by households that do not have safe or treated water sources available. Biosand filters remove 95 to 99% of organic contaminants, including bacteria, viruses, protozoa, worms, and particles. They are low cost ($15 per filter) and low maintenance and can typically treat about 20 to 60 liters of water per hour.

In June 2011, EWB-NU students and faculty traveled to Madagascar to introduce biosand filters to the people of Kianjavato by hosting a workshop on biosand filters and installing biosand filters in five schools as a pilot project. This year we hosted a second workshop and completed installation of at least one biosand filter in every public school in Kianjavato. At the end of this year’s workshop, the participants learned that efforts to continue to build and install biosand filters in the community and they asked us to return to help them with their gravity fed water supply system in need of repair. What a wonderful way to end a trip and to help us start on our work to return this next year!

Over 92% of the $56,000 needed for these two projects (project costs, airlfare, travel expenses, translators, etc.) was raised, donated or self-funded by the students. If you’d like to learn more about the work of these students and perhaps help them with future projects, please contact Dr. Libby Jones at ljones@unl.edu or Karen Moellering at kmoellering@iubfoundation.org

COMMITTED COUPLE: NANO SCIENCE FACILITY DEDICATED WITH NEBRASKA ENGINEERING ALUMNI NAMESAKE

With its namesakes present, UNL’s Voelte-Keegan Nanoscience Research Center was dedicated Sept. 27. UNL Civil Engineering alumni Don Voelte ’75 and his wife, Nancy Keegan (also an engineer and former chair of the University of Nebraska Foundation Board of Directors), praised not only the facility but also the people and tools working inside to make lives better.

Dave Williams, director of retention for the College of Engineering, led the trip and worked with Dennis Hirschbrunner, a retired vice president of marketing at HDR and UNL alumnus, and Roger Helgoth, CEO of Kirkham Michael. Hirschbrunner and Helgoth are members of the college’s Executive Advisory Board and facilitated connections with their business contacts at Columbus Chamber of Commerce and companies the students visited, to generate more involvement between Nebraska companies and UNL engineering students.

“Our goal is to expose students to the exciting careers they can have with an engineering degree and to the opportunities right here in Nebraska, and in Columbus,” said K.C. Belzat, president of Columbus Area Chamber of Commerce. “Our area, and the nation as a whole, will need many more engineers than are currently graduating from U.S. universities and we are excited to be able to encourage these students by connecting them to the ‘real world’ of engineering. We couldn’t be more pleased that the College of Engineering chose Columbus to help them achieve that goal.”

The trip is part of a new community initiative for the college’s Engineering Learning Community and exposed students to Nebraska companies who want to hire them when they graduate. The learning community began with a residence hall cluster of engineering students who form helpful study groups. A wider group of 40-plus College of Engineering students travels each Spring Break to U.S. cities such as Chicago and Boston, where they meet with engineering alumni.

Located at 16th and W streets, across from Scott Engineering Center and adjacent to Jorgenson Hall (home to UNL’s Physics and Astronomy programs), the facility will house as many as 20 research groups, said David Sellmyer, director of the Nebraska Center for Materials and Nanoscience, who added that a facility of this caliber is rare.

The new facility offers researchers access to specialized tools like a $2 million high-resolution electron microscope purchased with a grant from the National Science Foundation; a high-tech filter clean room that eliminates dust particles in high-level research.

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The school superintendent plans on their wishes come true for one classroom. Lights for classrooms. This May’s trip made Kianjavato as needing electricity to power schools to install solar panels to power lights in a classroom. The people of Kianjavato cited providing electricity to schools as a priority during our assessment trip in May 2010. Currently, a few gas generators supply electricity but at a high cost. With gas over $5/gallon in Madagascar and the daily average wage today, power is essentially non-existent in Kianjavato.

Schools were viewed by the people of Kianjavato as needing electricity to power lights for classrooms. This May’s trip made their wishes come true for one classroom. The school superintendent plans on holding evening study sessions for students preparing for their high school and college entrance exams. This is something they have wanted to do for years but have not been able to do without good light. We plan on continuing to work with the schools to install lights in all of the 48 classrooms in the community of 7,000 people over the next several years.

“We couldn’t be more pleased that the College of Engineering chose Columbus to help them achieve that goal.”

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**WISSARD**

Hot Water Drill System

**NEBRASKA-BUILT, EXPLORING ANTARCTICA**

Asmid 2012’s but Nebraska summer, the UNL Engineering and Science Research Support Facility (ESRSF) or simply “the Engineering Shop” and partners developed components for a different temperature extreme—the remote ice fields of Antarctica—with the Whillans Ice Stream Subglacial Access Research Drilling (WISSARD) project.

The Engineering Shop’s work now travels far south to fulfill a groundbreaking research promise, with many challenges surmounted along the way and more ahead.

ESRSF Manager Jim McManis said the Engineering Shop began work in March 2011 for the project through the ANDRILL ESRSF Manager Jim McManis said the Engineering Shop began work in March 2011 for the project through the ANDRILL

ESRSF team, working closely with their partners from SMO and the Northeast Professional Engineering Consultants Group, designed, machined and fabricated components for the hot water drill system (HWDS) to “provide up to 72 gallons per minute of hot water, which are installed in two 40’ long ISO containers (four Allota units in one ISO container and two Allota units in the other). The system was designed to accommodate two additional Allota units, if required, and the hose reel has been designed to accept up to a 1-1/2” ID hose, to provide additional capacity for making larger diameter holes through 800+ meters of ice sheet/ice shelf to meet the requirements of future planned and proposed projects at the grounding line of the Ross Ice Shelf. ESRSF technichants Mike Long and Mark Stroup custom machined the hot water manifold system as well as other parts for the heater units, and John Hudgens and David Birdzell provided fabrication and welding support for the heater unit installations and hose reel structural frame.

- The main heating and pumping capacity, provided by six Allota Model 12257K pressure washer, heater-pump units (HPU), each providing 12.0 gallons per minute of hot water, which are installed in two 40’ long ISO containers (four Allota units in one ISO container and two Allota units in the other). The system was designed to accommodate two additional Allota units, if required, and the hose reel has been designed to accept up to a 1-1/2” ID hose, to provide additional capacity for making larger diameter holes through 800+ meters of ice sheet/ice shelf to meet the requirements of future planned and proposed projects at the grounding line of the Ross Ice Shelf. ESRSF technichants Mike Long and Mark Stroup custom machined the hot water manifold system as well as other parts for the heater units, and John Hudgens and David Birdzell provided fabrication and welding support for the heater unit installations and hose reel structural frame.

- Half of the HWDS was delivered to Port Huemnte, Calif., in December 2011 and shipped to Antarctica on a cargo vessel that arrived in March 2012. The remaining half of the system was finished and pre-tested in August 2012 at UNL, including the reel container and the command and control system for the hot water drill head.

- Further testing of the system in Antarctica and deployment to Lake Whillans for the WISSARD Project are scheduled for late 2012 and early 2013, with a potential further season planned in 2013-2014, pending an extension of ARRA funding from NSF, among other factors.

- The majority of the equipment is currently being staged on the ice near McMurdo Station and moved out to a test location on the McMurdo Ice Shelf for testing of the hot water drill with the additional work decks, and science and logistics equipment. WISSARD Project is scheduled for late 2012 and early 2013, with a potential further season planned in 2013-2014, pending an extension of ARRA funding from NSF, among other factors.

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“Spikes cost pennies, but they have great effect on a track athlete’s performance, especially at higher levels of competition,” Adams said.

University of Nebraska-Lincoln mechanical engineering major Alex Adams developed a new spike-changing system that helps wearers more easily remove and tighten the tiny screw-in pieces. His invention has led to the start of a new venture, Blue Inventor LLC. He’s chief executive officer, and three UNL student colleagues are also involved in the startup business: Walter Bircher of Omaha, Shawn Bernard of Benkelman and Chauncey Thomas Brinn of Otsego, Mich.

Adams, of York, is a junior and a former Husker athlete. His invention includes the modification of traditional spikes in two ways to create a product called the TiteSpike. He first added thread-locking technology to prevent spikes from falling out during competition. His second adaptation was a “through hole” in the TiteSpike to aid spike insertion and removal using the TiteSpike Wrench, another patent-pending creation by Adams. The small wrench is fused to a shoelace tip so it won’t be misplaced or lost. Traditional spikes can stick in a shoe’s threads and ruin it, Adams said. Yet the mechanics of spikes’ insertion and removal basically hasn’t changed for decades.

“Spikes cost pennies, but they have great effect on a track athlete’s performance, especially at higher levels of competition,” Adams said.

Blue Inventor LLC worked with NUtech Ventures, the nonprofit organization responsible for building partnerships between the University of Nebraska and the private sector. NUtech Ventures filed patent applications on behalf of Blue Inventor LLC and connected the startup with potential business partners to manufacture and sell TiteSpike.

Adams began working on his invention with UNL’s Advanced Surgical Robotics Lab during summer 2011. While using lock nuts for a lab project led by engineering professor Shane Farritor, Adams said he realized this mechanism could be adapted to change track spikes. This spring, Adams took the College of Engineering course, Entrepreneurship for Engineers, co-taught by Farritor and David Conrad, executive director of NUtech Ventures. Class sessions prompted Adams to refine the Tite Spike design, and he then completed an Entrepreneurial Boot Camp offered by NUtech last May.

“NUtech would like to work with more students like Alex,” Conrad said. “People often hear startups and licensing and think only of faculty researchers. In reality, students and postdocs are critical components of an innovation ecosystem, and can help make UNL’s culture more entrepreneurial.”

Adams has done his own machining and testing on a small scale for the TiteSpike and TiteSpike Wrench, and is deciding whether to attempt licensing his products or to scale up production with U.S. manufacturers. He also offers the TiteSpike and TiteSpike Wrench to runners through the Lincoln Running Co., the UNL Athletic Department and area high schools.

Adams said he and his partners are grateful for the advice and mentorship.

“The UNL resources and courses helped me to keep things simple and focus on the product’s usability,” Adams said. NUtech Ventures also connected him with another mentor: UNL alumnus Kim Blair, founding director of the Massachusetts Institute of Technology’s Center for Sports Innovation, who offered additional sports business advice.

Adams’ brother, David – a UNL electrical engineering graduate who competed in the 2012 U.S. Track and Field Olympic Trials in Eugene, Ore. – inspired the TiteSpike inventor to send his products with Husker Olympians to the London Games. Blue Inventor LLC also obtained approval from three international organizations for use of the TiteSpike in London – the International Association of Athletics Federations, the International Olympic Committee, and Mondo, a track surfacing company.

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– Carole Wilbeck
The department has been known by several names over the century:

1907–Farm Mechanics Department
1910–Agricultural Engineering Department
1909–College of Engineering and Agriculture
1919 Chase Hall completed

First Agricultural Engineers
- Oscar Van Pelt Stout (1899 School of Agriculture)
- J. Bowlee Davidson (ME 1904)
- Leon W. Chase (ME 1904)
- C.K. Shedd (1919 1st Engineer-in-Charge of Tractor Testing)
- Jacob Waggoner (held first degree in Agricultural Engineering in U.S., from Iowa State College in 1910)

1904 first Neb. Graduates with degree in Agricultural Engineering
- Leon W. Chase
- J.B. Davidson
- J.M. Brownlee
- C.K. Shedd
- Oscar Van Pelt

1909 Civil Engineer degree
1912 First agricultural engineers

1909–1912 Iowa State College
1912–Present

1919 First Recipient of the Cyrus Hall McCormick Gold Medal from ASAE
- Declared “Father of Agricultural Engineering”

1912 First Neb. Graduates with degree in Agricultural Engineering
- Leon D. Wood
- Eber B. Lewis
- Claude D. Kinsman

1914 First M.S.
- Leon D. Wood
- First Extension Agricultural Engineer

Oscar Van Pelt (O.V.P.) Stout
- 1888 Civil Engineer degree
- 1890-91 Instructor in Civil Engineering
- 1893 In Charge of Civil Engineering Department
- 1895 Agricultural Engineer in M.E. School
- 1895 Irrigation Engineer in Experiment Station
- 1907 P.E. First year of Engineering licensure in U.S.
- 1912 Dean of the College of Engineering
- 1918-19 Mayor of Engineers, U.S. Army
- 1920 Irrigation Engineer, USDA
- 1928 Honorary Membership in ASAE
- 1932 Honorary Doctorate by University of Nebraska
- 1932 First Recipient of the Cyrus Hall McCormick Gold Medal from ASAE
- Honorary Membership by ASAE
- Published two texts: Farm Machinery and Farm Motors
- First Recipient of the Cyrus Hall McCormick Gold Medal from ASAE
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L.W. Chase and J.B. Davidson
- 1903 L.W. Chase was Instructor in Mechanical Engineering
- 1904 J.B. Davidson was Instructor in Forge and Farm Machinery
- 1904 Davidson taught Farm Machinery and Chase taught Foundry and Forge.
- 1905 Davidson went to Iowa State College
- 1906 Chase led Farm Mechanics Department
- 1909 authored thesis by Chase and Davidson—designed, cast, and assembled a 2-cylinder engine and tested using home-made prune brake.
- 1907 were founding members of ASAE
- 1909 Founded two texts: Farm Machinery and Farm Motors
- First test in new profession of Agricultural Engineering
- 1914 J.B. Davidson received first professional degree in Agricultural Engineering from University of Nebraska
- 1914 L.W. Chase received reciprocal professional degree in Agricultural Engineering from Iowa State College
- J.B. Davidson was first president of ASAE
- L.W. Chase was 6th president of ASAE
- Both were judges from 1908-1913 for the Winnipeg Plowing contests
- Chase tested 90 tractors near Fremont, Neb. in 1917 using three dynamosimeters
- Chase provided technical input to Nebraska Tractor Test Law in 1919 while in the Army in Washington, D.C.

C.K. Shedd
- Taught Farm Machinery at University of Nebraska
- 1929 First Engineer-in-Charge of new Tractor Testing program at University of Nebraska
- USDA Engineer at Kansas State, Missouri, and Iowa State
- Best known for developing design loads for grain bins

A Nebraska native with degrees in chemical engineering from the University of Michigan and Rutgers University spent the past 13 years at the University of Arizona, where he became department head of Agricultural and Biosystems Engineering in 2009.

Finding himself at home among bio-engineers, Riley advanced the field as founding editor-in-chief of the peer-reviewed Journal of Biological Engineering (BioEng.org).

His favorite part of teaching is engaging students in learning—leading classes with “not just equations but trying to help young engineers understand what matters and why engineering is so important to our economy and our environment.”

Riley values his skills as a “matchmaker”: bridging academia and industry, and even different disciplines within engineering and life sciences. “The engineer and the life scientist don’t always speak the same language and often have different goals,” Riley said, “but I enjoy finding ways to help them communicate and work together.”

From growing up in Detroit, he learned early on that new visions are necessary. For example, “we’ve got to rethink manufacturing,” Riley said. “Any new products can’t have wastes that contribute to landfills, we need to use all the energy and byproducts available. It is exciting to come to Nebraska to continue the development of smart machinery, biomedical devices, renewable energy and agricultural products. We need to explore more deeply the human-machine interface by using our expertise in machinery testing integrated with our biomedical applications.”

The Albuquerque-based company Riley co-formed with his business partner Dr. Robert Klein, RediRipe, grew from his research involving sensors—in this case, labels indicating fruit ripeness. Nebraska Innovation Campus intrigues Riley, and he’s eager to learn more and help BSE faculty and students be involved.

“Our diverse department has phenomenal people—faculty, staff and students—and it’s a great time to be doing this kind work,” Riley said. “There’s a wonderful blend here of the traditional and the futuristic, but at the end of the day the key is how well our work helps people lead healthier and more prosperous lives.”

BSE meets the Department of Engineering, Education & Research, an October 15—looks forward to leading its programs.

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Mark Riley
In His Words ... Wisdom From a Lifelong Career at 3M

Dr. Lester Krogh, ’45 CHME

From his humble beginning in the small town of Ruskin, Neb., Krogh came to the University of Nebraska at age 16 to become a chemist: “I found out chemical engineering had more chemistry so that’s what I became.” He received his master’s degree from Nebraska and then earned his Ph.D. from the University of Minnesota. His career began and ended at 3M, where he retired as senior vice president of Research and Development.

Below are samples of Krogh’s words of wisdom and memories as one of 3M’s leaders.

In the Beginning
At 3M, I was immediately assigned to a completely new field of photochemistry. We had recently introduced a pre-sensitized printing plate -- a graphic plate. They were looking for new compounds to put on that plate. I never succeeded better than the ones already being used, but on the other hand I also had some positive plates put on the market which were successful.

About that time I had an offer from the director of the chemistry section of Central Research to go to the Coated Abrasives division. The director was recruited to be the technical director and he asked me to set up a research group there. I spent 10 years with coated abrasives -- sand paper; I think these were the most interesting years I spent during my entire 3M career.

Being Inventive
One of the things I started with was trying to find ways of adhering coated abrasives to polyester backing -- Mylar -- and found some ways in which to do it and patented them. About that time we were into magnetic tape -- which was a big thing at 3M in those days -- television was just coming in and the original television recorders were very tough on tape. It was almost like you had an old-fashioned battery machine just banging away at this stuff. It couldn’t keep the coating on the tape at all. With what I discovered, they were able to do that and were very successful with videotape. About the time I retired, some 30 years later, they finally phased it out. It was quite a long lasting thing and also said something about 3M.

Encouraging Innovation
At 3M it was decided that, in coordination with R&D, all technical people get 15 percent of their time to work on anything they wished. Not very often used, but it certainly was an incentive and when I was the R&D vice president, I wanted to increase participation. People kept saying they didn’t use their 15 percent. Well, we found out our technical director was sometimes the reason they did not use it, for the simple reason the director wanted results. So that kind of said don’t take time off to work on something. We set up a fund that I could sponsor as VP of R&D, and we got a couple of senior corporate scientists to help out. A small committee would look at proposals from anyone in the laboratory for anything they wanted to work on, and we would give them money if we thought it was a pretty good idea. The first round, we had about 10 of these and before a year was out, three of them went on the market. It just keeps right on going and tells you that management has to sponsor research.

In Management, Don’t Second Guess
This can kill more things than you can imagine. Something management and 3M always says is don’t worry about failing. If you aren’t failing, you aren’t doing your job. I talked to people in various meetings and mentioned this to one fellow who said, ‘That’s why it’s so difficult to try new products. As soon as it fails, you’re gone. You don’t have a job.’ We’ve never fired anyone for failing. If they didn’t work hard or didn’t try, sure. But failing on a project, no.

Easy communication, from the top
At 3M, we learned very early that communication at the top was our key to success. Abrasives was in the oldest building. 3M owned—a very productive place. And back in the ’50s, we had the best coffee around ... Steve and Don on the first floor would come every morning for coffee and just talk -- lab and management were great like that. Every once in a while, our major competitor would bring out something better than us. One thing I appreciated about our team was that they were good in a number of fields. We’d analyze what [competitors] did with a variety of products and within two weeks we’d have something better.

Advice for Students
One of the things you have to be careful of as an engineer is that you don’t hide anything. Tell the truth, all the way. If the experiment went lousy, tell them. If you can’t figure it out, get help. One of the important things at 3M is you can talk to anybody, there is no restriction. Always be inquisitive. Be very curious as to what happened. You’ve got to be a little bit daring. Creating something new is what you are trying to do, all the time. You’ve got to know the science, too. We’ve had to turn projects off because people didn’t realize a scientific barrier showed it’s not possible to do this. And unless you understand that, sometimes you waste your time. Talking to other people can quickly help you understand what else to do.

The Nebraska Connection
When I came close to retiring, a number of Nebraska graduates in chemical engineering were at 3M, some who graduated shortly after WWII. Just before I retired, four of us from Nebraska were still in the top ranks of 3M — Lew Lehr ’44 was the chairman of the board, Gerry Mueller ’50 led engineering, Lauren Morin ’50 was manufacturing, and I had research. We all retired at about the same time and I was the last of the “Nebraska Mafia” to retire.

Learn a lesson on “sticking with it” — from the invention of Post-It Notes.
Go to http://go.unl.edu/postit to learn the story of “an adhesive that wasn’t supposed to be made” (but became Post-it Notes) while Nebraska Engineering’s Lester Krogh ’45 CHME led research at 3M Co.
LUKE SMITH: ENGINEERING MIND, ENTERPRISING APPROACH

L uke Smith has traveled far, geographically and in his career path, since earning his bachelor's and master's degrees in electrical engineering at UNL. Yet, a new challenge this fall finds him reaching back to Nebraska, working as a mentor with clients of NUtech Ventures—the technology commercialization group that's helping new business grow from the university.

After graduating, Smith entered the U.S. Army and later earned an MBA from Westminster College in Salt Lake City. He advanced to lead engineering organizations, manufacturing operations and product divisions in large public companies. In 1996, he entered the world of startups, rising to serve as chief executive for several technology-based companies. As a result, he has extensive experience obtaining funding for startups, and shares that expertise to consult, mentor and serve on several boards in the startup space.

Amid this heady mix, Smith applies an engineering mindset that’s rarely idle—a trait shaped at UNL. Recalling an important figure in his electrical engineering studies, Smith said: “Professor Nick Bashara brought me into his electrical engineering materials department” and helped Smith as a student join a project funded by the National Science Foundation—which enabled Smith to gain grant and fellowship support and to produce two publications, one as an undergraduate, in prominent journals.

“This was invaluable experience,” said Smith, “to get outside of the classroom and explore the materials program, that’s been the basis for my career so far.”

Though he now lives in Scottsdale, Ariz., he takes pride in his Nebraska background and “Husker heritage.” “If there were more ‘tech’ opportunities in Nebraska, I’d be living there,” Smith said—which is why he’s working on bringing that activity home. He invites members of the Nebraska Engineering community to connect with him in pursuit of this goal.

Learn more about Smith’s role with NUtech Ventures at http://go.unl.edu/gvu. To contact him, visit http://www.natescaventures.org/contact/name/luke-smith or find him on LinkedIn.

**ALUMNI PROFILE:**

Luke Smith

**ACCOMPLISHMENTS:**

**Professor Jim Hendriks** is serving as interim chair for the Department of Chemical and Biomolecular Engineering. William Velander, who held the D.R. Voorhees Jr. and N.A. Keegan endowed Chair in Engineering, continues as a CHME professor while he works on building an NIH center in years ahead. An active search is in progress for a new department leader.

**Electrical Engineering graduate student Yuh Zhai** was honored with a Best Paper award at IEEE’s Transportation Electrification Conference and Expo (ITEC 2012). He co-wrote the paper with EE Assistant Professor Wei Qiao and Long Wu, a researcher from the John Deere Foundation. Their paper, “Oscillation mitigation for sliding mode observers in sensorless control of PMSMs,” has relevance in the development of hybrid electric vehicles—an area of interest to many companies.

**Research led by Namas Chandra, professor of Mechanical & Materials Engineering, appeared in the September issue of Popular Science in “Labs That Go Boom.” The feature focused on UNL Trauma Mechanics, and covered the impact of shock waves from improvised explosive devices on the body and brain, and help develop protective armor for soldiers.**

**Tobias Louw, Chemical & Biomolecular Engineering graduate student, earned a prestigious UNL Fluing Fellowship, including a $20,000 stipend, tuition and fees for the 2012-13 academic year.**

**David Swanson, Computer Science & Engineering research professor, is the principal investigator with Open Science Grid Consorium: The Next Five Years: Distributed High Throughput Computing for the Nation's Scientists.**

**Chen Li, Civil Engineering graduate student, received a UNL Other Recruitment Fellowship, including an $8,000 stipend and a departmental assistantship for three academic years.**

**Choice Wing “Solomon” To, professor of Mechanical & Materials Engineering, was named a Fellow of the American Society of Mechanical Engineers in 2012. Distinction as an ASME Fellow is the highest elected grade of ASME membership, recognizing exceptional engineering achievements and contributions to the engineering profession.**

**Engineers Without Borders – NU student chapter** won a $5,000 Give Back BIG Award from UNL’s Center for Civic Engagement in 2012; the chapter also earned this honor in 2011.

**Mechanical & Materials Engineering Assistant Professor Jung Yul Lim** received a Scientist Development Grant from the American Heart Association (AHA). Lim’s lab focuses on engineering stem cell fate using extracellular cues, in this AHA-funded project, Lim’s research will be applied to an obesity study toward preventing heart diseases and stroke. With this three-year, $124,500 grant, his team aims to inhibit stem cells adipogenesis (creation of fat) by applying mechanical signal (cell stretch) and soluble factor (retninoid acid) aspects. Exploring the mechanical-biochemical interaction, the research also looks to reveal the cellular and molecular mechanisms involved in fat fate generated.

**Computer Science & Engineering doctoral student Qian Dong serves as entrepreneurial lead in research with CSE Associate Professor Mehmet Can Vuran to develop wireless underground sensor networks providing agricultural producers with real-time information about soil moisture and changing conditions for more efficient irrigation management.**

**Xin Dong won a $1,000 Give Back B1G Award for her research in adsorbents for oil recovery.**

**Karen Schurr, P.E., and Carrie Mohlman** earned honors at ARTBA’s “Women Leaders in Transportation Design & Construction” event in the summer of 2012. Schurr received the Ethel S. Birckeland Lifetime Achievement Award. Named after ARTBA’s executive director from the mid-1920s, it is given to individuals who have demonstrated outstanding leadership, long-term service in the industry’s public or private sectors and dedication to the advancement of innovation and other women leaders. She was applauded for her leadership and work teaching at UNL and in her prior service with the Nebraska Department of Roads. Mohlman gained the Future Industry Spotlight Award, which celebrates students who have achieved academic excellence, contributed to the engineering profession, and demonstrated extraordinary leadership skills within and outside of the academic environment. As a case study research assistant maintaining a 4.0 grade average, she conducts research on commercial driver fatigue and compiles commodity flow surveys for counties in Nebraska. She also volunteers with the “Road, Rails and Racers” afterschool mentoring program for middle school students, which encourages young adults to explore careers in the transportation field.

**from left, Rechenbach, Dem, Vuran and Trex**

**Tesla co-founder Martin Barzard visits Nebraska Engineering.**

A radiant red Tesla Roadster in the parking lot of Nebraska Hall has earned admiration for its sleek sportscar line and sustainability. “The car belongs to Don Cox, ’59 B.S. and ’60 M.S. EECL, who returned to Nebraska after a 33-year absence to help complete and most recently, teaching at Stanford University, where he earned his Ph.D.” This fall, Cox (fourth from right, standing) taught a course on electric vehicles for UNL Electrical Engineering, including field trips for students to test drive the car; best of all, he brought Martin Barzard (fourth from left), his friend and co-founder of Tesla Motors, to speak at Nebraska Engineering. Barzard, with degrees in computer and electrical engineering under his belt, is known for answering a variety of questions about engineering and startups.

Next, as COO for Ottawa-based communications chip maker Phlstar, he took the company from “nearly bankrupt” to a sale value of $280,000,000 Canadian in 15 months. Smith cited his quick-study process as learning the lay of the land by researching all the company’s disclosures, looking at pieces of intellectual property and finding pockets of entrepreneurship.

Similarly, his assessment checklist now with new business ‘mentees’ is to ask: “What’s your vision—where do you want to be?” Smith explained: “To start a business, you need a competitive advantage and a core competence. You also need an idea of what your second act might be and, how to build beyond that. If you don’t have good answers to those questions, then your deployment is meant to be more of an acquisition than an ongoing company.”

**Engineers Without Borders – NU student chapter** won a $5,000 Give Back BIG Award from UNL’s Center for Civic Engagement in 2012; the chapter also earned this honor in 2011.
The Durham School’s Lily Wang received two awards at the 2012 American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) conference in San Antonio. Wang, associate professor of Architectural Engineering, took home the ASHRAE Distinguished Service Award and the ASHRAE Ralph G. Nevins Physiology and Human Environment Award. The Distinguished Service Award recognizes society members who add their time and talent to the organization. The Ralph G. Nevins Award is given to a researcher under the age of 40 for significant accomplishments in the study of bioenvironmental engineering and its effect on human comfort and health.

Architectural Engineering students—Adam Buck, John May, James Harper, Patrick MacBride, and Reena Williams—won first place in the national 2012 ASHRAE Student Design Competition, HVAC System Selection. The team was coached by Nebraska Engineering alumnus Joe Hazel with Farris Engineering.

Yongfeng Li, professor of Electrical Engineering, was elected president of the Laser Institute of America for 2013. Li is the author of a textbook, The Mechanical and Human Environment, published in April 2012 by CRC Press.

Laser Institute of America for 2013. Engineering, was elected president of the Construction Management student Laser-Assisted Nano Engineering (LANE) Lab, Processes,” was developed in work with UNL’s Subtractive Femtosecond-Laser Direct Writing Fabrication by Integration of Additive and Best Student Paper Award Contest this year. Students Paul Kubitschek (Computer Engineering) and Mirzo Mirzokarimov (Electrical Engineering) lead UNL’s American Institute of Aeronautics and Astronautics (AIAA) rocketry team in work for Rock-Sat-C, a months-long payload design competition. Last June the team participated in RockOn, a workshop at NASA’s Wallops Flight Facility.

CSE Professor Sebastian Elbaum received $449,033 from the National Science Foundation (NSF) for his project “Solving the Search for Relevant Code in Large Repositories with Lightweights Specifications.”

In Biological Systems Engineering student Emily Hult’s USDA Agroecosystem Management Research Unit position, she continues her summer work in areas of environmental, food and biomedicine with a specific focus on pathogens.

MME Professor Ram Bishu was named an ASQ Fellow, based on his “ongoing training of quality management professionals on topics including statistical process control, Six Sigma, process reengineering through design of experiments, and configuration of quality in information systems” and his “experience in product and process evaluation and use of sophisticated statistical techniques (that) provide invaluable knowledge to a generation of quality advocates.”

Myra Cohen, associate professor of Computer Science & Engineering, received a $332,004 NSF award for the project: “A Web Infrastructure for Research and Experimentation in User Interactive Event Driven Testing.”

UNL Chemical and Biomolecular Engineering was named an Outstanding Student Chapter for 2012 by national AIChE.

UNL chemical engineers active at national AIChE conference

A number of Chemical & Biomolecular Engineering faculty and students represented the university at the American Institute of Chemical Engineers’ national conference, held in Pittsburgh in October. UNL earned several honors there:

• Senior Travis Jackson received one of the AIChE Donald F. and Mildred Sipp-Offner National Scholarship Awards for the 2012-13 academic year.

• UNL’s Chem-E car finished “in the middle of the pack” at the national event. Each car, the size of a coffeemaker, must be assembled on-site and travel for 50-100 feet while carrying a 50-100 ml payload of water, with power supplied by designated chemical reactions.

Baja Team climbs to top five at Oregon

UNL’s Baja SAE team finished fourth among 79 collegiate teams at the 2012 Baja SAE Oregon competition in May—the highest finish achieved by the Nebraska Engineering team at this major competition.

“We were extremely close to getting third,” said Casey Krese, former team captain. “We ended up getting sixth place in the rock crawl, sixth place in the hill climb, 14th in maneuverability and ninth place in the acceleration. We finished fifth overall in the dynamic events (those four individual events pooled together) and ninth place in the endurance race. We also got 16th in design and 15th in cost.” Krese said these results combined to give Nebraska the fourth place finish overall.

The team didn’t fare quite as well as a follow-up competition in Wisconsin, but the 2013 team is now at work, led by Mechanical & Materials Engineering senior Zach Blackford.

Formul a SAE Team

A
t international Formula SAE event—its first time in Lincoln—the University of Nebraska at Lincoln placed 50th of 83 registered teams with scores of 66.4 in cost, 42.1 in presentation, 50 for design, and 7.5 in aerodynamics, for a total of 166 points. But these numbers don’t tell the whole story.

Here’s a more telling set of figures: in its first year of competing, with just 18 months to prepare (most teams are veterans with years of competition experience), Nebraska achieved a victory: in Formula SAE a car made it to the starting line.

Graduate student Hunter Flocman earned the AIChE Separations Division Graduate Student Research Award.

Assistant Professor Sri Kidambi chaired a Biomaterials session and two of his research group members—Amita Daverey (postdoc) and Allison Drain (undergraduate/UCARE)—gave oral presentations with him on Patterned Co-

Baja Team

UNL’s 2012 Baja SAE team

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In Memoriam

Dr. William “Bill” Eldon Splinter ’43 AGEE George Holmes Professor Emeritus of Biological Systems Engineering, died Sept. 26. Lincoln. He was 86.

Today UNL noted: “He served UNL as a professor, department head, dean, vice chancellor and museum director.” UNL College of Engineering Dean Tim Wu said, “In many ways Bill was the heart of our Agricultural Engineering and Biological Systems Engineering programs, and he will be greatly missed.”

Splinter was born Nov. 4, 1925 and grew up at his family’s irrigated farm near North Platte. Attending college in Lincoln, he chose Agricultural Engineering as a major and later described entering a program of study as finding another home: “I had now found people who spoke my language.” He earned a bachelor’s degree from the University of Nebraska in 1943, and received a M.S. and doctorate from Michigan State University in 1951 and 1953. Splinter was a veteran, serving in the U.S. Navy, including duties as a radar officer.

He taught at Michigan State and North Carolina State before returning to Lincoln in 1968 to head Agricultural Engineering (now Biological Systems Engineering). Splinter was elected to the National Academy of Engineering in 1994. He also served as national president of the American Society of Agricultural Engineers, and was a member of the American Association for the Advancement of Science.

At Nebraska, Splinter was named interim vice chancellor for research in 1990, and was vice chancellor for research from 1992 until retiring in 1993. He returned as interim dean of engineering (1994-95), a post he again held from 2001-02. In September 2002, he served as interim director at the University of Nebraska State Museum. He played a vital role in developing the Lester F. Larson Tractor Test and Power Museum. He retired as director of the tractor museum in 2011.

UNL’s Splinter Lab is named in his honor, and he called it one of the greatest honors in all of his professional recognition. He wrote, “This facility has special meaning to me as I had laid out the design to specifically house the major noise generating functions of the department. . . the tractor testing lab, the engines lab, the machinery lab and the shop along with flexible research laboratories.”

With his late wife, Eleanor, he established both a student scholarship fund and an endowed professorship at UNL. As recently as this month, Splinter was working on the history of the Biological Systems Engineering programs, for their centennial being celebrated this year.

A memorial service was Oct. 1 at First Lutheran Church in Lincoln. The College of Engineering extends our sympathies to Splinter’s family—his wife, Betty; and his two sons, two daughters, and grandchildren—and friends, especially in the UNL BSE department.

Wendall Floyd Robinson died Sept. 30. He was 89. Born in Des Moines, he was a WWII U.S. Navy veteran. Robinson was a professor of Electrical Engineering at UNL for 39 years and retired in 1988. The college extends condolences to his wife, son and two daughters, grandchildren and great-grandchildren.

Donna Koch, with a 30-year career as a librarian in the University of Nebraska-Lincoln Library system, died Oct. 30. She was especially devoted to the Engineering Library and the students it serves, and had helped students prepare their Engineering Learning Community presentations for the annual Spring Break city visits with alumni. Director of Retention Dave Williams, who leads the ELC trips, said, “Donna worked closely with our students to introduce them to resources available in the Engineering Library and incorporate credible research. . . Traveling with our group for an entire year, she was very patient and focused, and enjoyed getting to know the students beyond a superficial level. Her positive nature, dedication to students, and professionalism will be missed.” In a message to the COE community, Dean Tim Wu said, “As our college remembers Donna, we value her work and appreciate her friendship with us, and extend our sympathies to her family.”

1950s

Donna Koch

Ronald B. Kratzer, P.E. ’73 EE (right) was awarded at the Fall 2012 UNL Career Fair by his son, Scott Kratzer ’16 MEEE. While recruiting alongside 140+ employers at the Career Fair’s Engineering Day, Ron shared that he is a manager of System Planning with Lincoln Electric System, and Scott is a mechanical design engineer with Emerson in Marshalltown, IA. With Emerson, Scott works on smart wireless capabilities for industrial instruments and controls; his team recently earned a patent for an antenna application.

“DREAM of future lab”

1990s

Mark Hoffman ’85 MECH is director of 797 Engineering with the Executive Program Management Office at Spirit Aerosystems, Inc. in Wichita, Kan. He’s responsible for “Section 47,” the aircrafts’ front end cabin. He also led development of the Dreamliner’s pylon suspension for mounting the aircraft’s engine under the wing.

Tom Pick ‘97 BS MEE, ’97 MS DSEE is the engineering manager for RD in Columbus, Neb. He led tours for 100 of the 480+ Nebraska Engineering Learning Community students who visited Columbus industries on an afternoon in September. At the east and west sections of RD’s local operations for consumer health industry products, the students saw needle manufacturing assemblies and robotics for sterilization processes.

2000s

At UNL’s Fall 2012 Career Fair, Glen Stach ’90 and Jeremy Baum ’73 (both CONM) added their perspectives on behalf of JF Dunn.

Alex Person ’07 CENG is a product support engineer with National Instruments in the Compact Rio software group based at Austin, Tex. Bryan Ingram ’01 BSEE is a mechanical engineer with Sega Engineering & Technical Services in Overland Park, Kan. His work includes stress analysis and piping design for power plants.

2010s

Alex Person

Karen Stelling was involved at 2012 Masters’ Week. When a vice president of Burns & McDonnell speaks to a Nebraska Engineering class, students listen. When that VP is an alumnus of your college, her words carry even more meaning.

That was the case when Karen Stelling returned to UNL in November for 2012 Masters’ Week. Each year, the Nebraska Alumni Association invites graduates who’ve excelled in their careers to return to campus and engage with current UNL students, faculty and staff.

During her visit, Stelling talked with students about the opportunities and challenges (“with a tight deadline, you learn more at a faster rate”) and teamwork (“you know you’ll finish the project—the question is, will your contributions be remembered for making the time more or less productive?”).

Stelling, a 1987 UNL graduate who majored in mechanical engineering, joined Burns & McDonnell 24 years ago as a design engineer, working her way up in a male-dominated field. Today she encourages young people to pursue engineering by co-chairing the Kansas City Metropolitan Area Industry Council for Project Lead the Way, an engineering curriculum for middle and high school students. Stelling also serves on Nebraska Engineering’s Executive Advisory Board.
Meet the challenge. Be the leader. Define the future. M.Eng. (online degree)

From a career in central Nebraska to a position requiring trips around the country, University of Nebraska–Lincoln College of Engineering students Chelsea Clark and Michael Shaw have jobs that are putting their current Master of Engineering program to good use, no matter what the setting.

Chelsea Clark of Kearney, Neb., works as a New Programs Manager for Eaton, a large diversified industrial company. In her current role she is responsible for managing all of the new valve program launches.

“Working with new business is always exciting,” Clark said. “I get the chance to work directly with the customer from time of design conception through production. I really like this type of environment. It is very fast paced, and it constantly challenges me to change directions and react quickly.”

But she is looking to prepare for the next step in her career, so two years ago she applied and was accepted into the UNL College of Engineering’s Master of Engineering with a concentration in Engineering Management program online.

Through the program, Clark is not only boosting her resume, she is also improving her knowledge of engineering concepts and effective administration and management skills. With a coordinated effort between the College of Engineering, which has been providing distance education for more than 25 years, and the UNL College of Business Administration, Clark is taking courses that apply to her engineering profession as well as business courses to push her career forward.

“A lot of the engineers I work with automatically think the next step in their education has to be an MBA,” Clark said, “but this program mixes things up. It is a little more interesting for us because it applies more directly to what we do, but it also offers the business side that we need.”

The engineering courses have allowed her to reconnect with information she learned during her undergraduate degree and discover new concepts and theories. Many of the projects and real-life examples have been applicable to her job, teaching her how to analyze data and solve problems in new ways.

The flexibility of the online format has also made the program more accessible for Clark who works 60 hours a week. Her peer Michael Shaw couldn’t agree more.

Shaw is a project manager for ConAgra Foods with teams throughout the country. He makes it a priority to visit his teams at least once a month to observe progress and provide face-to-face feedback and coaching relative to organizational and personal objectives. What this doesn’t leave time for in his schedule, however, is going to class.

“I knew that if I wanted to earn my master’s degree, I would need to find a distance program to fit my schedule.” Shaw said, “I reside in Nebraska and have come to respect the state’s university system, so once I realized UNL had a long distance program, the decision to enroll was relatively easy.”

Shaw has enjoyed the online format as it has allowed instructors to leverage available technologies and the Blackboard system. The graduate program has also improved the quality of his output and his confidence as he feels well-rounded and can carry on conversations with respect to a wide array of business and operational topics.

Clark and Shaw plan to complete their programs in the year ahead.

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“Working with new business is always exciting,” Clark said. “I get the chance to work directly with the customer from time of design conception through production. I really like this type of environment. It is very fast paced, and it constantly challenges me to change directions and react quickly.”

“There’s no doubt that a master’s degree makes me more marketable to future employers, but there’s really more to it than that,” Clark said. “I am a better engineer than when I started, but I’m also a much more well-rounded employee.”

“The MBA courses were almost all new concepts for me, and I have a much better understanding of the decisions senior managers face than I used to. Having a diversified background can only help my future opportunities and may open doors to some of those senior level positions.”

For more information about the program, visit online.unl.edu/UNLEngineering.

One of the first things you learn in the College of Engineering is how to calculate things.

Like the cost of your education.

Earning a degree in engineering takes a lot of late nights and weekends. It also takes a lot of money. That’s why scholarships are so important to the next generation of engineers.

As someone who has successfully completed the program, your College of Engineering is asking you to give back to the college that gave you so much. The up-and-coming engineers need private support for scholarships to help them realize their career dreams. And they could really use your help right now.

To give or to learn more, contact Karen Moellering at kmoellering@nufoundation.org, 402-458-1179. Or Amy Ferguson at aferguson@nufoundation.org, 402-458-1203.

Please consider helping to engineer the future through your scholarship support today.
A “robot uprising”—in awareness

“robot take-over” in Nebraska? It’s actually more like a partnership, with a showcase of technology—and Nebraska versions of it—featured now at the Strategic Air & Space Museum in Ashland.

The museum hosts ROBOTS: The Interactive Exhibition—until January 6, 2013. Sponsored by the Ford Motor Company and built by Global Experience Specialists, Inc. (GES), the exhibit is based on the Twentieth Century Fox movie, ROBOTS—which depicts a world populated entirely by mechanical beings, including genius inventor Rodney Copperbottom and his friends, the Rusties.

The Museum has also partnered with the University of Nebraska at Omaha, the University of Nebraska Medical Center, the University of Nebraska-Lincoln, and the NASA Nebraska Space Grant Consortium to present a complimentary exhibit, Innovations: Inside Nebraska Robotics, with cutting edge robotics research and development from these campuses of the University of Nebraska.

“It is great to showcase the world-class work of UNL engineering students, and our strong collaboration with UNMC in research and education,” said UNL Mechanical & Materials Engineering Professor Shane Farritor. “We’re also excited to show our robots to young Nebraskans who might be considering STEM fields. We need to build more excitement in STEM areas and prepare young Nebraskans as strong engineers.”

Museum visitors can become a Robotic Explorer in deep space, underwater or on the surface of Mars. Another feature, Build-A-Wonder-Bot, offers robotic help with daily chores. Visitors can also try maneuvering robotic arms similar to Industrial Robots. And a Future of Robots display offers further possibilities to re-shape our world.

The Strategic Air & Space Museum, located between Lincoln and Omaha near Interstate 80, utilizes over 300,000 square feet of exhibit, education, and event space to ignite the thrill of discovery and innovation in guests of all ages. Learn more at http://sasmuseum.com/exhibits/featured-exhibits/

– Carole Wilbeck