

RESEARCH AT NEBRASKA

2019-2020 REPORT



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About the Cover
Read the story behind the Nebraska
research heroes cover image on Page 18.



This report is available online:
research.unl.edu/annualreport2020

Problem Solvers, World Changers: We are Nebraska Research

2020 is leaving an indelible mark on history. The COVID-19 pandemic, growing political divisions, racial and other social tensions, and natural disasters have strained Americans' sense of peace and well-being.

University of Nebraska-Lincoln scholars are meeting those challenges head on.

Nebraska's COVID-19 response (Pages 10-18) showcases researchers and community heroes whose efforts are potentially saving lives during a chaotic, evolving pandemic. Husker engineer Benjamin Terry and University of Nebraska Medical Center surgeon Keely Buesing leveraged a longtime partnership to develop a system that can increase hospitals' ventilator capacity if shortages arise (Page 10). The Food Processing Center at Nebraska Innovation Campus temporarily became a manufacturing site for hand sanitizer (Page 14). These are only a couple of examples of how Nebraska is addressing the most serious public health threat in a century.

This report's focus is Husker researchers and scholars who are problem solvers and world changers. Topics include understanding obesity and related diseases at the molecular level (Page 2), improving nanomaterials (Page 4), and growing and diversifying Nebraska's STEM workforce (Page 5).



Vice Chancellor Robert "Bob" Wilhelm

Faculty startup companies demonstrate Huskers' ingenuity and innovative spirit (Page 8). Nebraska offers an exceptional undergraduate experience, exemplified by our student journalists who photographed the state's devastating floods in 2019 and explored possible causes (Page 21). Nebraska's arts and humanities faculty are fostering appreciation for the state's heritage through a "Discover the Great Plains" book series (Page 24) and an opera premiere (Page 25).

Although COVID loomed large in 2020, Nebraska also embraced a journey of anti-racism and racial equity. As scholars, we must work to advance the

conversation and develop solutions for our community. Nebraska Research is committed to leading this journey.

Today's challenges will not slow our momentum. Nebraska's research expenditures reached a record \$317 million in fiscal year 2019 (Page 36). We aim to approach \$450 million in expenditures by 2025.

Identifying grand challenges that Nebraska is uniquely positioned to solve is crucial to making an impact in the 21st century. The Office of Research and Economic Development, on behalf of Chancellor Ronnie Green, guided a faculty-led process to identify areas of expertise and shape priorities for the next five years. A new strategic plan provides a roadmap for developing research expertise; enriching creative activity; bolstering commitment to diversity, equity and inclusion; enhancing economic development; and much more.

I am proud of the excellent work of our faculty, staff, students and partners, and I am pleased to share our progress with you.

Robert "Bob" Wilhelm
Vice Chancellor for Research and Economic Development



Targeting Obesity, Related Diseases at Molecular Level

When the Nebraska Center for the Prevention of Obesity Diseases through Dietary Molecules launched five years ago, its director never imagined how much it would benefit Nebraska.

Then Janos Zempleni added up the numbers: earning nearly \$100 million in external funding, about \$36 for every dollar the university invested; supporting the careers of numerous junior faculty; and filling a vital research gap with a new core facility for faculty and industry.

“By (National Institutes of Health) standards, this is exceptional,” said Zempleni, Willa Cather Professor of Molecular Nutrition.

NPOD’s success garnered an \$11 million renewal grant for another five years from NIH’s Centers of Biomedical Research Excellence program. An \$11 million COBRE grant originally established the center in 2014. COBRE funds health-related research and fosters faculty development and research infrastructure.

NPOD aims to become a leader in preventing obesity and obesity-related diseases, including Type 2 diabetes, cardiovascular disease and

nonalcoholic fatty liver disease, by understanding processes at the molecular level.

Center research is yielding new insights. For example, Dustin Yates, associate professor of animal science, has uncovered predispositions toward obesity and metabolic disorders that occur during fetal development and a simple solution to prevent it.

He credits NPOD’s mentorship, funding and its Biomedical and Obesity Research Core facility, which conducts analyses and other services that are difficult to outsource.

“The research core provides a lot of services that I don’t have the ability to do on my own, so we get a bigger picture of what’s going on,” Yates said.

Center collaborations also helped Juan Cui, assistant professor of computer science and engineering, develop MicroRNA Discovery, a web-based platform that allows researchers to analyze vast numbers of nucleotide sequences, which may speed screening for cancers and other diseases.

With renewed funding, Zempleni is concentrating on turning research into human health treatments by expanding relationships with University of Nebraska Medical Center and UNL faculty, including those in public health and psychology.

“The national trends for obesity continue to be really bad,” Zempleni said. “Our overall concept is to come up with strategies that are consumer friendly.”

“The national trends for obesity continue to be really bad.”

Janos Zempleni

Creating Graphene Circuits with 'DNA Origami'

A great conductor of electricity and heat, graphene is almost completely transparent but also so dense nothing can pass through it. Nebraska researchers are harnessing DNA to make this remarkable material more useful in a variety of electronic applications.

The single-atomic-layer graphene is the thinnest and strongest form of carbon. Its two-dimensional structure is made of atoms arranged in a honeycomb pattern. Since its discovery earlier this century, graphene has sparked great interest from physicists, chemists and materials scientists.

Alexander Sinitskii's lab previously devised an approach to create atomically precise graphene nanoribbons, narrow strips of graphene only a few carbon atoms wide. Their miniscule size and highly tunable electronic properties make these ribbons promising building blocks of miniature electronic devices.

While graphene nanoribbons are nearly endlessly functional, they're difficult to assemble into the required electronic circuits. Enter DNA nanotechnology to create artificial structures that mimic the cellular building block.

Forget what you learned in science class about DNA strands only forming in the classic double-helix form. The key to using DNA to shape graphene nanoribbons is the ability to controllably fold DNA strands into a variety of other shapes such as squares, circles and even three-dimensional boxes. Known whimsically as "DNA origami," this technique allows researchers to build nanoscale devices that are opening new possibilities in biomedical research and materials science.

A three-year, \$4.5 million grant from the U.S. Department of Defense's Office of Naval Research funds the research led by Sinitskii with collaborators from New York University,

Silicon substrates with lithographically patterned graphene nanoribbon devices inside a cryogenic probe station



Alexander Sinitskii

University of Chicago, University of California, Berkeley and University of Illinois at Urbana-Champaign.

Graphene's properties already have paved the way to applications in transparent conductive films, electronic and opto-electronic devices, actuators, sensors, composites and more. Graphene nanoribbons assembled with DNA nanotechnology could help meet the increasing need for ever-smaller electronic components in a variety of devices, said Sinitskii, professor of chemistry and part of the Nebraska Center for Materials and Nanoscience.

"We know how to make graphene nanoribbons, and now we want to employ DNA nanotechnology to assemble them into functional electronic structures for device applications."

Growing, Diversifying STEM Workforce

They're the next generation of mathematicians, computer scientists, software developers and technology entrepreneurs, eager to solve problems and improve society.

Nebraska is giving talented low-income students across the state an opportunity to pursue careers in science, technology, engineering and math. The support, in turn, will help expand Nebraska's STEM workforce.

Nebraska partnered with Southeast Community College and Western Nebraska Community College to create a grant program called STEM Career Opportunities in Nebraska: Networks, Experiential-learning and Computational Thinking.

STEM CONNECT, which began in spring 2020, will provide more than 120 students over the next five years with scholarships and academic support, including faculty mentors and a community of peers. The program targets underrepresented minorities,

women, and rural and first-generation students.

"We will be working with academically gifted, low-income students to help them successfully enter the workforce or pursue graduate education," said the program's leader Jim Lewis, Aaron Douglas Professor of Mathematics.

Students begin their studies at either the university or a community college.

Scholarships, up to \$8,000 per year, are renewable for four years at Nebraska or two years at SCC or WNCC. Students who transfer to Nebraska receive two more years of funding.

Abby Seibel, a computer engineering major from Elkhorn, Nebraska, was one of 10 UNL students chosen for STEM CONNECT's initial cohort. She's passionate about using technology to solve some of society's most intractable environmental problems in water and energy.

"I am newer to the technology field and can sometimes feel a little behind or out of place because I haven't been coding for years," Seibel acknowledged. "I think that STEM CONNECT will be a really good support system for me and will help me explore STEM more boldly."

STEM CONNECT also funds a study examining factors that affect retention, academic success and graduation in STEM fields among low-income students.

A large interdisciplinary team of researchers, advisers and administrators from all three institutions participates in the program.

A \$3.56 million grant from the National Science Foundation's S-STEM initiative funds this program.



From left: Petronela Radu, Jim Lewis, Brittany Duncan, Wendy Smith and Amy Goodburn



“Our pace places us among the fastest-growing research parks in the United States.”



Innovation Hub Builds on Decade's Success

Innovation, collaboration and economic growth are hallmarks of Nebraska Innovation Campus' first decade.

The former Nebraska State Fairgrounds has transformed into a thriving public-private research innovation hub where partners collaborate with Husker faculty and students. With 455,000 square feet of office, conference, manufacturing, teaching, research and greenhouse space, NIC is home to more than 50 partners.

In 2019, NIC generated a \$324.1 million economic impact, 1,657 jobs and nearly 100 student internships.

But the work is far from done, said Dan Duncan, NIC's executive director.

“We're thrilled with how quickly NIC is developing. Our pace places us among the fastest-growing research parks in the United States,” Duncan said. “But looking forward, we're expecting even greater growth, with the goal of becoming a 2.2 million-square-foot campus in the next 20 years.”

After completing the \$15.3 million, 75,000-square-foot Rise Building in early 2019, developers broke ground on The Scarlet Hotel. The six-story hotel will have 154 rooms for conference attendees, clients of NIC businesses and visitors. The building, slated for completion in July 2021, will include learning spaces for Husker students studying hospitality, tourism and restaurant management.

NIC's partnerships are also growing. Recent additions include Celerion, a Lincoln, Nebraska-based pharmaceutical and biotechnology company, and CropX, an international soil sensing and agricultural analytics company.

Existing partners are thriving. Medical device company Virtual Incision recently raised \$20 million in Series B+ investment funding. Funds will support the path to

commercializing its surgical robot platform, a tool for minimally invasive abdominal surgeries.

Adjuvance Technologies, a biopharmaceutical company focused on vaccine design and manufacturing, received a more than \$500,000 contract from the National Institutes of Health to improve the influenza vaccine. It also received NIH funding for COVID-19 vaccine research.

Quantified Ag, a startup developing smart technology for ear tags that monitor cattle health in real time, was acquired by Merck Animal Health, a global business.

NIC's decade of investments in partnerships, infrastructure and talent has positioned Nebraska to meet emerging high-stakes challenges. When the COVID-19 pandemic flared, Nebraska researchers tapped NIC's facilities and partnerships to produce much-needed hand sanitizer, face shields and disposable protective gowns for Nebraska and beyond. (Read more on Pages 14-15)

“Ultimately, the work we've put in to unite university researchers with companies and to provide them with cutting-edge facilities and equipment is about bringing together problem-solvers who can collaborate to solve real-world problems,” Duncan said.



Above: Innovation Campus during early stages of construction.
Left: Outside an iconic NIC building, large containers store hand sanitizer manufactured there during the pandemic.



Research Ignites Faculty Startups

NUtech Ventures gives Nebraska's big ideas a boost. The university's technology commercialization affiliate supports economic development that improves lives across a range of disciplines. These three Nebraska startups benefited in 2019-2020.

Synbiotic Health

Combining healthy bacteria found in probiotics with the food that fuels them yields even greater health benefits. To create and commercialize these healthy synbiotic combinations, Nebraska faculty founded Synbiotic Health.

The startup plans to sell its synbiotics as ingredients to food and beverage companies. Working with NUtech Ventures, the company licensed its first two synbiotic strains. Human trials on the first begin soon.

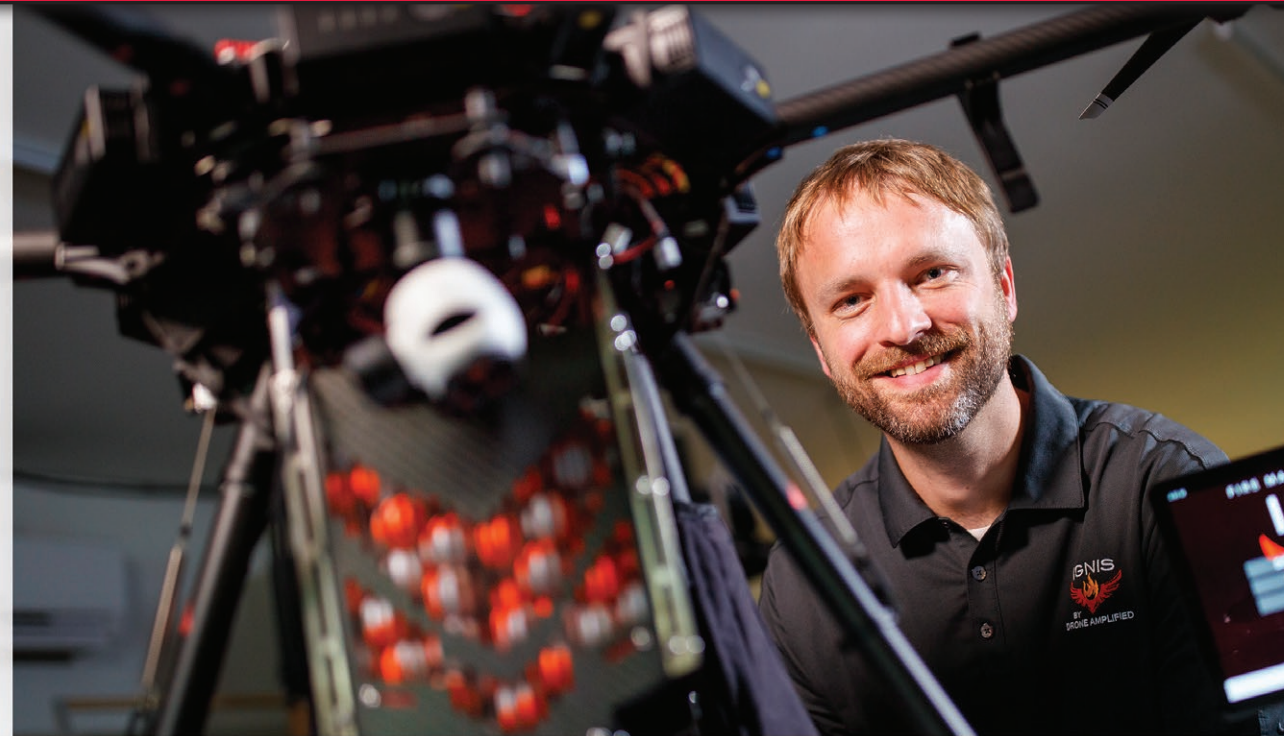
"The partnership (with Synbiotic Health) demonstrates the center's commitment to translating and commercializing research-based products. These synbiotics are a rapidly emerging class of next-generation probiotics that can ultimately improve human and animal health," said Benson, W.W. Marshall Distinguished Professor of Biotechnology.

He founded Synbiotic Health with Bob Hutkins, Khem Shahani Distinguished Professor of Food Science; Tom Burkey, professor of animal science; Jens Walter, University College Cork, Ireland; and company CEO Tim Brummels.

Drone Amplified

As fire seasons stretch longer and blazes burn hotter, a Nebraska startup is helping drones fight fire with fire and keep people safe.

Drone Amplified developed drone-mounted technology that intentionally sparks small fires, which starve oncoming wildfires of fuel.



Carrick Detweiler

Using drones to initiate controlled burns in remote or dangerous areas reduces risk to firefighters.

The technology has fought fires throughout the West and been sold to companies internationally. It mounts on standard, commercially available drones using the team's custom software to automate tasks. A thermal camera aids visibility and enables nighttime flights.

Drone Amplified worked with NUtech Ventures to patent and license the technology.

"I think we're right at the leading edge of this wave of using unmanned systems in firefighting," said CEO Carrick Detweiler, Susan J. Rosowski Associate Professor of Computer Science and Engineering. "We want to save the lives of people doing very dangerous jobs."

TurfGrade

Before a golfer faces that immaculate expanse of green, lots of effort – and some guesswork – goes into achieving the perfect turf.

To make turfgrass management easier and more environmentally friendly, Nebraska's Bill Kreuser launched TurfGrade, a startup that provides an app called GreenKeeper to guide management decisions. More than 2,000 customers worldwide, from high-end golf and other turf sports facilities to small-town golf courses, actively use the sophisticated software.

GreenKeeper combines weather data and hundreds of research models, incorporating different fertilizers, grasses and management practices. Users enter data and receive customized guidance, such as when to reapply products.

"Our goal is to take all this research and put it into an interface that is intuitive, quick and easy to use," said Kreuser, assistant professor of agronomy and horticulture and extension turfgrass specialist.

Kreuser developed GreenKeeper and licensed the software from NUtech Ventures.



Bill Kreuser



Bob Hutkins, one of the co-founders

Synbiotic Health stems from Nebraska's successful research on beneficial gut bacteria. Co-founder Andy Benson directs the Nebraska Food for Health Center, which studies gut-healthy food.

Nebraska Economic Development at a Glance

Source: Bureau of Business Research. Figures represent fiscal year 2019, the most recent year for which information is available.

\$13.44M

EXPENDITURES SUPPORTED BY INDUSTRY SPONSORSHIP

\$6.4M

LICENSING INCOME IN FY 2020

1,657

JOBS CREATED STATEWIDE BY NEBRASKA INNOVATION CAMPUS

\$324.1M

ECONOMIC IMPACT OF NEBRASKA INNOVATION CAMPUS

65

UNIVERSITY OF NEBRASKA RANKING AMONG THE TOP 100 ACADEMIC INSTITUTIONS RECEIVING U.S. PATENTS

97

STUDENT INTERNSHIPS FUNDED



Ventilator Sharing Strategy a Potential Lifesaver

A potential ventilator shortage sparked widespread concern as the U.S. COVID-19 outbreak intensified.

The math suggested that not all people with COVID-induced acute respiratory distress syndrome, or ARDS, would have access to the lifesaving machines that help people breathe.

The problem captured the attention of Nebraska engineer Benjamin Terry and Keely Buesing, a University of Nebraska Medical Center trauma critical care surgeon, who have an ongoing research collaboration focused on ARDS. Building on this expertise, they developed a strategy for stacking two patients on one ventilator.

Their approach, a simple configuration that relies on standard tubing and widely available hardware store supplies, is an option for clinicians who need a quick fix for a temporary ventilator shortage.

“My colleagues and I agree that if we’re looking at two patients and their families, we don’t want to have to make a decision as to who gets the ventilator,” said Buesing, associate professor of surgery.

Their setup tackles the core problem with split ventilation – patient mismatch. This is when patients of different sizes, diagnoses or states of disease progression are candidates for sharing a ventilator.

The third scenario is most challenging to frontline physicians because the lungs behave differently depending on how sick a patient is. Under split ventilation, the sicker patient’s lungs take in less oxygen because they’re stiffer and harder to inflate. The healthier patient’s lungs take in more than they need, leading to dangerous hyperinflation.

To solve this, the team used a variable flow restrictor. Adding this device to a split ventilator setup enables respiratory therapists to decrease oxygen volume to the healthier patient without undercutting the sicker patient’s needs.

“We’re using the same tubing system you can buy off the shelf and just modifying it a little bit,” said Terry, associate professor of mechanical and materials engineering. “You could essentially do this setup with stuff from Home Depot.”

While sharing a ventilator is never ideal, the researchers said, their device offers a potentially lifesaving strategy in a crisis situation with no other solutions.

Nebraska’s College of Engineering and Office of Research and Economic Development funded this project.

From left: Benjamin Terry and Keely Buesing hold both sides of their split ventilation system, which regulates the amount of oxygen going to each patient.



Comics Help Kids Learn About Coronavirus



Judy Diamond

BIF! POW! BANG! The new coronavirus wreaking havoc on our fair planet is no match for a squad of Husker superheroes.

Nebraska researchers joined forces with comic artist Bob Hall to create a series of comics that tells the gripping tale of the virus that causes COVID-19. The one-page comics are designed to both entertain and teach middle school students – and their older siblings and parents – about the science and public health of viruses and infectious diseases.

The comics, published online weekly since June, will continue through December 2020. Then they will be compiled, along with essays and other material, into a single publication. The coronavirus comics are the eighth in a series of comic projects by Nebraska’s World of Viruses education program.

“We hope that kids will become curious enough to learn more about the science of viruses and, in particular, the science of SARS-CoV-2,” said Judy Diamond, professor and curator at the University of Nebraska State Museum.

Diamond and Elizabeth VanWormer, assistant professor in veterinary medicine and biomedical sciences, lead an interdisciplinary team of researchers who develop stories and disseminate the comics through social media and other online formats. Each week, a cast of characters, including the villainous virus, conveys a scientific principle, such as how viruses mutate, how vaccines work or how viruses jump from animals.

Researchers will invite 10,000 middle school students in Lincoln Public Schools to give feedback on the comics’ effectiveness.

Diamond said the comics’ success is due to their authenticity. She credits the collaboration with Hall, a former Marvel and DC Comics artist based in Nebraska.

“Our priority is that they be good comics – dynamic, a little crazy,” she said. “This is not your ordinary educational comic.”

Take that, coronavirus!



Bob Hall



C'rona Comix No. 1

The National Science Foundation’s Advancing Informal STEM Learning funds this project.

Modeling Aids Pandemic Decision-Making



Decision-making during the COVID-19 pandemic is fraught with tradeoffs. Business closures suppress transmission but hurt the economy. Mass testing can help contain the virus but strains medical resources.

Özgür Araz is developing models that help officials visualize these pros and cons and make cost-effective decisions that maximize public health. Araz, associate professor of supply chain management

and analytics, said his predictive analytics tools improve the public good.

“Through modeling, we can determine how to save more lives by allocating scarce resources to places that need them most at the right time and contributing to effective policies,” he said.

His April 2020 paper in *Health Systems* presented a framework for setting up efficient COVID-19

testing sites. It integrates epidemiological and health care delivery models with supply chain management data.

Araz has also published pandemic decision-making models related to school closures, vaccine distribution, social distancing, and ventilator and resource allocation, which can help mitigate the COVID-19 crisis.



Partnering to Meet Hand Sanitizer Need

With the nation facing a significant shortage of hand sanitizer amid the COVID-19 outbreak, the university partnered with Nebraska's ethanol industry to produce sanitizer for thousands of organizations and facilities nationwide.

The Food Processing Center on Nebraska Innovation Campus has donated over 200,000 gallons of hand sanitizer to health care workers, nursing homes, schools, businesses and U.S. Department of Agriculture Food Safety and Inspection Service offices.

The fast-paced effort, led by Nebraska's Hunter Flodman and the Nebraska Ethanol Board, required securing millions of dollars in donations from numerous Nebraska companies, gaining Food and Drug Administration approval and training student volunteers and staff. More than 25 organizations, including Green Plains Inc., Nebraska Forest Service, Cargill, Syngenta, Phillips 66, BASF and others supported the project.

"The partnership with the Food Processing Center is key. Without them, we would not have been able to make this happen," said Flodman, associate professor of practice in chemical and biomolecular engineering and technical adviser to the Nebraska Ethanol Board.

Industry partnerships enabled the university to produce over 200,000 gallons of hand sanitizer for critical services.



Makers Supply Face Shields

As the coronavirus advanced, Nebraska faced a shortfall of face shields to protect its health care workers. To fill the need, a Husker team partnered with businesses and volunteers to manufacture 21,000 face shields for the Bryan Health system and the University of Nebraska Medical Center.

What began as a group of volunteers and staff 3D printing and assembling parts at Nebraska Innovation

Campus quickly morphed into a monumental effort to scale up production. Partnerships with the University of Nebraska-based National Strategic Research Institute and private companies were critical to success.

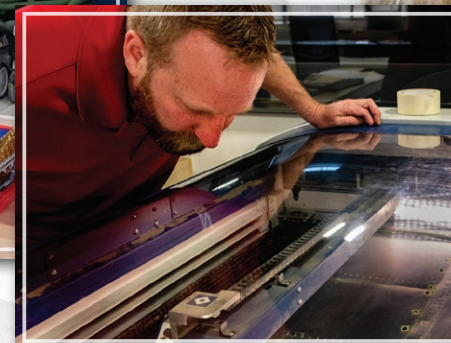
Within days, Nebraska engineers began the injection molding parts process, which is faster than 3D printing, with materials supplied by local companies. Volunteers and staff continued

making and assembling parts at Innovation Studio, said Shane Farritor, Lederer Professor of Engineering and the studio's executive chairman of the board of advisers.

"That's pretty special. This may be the reason Innovation Studio exists – where people come together to make stuff happen that helps others," Farritor said.



Instructional technician Max Wheeler assembles face shields with parts manufactured at Innovation Studio.



Jerry Reif, NIS shop manager, laser cuts plastic sheeting for face shields.



Residence hall custodial leader Cheryl Duncan dons a shield manufactured on campus.



Drone Images Offer Remote Teaching Solution

The College of Architecture looked to the sky for the answer when it needed a way for students to complete their final design projects in the spring.

Instructors worked with University Communication photography director Craig Chandler to use drone technology to capture location images in an iconic alleyway between two well-known buildings in Lincoln's Historic Haymarket.

Typically, students would have done an in-person site inventory and analysis before design concepts or proposals began. Instead, Chandler took videos and still pictures of the area.

Students used the drone content to work on a threshold development project that encompassed the vertical and horizontal landscape and field conditions connecting the site's spaces and their environment in a meaningful way.

"This collaboration is the true definition of synergy," instructor Ernesto Sanchez Andrade said. "Craig Chandler's imagery really helped elevate the content we deliver our students to the next level."

Craig Chandler and Ernesto Sanchez Andrade

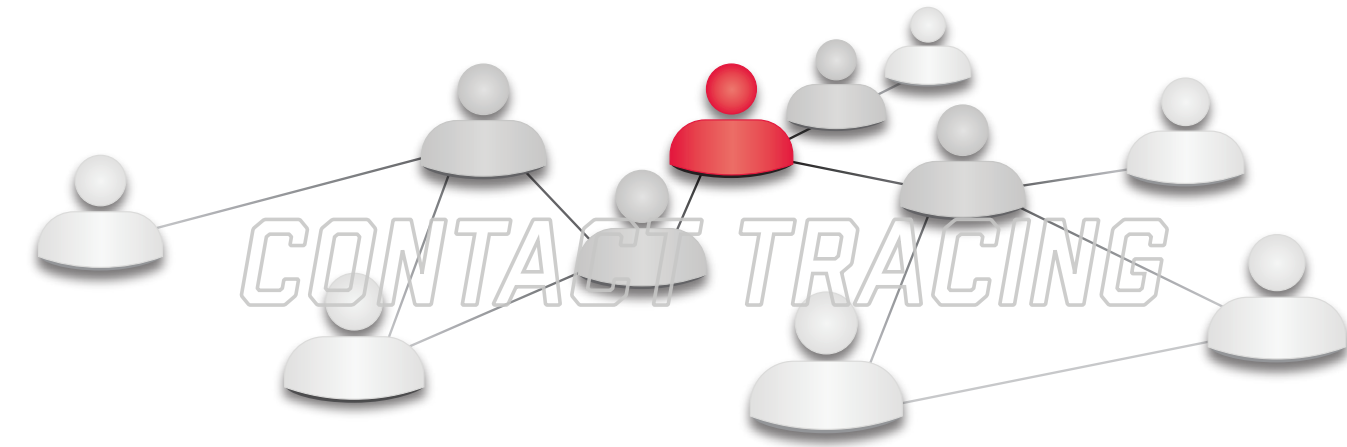


App Could Speed Contact Tracing

A Nebraska researcher's software could help limit the spread of COVID-19.

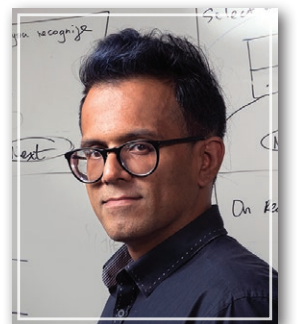
Bilal Khan, Happold Professor of Sociology and professor of computer science and engineering, developed the contact-tracing application for social science research funded by the National Institutes of Health.

"Now, five years later, we have this system that already exists and doesn't need to be designed and built from scratch," Khan said. "Our goal is to leverage it and quickly put something into use."



Users who download the app are assigned an anonymized identification number, which protects privacy by avoiding any connection to personal data. The system uses location and Bluetooth data to track users' proximity, noting which ID numbers are in close contact with other ID numbers.

If an app user is diagnosed with COVID-19, health officials can download a list of all ID numbers potentially exposed to that person in the past 14 days and send in-app notifications.



Bilal Khan

Khan is working with NUtech Ventures, the university's commercialization affiliate, to find a partner for implementation.



The team captured location images in Lincoln's Haymarket district for a student architecture project.



Representing Nebraska's Research Heroes

About the Cover

During a pandemic, working together means being physically apart. For Craig Chandler, director of photography, visually representing the work required extraordinary creativity.

Team photos presented the greatest challenge. For the cover image and others, Chandler photographed each person individually while following stringent health and safety protocols. With help from graphic designer Rob Cope, the photos were stitched together to create one seamless image.

This composite represents essential workers in the Lincoln community and faculty and staff tackling COVID-19 projects. The background is Nebraska Innovation Studio, which has produced and distributed over 200,000 gallons of hand sanitizer and other supplies.



From left: Matthew Newman, mechanical research engineer; Benjamin Terry, associate professor of mechanical and materials engineering; Max Wheeler, instructional technician, and Jerry Reif, shop manager, Innovation Studio; Dr. Chad Duval, emergency physician, Nebraska Emergency Medicine; Tamara Silcott, aerospace medical technician, Nebraska Air National Guard; Dr. Steven Wirth, dentist, Optimal Dental; Grace Panther, assistant professor of civil and environmental engineering; Hunter Flodman, associate professor of practice, chemical and biomolecular engineering; and Dr. Keely Buesing, associate professor of surgery, University of Nebraska Medical Center.

RESEARCH AT NEBRASKA



Virtual Field Trips Take Museum to Students

Morrill Hall's corridors went silent in March, robbed of their usual spring arrival of curious schoolchildren marveling at the wonders of discovery.

It was "kind of heart-wrenching," said Susan Weller, director of the University of Nebraska State Museum. But staff didn't let the pandemic stop their mission. They built on a previously established online presence to launch a variety of lessons. The effort met needs during a unique time and just might point the way to how the museum will do business in the future.

"Once we knew schools were shutting down ... we thought through what we could do to support parents and teachers who are home and trying to support their children's learning," Weller said. "That meant taking what we usually do face to face and pivoting to deliver it remotely."

The museum had begun creating virtual field trips about five years ago with an initial lineup of eight lessons. In April and May, museum staff made those lessons available via Zoom at scheduled times. Facebook Live learning sessions were

posted weekly and archived on the museum's website. The Mueller Planetarium posted new content exploring space and astronomy every Wednesday. Hands-on activities that require only minimal supplies likely to be available at home are online as well.

Historically, museums have worried that making too much of their content available online could discourage people from visiting the brick-and-mortar buildings. The pandemic forced them to rethink this and likely will change their way of doing business for good.

The online experience can enrich museums' contributions as they coordinate it with in-person visits, Weller said. The emphasis on home learning "brings us back to our roots, if you will, as observers of nature and of science, because your basic tools for doing science are your eyes, your ears, your hands, your nose."

Weller said her staff already is thinking beyond this moment to how they can add more museum content online.

"There will be innovation that continues long after this pandemic is gone, and it will be a way for people to connect long after they're here," she said.

Students Capture Flood Recovery Stories

Catastrophic flooding devastated Nebraska in 2019, killing four people, inundating communities, causing more than \$3 billion in damage to homes, farms, businesses and infrastructure and changing some lives forever.

For eight College of Journalism and Mass Communications undergraduates who worked on the Flood Feed Media initiative, reporting on these dismal tales and recovery had a silver lining: hands-on experience with what project leader Jennifer Sheppard called "the emotional part of journalism."

"I can tell a student how to do an interview," said Sheppard, assistant professor of practice in journalism. "But when you're talking to someone whose house flooded, you have to learn compassion on the fly. You have to have something in your eyes that's empathetic."

Participants selected for the summerlong service project funded by the college and Nebraska Extension also immersed themselves in the technical side of their craft. They honed writing, interviewing, photography and video skills that will power their careers.

Traveling the state, they captured stories of flood recovery efforts, such as the rehabilitation of an in-home daycare in Osmond, the Quail Run Golf



Student journalists documenting 2019 Nebraska floods.

Course in Columbus and many farms, ranches and homes. They covered efforts in Spencer and Lynch, two hard-hit northern Nebraska towns, to secure safe drinking water after the 92-year-old Spencer Dam broke, leaving the towns' water espresso-colored and unusable.

Student journalists also explored the factors fueling the disaster, gaining valuable experience in navigating powerful clashes between journalism, science and politics.

"It's impossible to tell the story of the floods without talking about climate change," said junior

Nick McConnell, Flood Feed's news director and a Lincoln native. "But this is a tough state to do that in, particularly in the areas we were visiting. We learned to bring it up in the most roundabout ways we could. Learning about different views in the state was really meaningful."

The students' work, which includes a capstone documentary, is published on the Flood Feed Media website. Local media picked up some stories, and Nebraska 4-H showcased the documentary at the Nebraska State Fair.



Annie Mumgaard, virtual learning coordinator, gives a virtual tour of the museum's geology collection to more than 120 young students.

Protecting Ecosystems with Early Detection

In medicine, disease screening with tests like colonoscopies and mammograms helps detect problems before symptoms emerge – while there is still time to reverse course.

Nebraska's Dirac Twidwell, associate professor of agronomy and horticulture, is bringing this proactive early-detection approach to agricultural resilience, which focuses on the ability of ecosystems to withstand sudden, destabilizing transitions.

These shifts – from grassland to cedar woodland or fertile farmland to desert, for example – can spark chaos in communities by reducing biodiversity, wildlife habitat and livestock forage. These changes reduce food and water security and increase flood, wildfire and other risks.

Twidwell is collaborating with University of Montana researchers to develop and implement first-of-their-kind screening tools that detect, more precisely and earlier, subtle changes that foreshadow destabilizing ecological transitions.

“The approach is meant to mimic the philosophy of medicine, so we can start to nail down, as early as possible, where we see problematic changes

that we know carry a host of severe consequences to ecosystem services and people's well-being,” said Twidwell.

The team's tools include maps that highlight changing vegetation patterns across the Western U.S. The maps, developed based on cloud computing, comprehensive vegetation data and resilience theory, enable researchers to identify areas where one vegetation type is displacing another across multiple tracts of land – a telltale sign of forthcoming disruptive change.

“The tools are no different than a patient looking at an X-ray scan or a brain scan,” Twidwell said. “We can talk with landowners about what we're seeing and give them a heads up that they may need to change their management strategies.”

Montana researchers will use big data approaches and social network analysis to develop an algorithm that identifies individuals likely to use the technology. They'll also meet with Nebraska and Montana stakeholders to showcase the tools.

Nebraska's team includes Craig Allen, professor and director of the Center for Resilience in Working Agricultural Landscapes; Simanti

Banerjee, associate professor of agricultural economics; and Daniel Uden, assistant professor in the School of Natural Resources.

A \$4 million National Science Foundation EPSCoR Research Infrastructure Track-2 award funds this project.

AGRICULTURAL RESILIENCE



From left: Craig Allen, Simanti Banerjee, Dirac Twidwell and Daniel Uden



Series Showcases Great Plains Culture, History, Environment

The Great Plains is sometimes described by what it lacks: oceans, mountains, skyscrapers, big-city noises and world-class museums. Richard Edwards, director emeritus of Nebraska's Center for Great Plains Studies, seeks to showcase the region's abundance of quiet beauty and significant culture.

He developed "Discover the Great Plains," a series of short paperback books written for a general audience, to highlight different aspects of the region, which stretches from the Dakotas to the Texas Panhandle.

To date, seven books introduce readers to American Indians, bison, weather, politics, literature, geology and birds. Four more books are in the works. The series, which began in 2016, is a collaboration with the University of Nebraska Press.

"Even people who live in the region don't necessarily know much about it," said Edwards, the series editor. "We see this series as a way to inform ourselves and the reading public about the many riches of the Great Plains."

By encouraging people to explore the Plains, the series promotes greater appreciation of the region's culture, history and natural environment, a key mission of the Center for Great Plains Studies, which was established in 1976.



Titles in the "Discover the Great Plains" book series

Richard Edwards

Donna Shear, director of UNP, said the series has been popular and is a good fit for the Bison Books imprint, which shares the history and literature of the American West and Great Plains.

The books' themes appeal to audiences beyond the region. "Great Plains Birds," for example, offers a meditation on birds popular with birders. "Great Plains Politics" portrays national political figures, such as Wilma Mankiller and Robert Dole, by highlighting their backgrounds as community collaborators.

Accessibility is a key ingredient. Edwards enlists authors both deeply knowledgeable about the topic and able to write in a personal style. For example, in "Great Plains Weather," Kenneth Dewey, emeritus professor of climatology, explains not only the area's extreme weather but also how his boyhood interest in it developed.

"There's a personal element to these books that allows the reader to get carried along with the enthusiasm of the author," Edwards said.

Opera Premieres in Town Where Story Began

A plague of locusts, a bison stampede, a fatal shooting, an escape in the night. The 1873 founding of Cozad, Nebraska, by gambler John Cozad had plenty of melodrama for an opera.

Nebraska's Glenn Korff School of Music debuted "The Gambler's Son," an opera about Cozad's ill-fated attempt to establish a preeminent metropolis on the Plains. It premiered in November 2019 at Cozad, a west central Nebraska town of 4,000, to a full house before concluding at Nebraska's Kimball Recital Hall.

Despite the story's Wild West excitement, Nebraska's Tyler White and Laura White were determined not to make a "cowboy opera." Instead, they focused on

Cozad's complicated relationship with his famous son, the painter Robert Henri.

"The core of the opera is examining their relationship and how they came to understand each other," said composer Tyler White, director of orchestras and professor of composition and conducting. "It's a family drama that happens to be set in the Old West."

The opera is adapted from Mari Sandoz's novel "Son of the Gambler's Man. The Youth of an Artist." Laura White, John E. Weaver Professor of English, had the difficult task of pulling key moments from Sandoz's action-packed novel to write a libretto that didn't overwhelm.

Cozad "was almost this tragic hero because he had huge dreams for Cozad, the town," she said. "Then it was just one horrible thing after another."

Tyler White set the libretto within an eclectic music style that animates the characters and appeals to a modern audience.

The collaborative duo's efforts gave William Shomos, director of opera and Richard H. Larson Distinguished Professor of Music, the rare opportunity to produce an original opera set in Nebraska. For Shomos' team, the highlight was performing it where the story took place.

"The mission of UNL opera is to promote new American works and to take opera to rural Nebraska, to share what we're doing and let people experience it. Thus far, the response has been great," Shomos said.

An audience member called the first live opera performed in Cozad a gift to the town.

"The Gambler's Son" was supported by the James C. and Rhonda Seacrest Tour Nebraska Opera Fund, Jane Rohman, Willard Bellamy family, Ivan and Shirley Paulsen family, Lincoln Community Foundation, UNL Friends of Opera and the Wilson Foundation.



"The Gambler's Son" tells the story of John Cozad, founder of Cozad, Nebraska.



Boosting Educational Success for Kids Leaving Foster Care

Kids who've spent time in foster care often have a hard time succeeding in school, especially those who bounce in and out of state care.

To put Nebraska's foster kids on a path toward academic success, the Academy for Child and Family Well Being is partnering with the state's largest foster care agency. Together, they are developing an intervention program supporting middle and high school students who leave foster care for homes with family, adopters or other guardians.

"The primary goal is centered on educational support. Existing supports don't target this area. We hope to address this need to promote academic success and prevent reentry," said Jacqueline Huscroft-D'Angelo, research associate professor

in special education and communication disorders. "The more placement changes [that] students experience, the more likely they will fall behind academically."

Nebraska has more than 3,500 children in foster care, of whom about 85% leave state care for a permanent home. A quarter of the children who leave foster care return.

Huscroft-D'Angelo co-leads the intervention program with the academy's co-director Alexandra Trout, research professor in special education and communication disorders.

The program, Fostering Educational Success: Reconnecting Families, Empowering Youth, takes

advantage of the academy's extensive experience developing programs that keep students engaged in school.

It's modeled on a successful program the academy developed in collaboration with Boys Town to support kids leaving residential care.

The university's academy is working with foster care agency KVC Nebraska to develop and refine program components. KVC will deliver program services.

"We want to improve the collaboration between community agencies and schools, working together to support these students," Huscroft-D'Angelo said.

The program initially targets young people ages 12 to 18 within 60 miles of Lincoln and Omaha but will eventually expand statewide.

The academy will study the five-year project's results through a randomized controlled trial and follow-up studies. The long-term goal is to provide a successful model to support the educational needs of the nation's nearly half-million foster kids, Huscroft-D'Angelo said.

A nearly \$4 million grant from the U.S. Department of Education's Education Innovation and Research Program funds this project.

Eviction Reflects Deeper Financial Stress

Eviction gained national attention in 2016 with sociologist Matthew Desmond's Pulitzer Prize-winning book "Evicted: Poverty and Profit in the American City."

Husker economist Daniel Tannenbaum heard Desmond speak and was blown away by the problem's magnitude – roughly 2.5 million evictions, or about four each minute, are filed annually in the U.S. He and colleagues noted the absence of economists studying the problem.

To determine whether eviction causes financial difficulties, household relocations and other problems, Tannenbaum's team launched a study linking 17 years of eviction court records from Cook County, Illinois, to financial data.

It's the first research using administrative data – payday loans and credit reports – to trace long-term outcomes for people who appear in eviction court. This innovative approach gives Tannenbaum's team a long-range perspective unavailable through traditional methods.

"It would be very difficult to do this using survey data," said Tannenbaum, assistant professor of economics. "We would have to wait years, then follow up and try to find people who

are experiencing housing difficulty. Using administrative data, we can circumvent that."

The team found that eviction court appearances reflect deeper, preexisting financial distress. Though eviction reduces credit access and the ability to purchase durable goods like appliances, cars and electronics, those effects are modest compared to pre-court economic strain.

"Eviction is an inflection point," Tannenbaum said. "We see declining earnings, falling credit scores and a surge of payday loans in the two years leading up to eviction court."

Win or lose, tenants experience significant housing instability after court, the team found. This suggests that while court outcomes are important, the real culprit may be the financial distress that lands a tenant in court in the first place.

Public policy-wise, Tannenbaum said, early interventions to help tenants avoid court may be ideal. He suggested policies such as emergency financial assistance for struggling renters should be evaluated.



Daniel Tannenbaum

Next, Tannenbaum will access additional data through the university's Central Plains Federal Statistical Research Data Center to assess other eviction outcomes. He also will study eviction's effects on children's education.

The National Science Foundation, The Spencer Foundation, the Laura and John Arnold Foundation and the Kreisman Initiative on Housing Law and Policy fund this work.



From left: Alexandra Trout, Jacqueline Huscroft-D'Angelo, Kristin Duppong Hurley and Matthew Lambert



Improving Training for Teachers of Multilingual Students

More than half of K-12 public school teachers nationwide have at least one student classified as an English language learner, estimates show. Yet the training for teachers of multilingual students varies widely across states and school districts.

This complicates an already challenging task: educating students with varying levels of English fluency, different home languages and different cultural expectations of education.

Husker education researcher Kara Viesca is using a \$2.7 million grant from the U.S. Department of Education's Office of English Language Acquisition to expand a set of e-workshops that offer professional development and support to K-12 teachers of multilingual students. First launched in 2011 in Colorado, Viesca's program fosters collaboration and mentorship among participants.

Now, she and her team of teaching, learning and teacher education colleagues and numerous current and former students are expanding the International Consortium for Multilingual Excellence in Education into at least 11 more states. She's also designing tailored e-workshops for specialized groups, like school psychologists and special education teachers.

A cornerstone of the workshops is respect for students' home languages and backgrounds.

"There is often a monolingual approach, in that we 'treat' what we see as a deficiency in English," said Viesca, associate professor of teaching, learning and teacher education. "This ignores the rich ability and knowledge of speakers of multiple languages. We want teachers to recognize the value of home languages in the classroom."

To reach more teachers with this philosophy, Viesca's team forged a partnership with WIDA, a consortium of 40 states, territories and federal agencies focused on English development standards and assessments. This led to the launch of the program in eight states beyond the 11 targeted.

In Nebraska, the team is working with stakeholders to increase use of the e-workshops. About 7% of Nebraska's public school students are English language learners, according to the Nebraska Department of Education.

In the program's research component, the team is studying outcomes of participating educators to pinpoint successful strategies. They've also collaborated with colleagues in Europe to disseminate the e-workshops in Finland and Germany.

Above, from left: Lauren Gatti, Jessica Mitchell-McCollough, Kara Viesca and Aaron Johnson

Immigration Clinic Offers Aid, Experience

The more than 10 million undocumented residents living in the United States have no constitutional right to legal representation. Without a lawyer, they are more likely to forgo legal help in dire situations and face poor outcomes as a result.

To help fill that representation gap, third-year students at the University of Nebraska College of Law's Immigration Clinic provide free legal services to those in need. The clinic more than tripled the number of students working on cases in 2019, meeting a growing demand for deportation and asylum assistance across Nebraska.

"It's a pretty tumultuous time for immigration and immigration policy, and that leaves a lot of clients with a lot of questions and fears," said Sam Hawley, a Nebraska Law alumnus from Eldridge, Iowa. "To be able to be that person who can go and help address those fears and problems is a really valuable experience and what drew me specifically to the Immigration Clinic."

The law college takes on around 40 pro bono cases at a time. Kevin Ruser, who founded the clinic 21 years ago, compares the experience to students having a "learner's permit" for practicing law.

"This is a valuable chance for students to actually work with clients and real cases," Ruser said. "I think they get enjoyment out of finally applying the theory they've learned up until this point in their law school career."

The clinic's services are in especially high demand due to Nebraska's large refugee population. Over the years, refugees from Vietnam, Tajikistan, Bosnia and Iraq have visited frequently with citizenship questions.

"We keep a map and stick pins in every country that a client has come from that we've worked with, and it's covered with pins. It just astounds me," Ruser said.

Nebraska's legal outreach efforts have received national recognition by the American Bar Association, which named it a Pro Bono Leader in both 2018 and 2019. The college also continues to excel in job placement for alumni, with 94% of its 2018 graduates employed within 10 months of graduation.



Law students Brig Jensen and Nichole Sklare (center) talk with clients while Eric Davis serves as an interpreter.



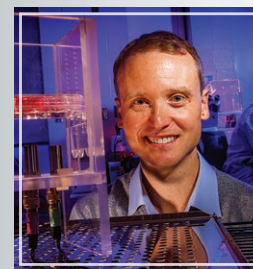
Promising Research Efforts Earn CAREER Awards

Nebraska researchers are seeking better ways to combat heart disease, improving nanomaterials' stability and transforming excess plant material into useful products with Faculty Early Career Development Program awards from the National Science Foundation. In 2020, these Nebraska faculty earned these prestigious five-year awards that support outstanding pre-tenure faculty, totaling more than \$1.8 million.

RISING

RESEARCH STARS

Inset: An image of the heart, as seen during an esophageal ultrasound



Ryan Pedrigi

Nebraska's Ryan Pedrigi received a \$543,000 CAREER award to explore a targeted, noninvasive treatment for atherosclerosis, which is plaque buildup in the inner lining of arteries.

Treating Cardiovascular Disease with Ultrasound

Cardiovascular disease is historically the leading killer in the United States and a health care budget buster. A new treatment for one of its primary causes could help lower both those statistics.

Atherosclerosis currently is treated with statin drugs or stents. Statins don't target the diseased artery, while stents are invasive and pose serious risks to patients.

Pedrigi, assistant professor of mechanical and materials engineering, envisions treating diseased arteries with ultrasound pulses, stimulating a cellular response that could reduce plaque buildup and prevent further accumulation.

He will start by studying how endothelial cells – the cells that form the inner lining of arteries – respond

to low-intensity pulsed ultrasound. He hopes to identify the ideal ultrasound parameters for combating atherosclerosis.

For the project's education component, Pedrigi aims to attract more women and other students from underrepresented groups to mechanical engineering.



Vitaly Alexandrov

Nebraska's Vitaly Alexandrov, assistant professor of chemical and biomolecular engineering, aims to advance basic understanding of these chemical processes.

Probing How Nanomaterials Dissolve

Understanding how nanocrystals dissolve in water could lead to nanomaterials with improved stability and more controllable chemical activity.

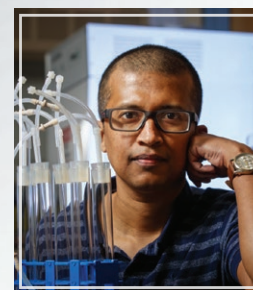
"It's well known that (nanomaterials') dissolution may play both beneficial and detrimental roles," said Alexandrov, who received a \$520,244 CAREER award.

Dissolution can aid in processing and recycling materials, but it also causes corrosion and degradation of alloys and photo-electrocatalysts and decomposition of hybrid organic-inorganic solar cells and pharmaceuticals.

Better understanding how nanomaterials dissolve will help scientists better process and recycle the materials,

identify the conditions that will enable them to drive dissolution along preferable paths and aid design of materials less prone to dissolution. Alexandrov conducts his research through the Nebraska Center for Materials and Nanoscience.

Nanomaterials have widespread applications, including medicine, aerospace, batteries, magnets, televisions, computers, weapons and insulation.



Rajib Saha

Transforming Plant Waste with a Microbe

In addition to producing lots of corn, Nebraska farmers produce lots of plant waste. Much of it goes toward ethanol, but Nebraska's Rajib Saha is studying how a bacterium could break it down for other uses.

Saha, assistant professor of chemical and biomolecular engineering, is working with *Rhodospseudomonas palustris*, a purple non-sulfur bacterium noted for its ability to switch among four different types of metabolism. That versatility makes it ideal for breaking down lignin and transforming it into two substances. One can be used to create biodegradable plastics and the other to synthesize polymers widely used in textile production.

With a \$747,855 CAREER award, Saha's team will use computational modeling and experimental approaches to understand how this organism adjusts its metabolism in response to environmental changes.

"At the end of the day, it's built on something that is a waste in our state and is abundant in our state," Saha said.





Mental Health Aid for Flood Victims

To help Nebraskans affected by 2019's devastating floods, the University of Nebraska's Public Policy Center is collaborating with four of the state's Behavioral Health Regions and community partners on two mental health initiatives. Stacey Hoffman, the center's senior research manager, helped secure two grants totaling nearly \$2 million from the federal Substance Abuse and Mental Health Services Administration.

One focuses on training school employees to address the behavioral health needs of students and families by providing on-site services or referring them to other providers. The second serves adults affected by the disaster who face mental health or substance abuse problems.

Goals are to train people to recognize and respond to adults with behavioral health issues, educate the workforce on disaster-related mental health problems and provide treatment vouchers to people in affected areas. Each grant will reach 23 mostly rural counties.

Merging Machine Learning, Genetics

Sorghum has potential to be a star player in the biofuels industry. But without pinpointing the functions of the crop's roughly 30,000 genes, it's impossible to develop specialized varieties. With a \$2.7 million grant from the U.S. Department of Energy, an interdisciplinary Husker research team is leading a group of Corn Belt-based institutions in developing a rapid, efficient method for identifying sorghum gene functions.

The strategy is based on reverse genetics, where scientists start with a known gene, alter it, then study the resulting plant to shed light on the gene's function. But because identifying the right genes to study is like finding a needle in a haystack, the team is using artificial intelligence to teach computers to identify key genes.

The team will edit the selected genes and study the resulting plants. Project leader James Schnable, Charles O. Gardner Professor of Agronomy, said the project is among the first to merge machine learning and plant genetics.



Investigating Cells' 'Power Supply'

Oleh Khalimonchuk's investigation into a single protein implicated in amyotrophic lateral sclerosis, or ALS, has morphed into an expansive quest to identify the complex causes of numerous degenerative diseases.

His research could lead to new therapies for ALS, Parkinson's, Alzheimer's, other degenerative diseases and some cancers.



Oleh Khalimonchuk

Khalimonchuk, the Susan J. Rosowski Professor of Biochemistry, earned a \$1.8 million National Institutes of Health Maximizing Investigators' Research Award, a five-year grant that allows talented researchers to explore promising new directions. He investigates mitochondria, the cell's power supply centers.

To remain healthy, mitochondria rely on a complex network of proteins and other molecules working together to maintain and repair them. His team studies both the individual roles of a variety of key proteins and how the breakdown of this intricately choreographed quality control system leads to diseases.

Khalimonchuk is a member of the Nebraska Redox Biology Center and the Nebraska Center for Integrated Biomolecular Communication.



Preparing the Kiewit Hall site

Kiewit Gift Boosts Engineering Expansion

Nebraska Engineering received a substantial gift from Omaha corporation Peter Kiewit Sons' Inc. to help construct a new facility in Lincoln.

The building, to be named Kiewit Hall, will be the College of Engineering's academic hub and house its construction management programs.

Kiewit donated \$20 million toward the \$85 million facility, which is expected to be completed in fall 2023. The Abel family of Lincoln is a second major contributor to the project. Jim Abel, chairman and CEO of NEBCO, and his wife, Mary, are longtime civic leaders and their family's support for the university goes back three generations. The family has agreed to donate a parcel of land at 17th and Vine streets to the project.

Other major donors contributing to ongoing fundraising include Robert and Joell Brightfelt; Hausmann Construction; Rick and Carol McNeel; Dan and Angie Muhleisen; Olsson; Union Pacific Foundation; and Don Voelte and Nancy Keegan.

The facility is part of a larger multiphase project to significantly renovate and expand the College of Engineering and meet the state's accelerating need for engineers and computer scientists.

"The college is extremely grateful to Kiewit for this generous gift and continued partnership as we make critical investments to provide Nebraskans with world-class construction, computing and engineering education and research," said College of Engineering Dean Lance C. Pérez.

Carson Media Arts Center Opens

Nebraska's Johnny Carson Center for Emerging Media Arts opened in August 2019, welcoming a new generation of creative, future-oriented leaders.

Plans for the center, part of the Johnny Carson School of Theatre and Film in the Hixson-Lied College of Fine and Performing Arts, began in 2015 with a \$20 million gift from the Johnny Carson Foundation. The iconic talk show host was a Nebraska native.

The center's curriculum focuses on four cognitive skills needed to thrive in the age of intelligent machines: critical thinking, systems thinking, cultural agility and entrepreneurship. These skills will prepare students for careers in artificial intelligence, game design, virtual reality, data streaming and other fields that go beyond entertainment, said Megan Elliott, the center's director.



The center was the first program at a Big Ten university to earn a Hewlett Packard/Educause Campus of the Future designation, a partnership that gives Nebraskans access to the latest high-tech equipment.



Demolition of Mabel Lee Hall

New Home for CEHS

The former site of Mabel Lee Hall is undergoing a transformation to meet the future needs of students.

Dedicated in 1968 as the Women's Physical Education Building, the facility was renamed in 1977 and transitioned to a mixed-use space. Now, it's been demolished to make way for the new home of the College of Education and Human Sciences.

The project, which started in spring 2020, will allow the college to better connect its programs across City and East campuses and add flexibility to meet future student needs. Scheduled to open in summer 2022, the new 126,590-square-foot, four-story building will feature a variety of classroom and office options and link directly to Teachers College Hall.

"The modern, new space will inspire collaboration while elevating our efforts to provide students with innovative and engaging ways to learn," said Sherri Jones, dean of the college.





Mark Griep

Rediscovering Pioneering Chemist

Forgotten for more than a century, Rachel Lloyd and her contributions to Nebraska chemistry and agriculture have received well-deserved national recognition, thanks to the efforts of Mark Griep.

Griep, professor of chemistry, received the Champion of History Award from History Nebraska, the state historical society, for bringing Lloyd's story to light.

Lloyd was the first American woman to earn a doctorate in chemistry. In 1887, she became Nebraska's second chemistry professor and chaired the department before retiring in 1894. Her research on sugar beets gave Nebraska farmers a new crop and pioneered a new industry, an economic boon for the young state.

Griep has spent more than two decades researching Lloyd's life and championing her accomplishments. In 2014, his efforts led the American Chemical Society to recognize Lloyd as a National Historic Chemical Landmark. Griep continues to give presentations about Lloyd's historic contributions to chemistry and the state.

Accolades



Raymond Hames

Raymond Hames, professor of anthropology, earned membership in the National Academy of Sciences. The honor, one of the highest distinctions for a scientist or engineer in the United States, recognizes distinguished and continuing achievements in original research. Hames is an international authority on the lives of indigenous peoples of the Venezuelan Amazon, particularly the Yanomamö and Ye'kwana, and has received funding from the National Science Foundation, the Harry Frank Guggenheim Foundation and The Leakey Foundation. His work focuses on behavioral ecology, food and labor exchange, human ecology, marriage, kinship and parental investment. Hames is the fourth Nebraska faculty member, and the first since 2003, to earn the prestigious distinction.



Ed Cahoon



Tom Clemente



Eileen Hebets

Ed Cahoon, **Tom Clemente** and **Eileen Hebets** were named American Association for the Advancement of Science Fellows in 2019. Fellows are selected by their peers for scientifically or socially distinguished achievements that advance science or its application.

- Cahoon, George Holmes Professor of Biochemistry, was recognized for contributions to plant lipid biochemistry.
- Clemente, Eugene W. Price Distinguished Professor of Biotechnology, was honored for contributions to plant molecular biology and genetics.
- Hebets, Charles Bessey Professor of Biological Sciences, was recognized for contributions to behavioral and evolutionary biology.

Two Husker researchers will use Fulbright U.S. Scholar Awards to travel to São Paulo, Brazil, to research and teach. **Cody Hollist**, associate professor of child, youth and family studies, will study suicide and self-harm in Brazil, develop interventions to mitigate them and teach family therapy courses to students at the Federal University of São Paulo. **Isabel Velázquez**, Harold E. Spencer Professor in Modern Languages and Literatures, will conduct research at the Universidade Estadual de Campinas, or UNICAMP, focused on the sociolinguistic experience and perceptions of speakers of Venezuelan Spanish, an estimated 100,000 of whom have recently settled in Brazil after fleeing political and economic crises in Venezuela. Through her research, Velázquez aims to help these refugees integrate into Brazilian society.

Author **Chigozie Obioma**, James E. Ryan Associate Professor of English, appeared on the Booker Prize for Fiction shortlist in 2019 for his second novel, "An Orchestra of Minorities." The prize is one of the world's most prestigious awards in literature and has recognized outstanding fiction for more than 50 years. Obioma's book, written in the mythic style of the Igbo literary tradition, tells the story of a Nigerian poultry farmer as he pursues the woman he loves. This was Obioma's second appearance on the shortlist. In 2015, his debut novel, "The Fisherman," received the same honor. He is among a handful of authors selected for the shortlist more than once.

Amy Burnett, Paula and D.B. Varner University Professor of History, was named a fellow of the John Simon Guggenheim Memorial Foundation. The fellowships honor individuals who have demonstrated exceptional capacity for productive scholarship or exceptional creative

ability in the arts. During the 12-month fellowship, Burnett will research the correspondence among European humanists, pastors and teachers during the Reformation and work on a book, "The Religious Republic of Letters: Correspondence Networks in Reformation Germany." She was one of 175 fellows in 2020, who were selected from more than 3,000 applications.

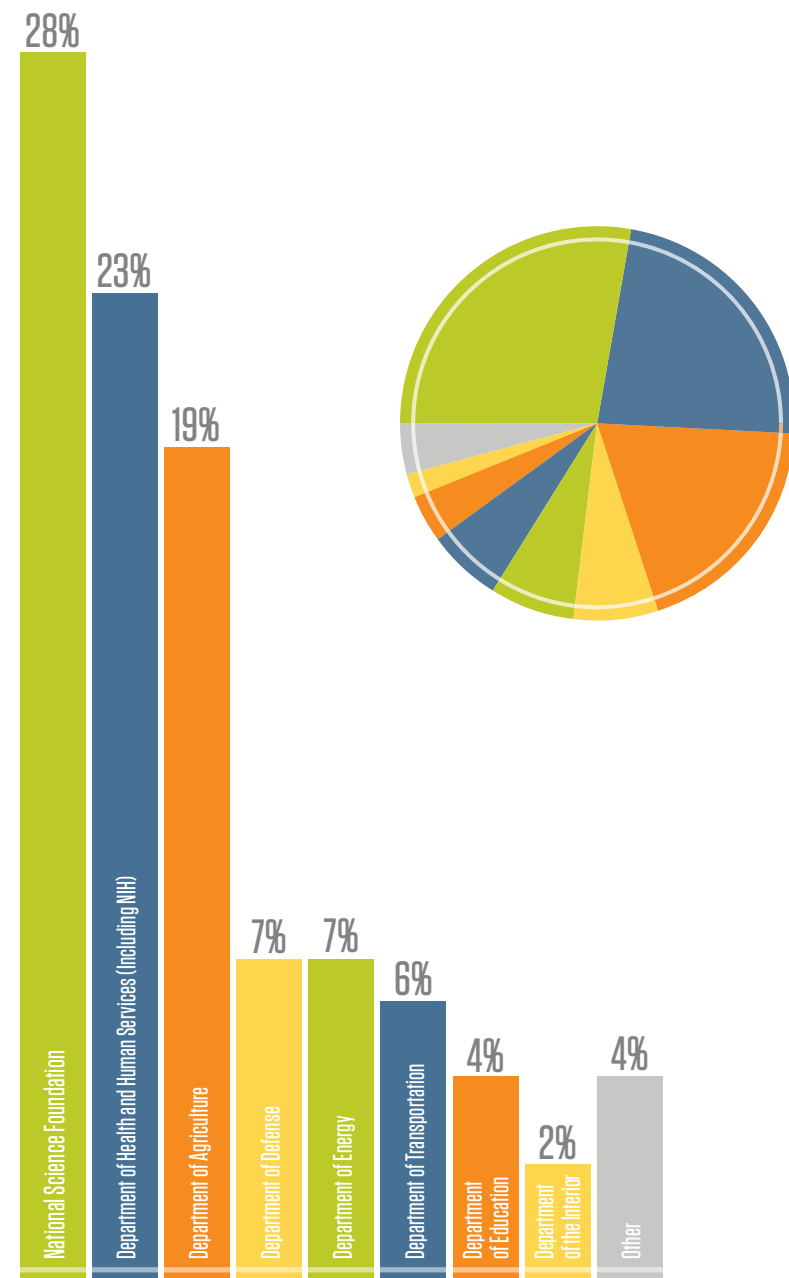
Shudipto Dishari, assistant professor of chemical and biomolecular engineering, received the Early Career Research Program award from the Department of Energy's Office of Science. The award is designed to enhance the nation's scientific workforce by supporting exceptional researchers during their critical early career years. With the funding, Dishari will design new polymer materials that improve energy efficiency and storage, possibly in devices such as fuel cells and redox-flow batteries. She hopes the work will pave the way for her to eventually commercialize the polymers through a spinoff company. Dishari was one of 73 scientists to receive the DOE early career award in 2019.

Cody Creech, assistant professor of agronomy and horticulture, received the Crop Science Society of America Early Career Award. The honor recognizes individuals who have made an outstanding contribution in crop science within seven years of completing their final degree. Creech, a dryland cropping systems specialist at the university's Panhandle Research and Extension Center, focuses on enhancing agronomic practices to increase profitability, optimizing soil water conservation and improving weed management. His research has contributed to refining seeding recommendations for winter wheat and defining the role of wheat residue in soil water conservation.

Anthropologist **Heather Richards-Rissetto** received a fellowship from the National Endowment for the Humanities. The award is granted to scholars pursuing projects that embody exceptional research, rigorous analysis and clear writing. With the fellowship, Richards-Rissetto, assistant professor of anthropology, will pursue work on a digital publication focused on the Mayan city of Copán, an archaeological site in Honduras dating from the 5th to 9th centuries CE. The publication will feature 3D reconstructions and immersive virtual reality experiences of the city.

Sherri Jones, dean of the College of Education and Human Sciences and Velma Warren Hodder Professor of Special Education and Communication Disorders, received Honors of the Association recognition from the American Speech-Language-Hearing Association in 2019. The group's most prestigious award, this honor recognizes lifetime achievement and distinguished contributions to the field of communication sciences and disorders. Jones was honored for her 30 years of continuously funded audiology research focused on identifying the functional consequences of genetic mutations in the inner ear. She developed a technique to examine vestibular neural function, with the ultimate goal of better diagnosis and treatment of dizziness. The association also noted Jones' success as a teacher, mentor and administrator.





Nebraska Research at a Glance

\$317M TOTAL RESEARCH EXPENDITURES FY 2019

1,593 SPONSORED RESEARCH AWARDS

26% INCREASE IN RESEARCH EXPENDITURES OVER THE PAST 10 YEARS

1.5M SQUARE FEET OF SPACE FOR RESEARCH

25,057 TOTAL ENROLLMENT, FALL 2020

2019-2020 NEBRASKA RESEARCH REPORT

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SCAN TO DISCOVER MORE



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IN OUR GRIT



OUR GLORY

UNIVERSITY of NEBRASKA-LINCOLN