ND EPSCoR
Established Program to Stimulate Competitive Research

News & Notes

June 27, 2023

From the Executive Director

Summer has finally arrived and students across North Dakota are using their time off from coursework to pursue additional STEM opportunities. Over the next several months, we will highlight how we are helping students pursue STEM opportunities outside of the traditional classroom setting starting with how six students from NDSU, UND, and the University of Mary are using their summer to pursue STEM internships at North Dakota companies.

We are bringing back efforts to highlight the scientific studies that are the basis for what we do at ND EPSCoR. The New Discoveries in the Advanced Interface of Computation, Engineering and Science (ND-ACES) is a project funded by NSF to build infrastructure and drive the growth of North Dakota's bioscience ecosystem. Work on this project is brings together the fields of computational modeling, materials research, and cellular biology to address basic biological questions around pancreatic and breast cancer. The project involves faculty, staff, and students at 10 North Dakota institutions including six state universities (NDSU, UND, Minot State University, Dickinson State University, Mayville State University, and Valley City State University) and four tribal colleges (Cankdeska Cikana Community College, Nueta Hidatsa Sahnish College, Sitting Bull College, and Turtle Mountain Community College).

Thank you for your interest in ND EPSCoR projects and programs and the stories below.

-Jolynne

BIG results for ND EPSCoR scientists

Few people can say that cancer has not impacted their life or feel that finding a cure is unimportant. Scientists supported by ND EPSCoR have responded by studying the relationships between cancer and noncancer cells, and their research has generated landmark discoveries.

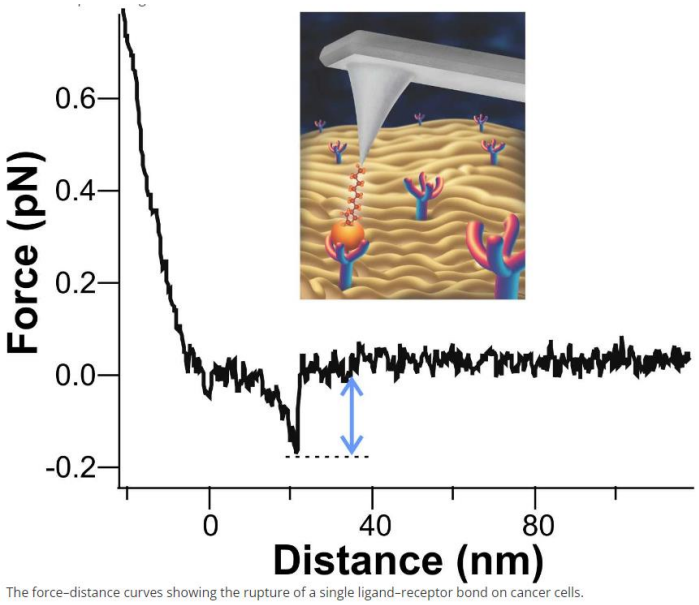
The receptors covering cell surfaces are essential to maintaining normal cellular functions such as communication between cells, maintaining cells' location on tissue, and transporting materials through the cells. Changes in the signals sent from or at a cell's surface oftentimes disrupt these normal functions and ultimately lead to disease.

For example, cancer cells produce more of the receptors that disrupt cell-to-cell communication, manipulate the cellular environment, and promote tumor invasion and growth. This makes understanding the properties of a cell's surface and receptors and the dynamics of how these receptors interact with their surroundings, crucial to unraveling the changes that occur when cells transition from a normal to cancerous state. Acquiring that understanding paves the way for developing new strategies for treating human diseases.

A team of experts, biophysicist Dr. Yongki Choi, cancer biologist Dr. Jiha Kim, and pharmaceutical scientist Dr. Sanku Mallik, has assembled to address this challenge. Their investigations will focus on the relationship between cell-to-cell communication and disease development. The outcomes of this research will address knowledge gaps, offer new insights into the mechanisms governing intercellular communication, and potentially help develop innovative drug discovery methods.

The results of the recent work supported by ND-ACES funding (NSF OIA 1946202) were shared during the ACS Spring Meeting (March 26, 2023).

https://acs.digitellinc.com/sessions/528038/view)



The force–distance curves showing the rupture of a single ligand–receptor bond on cancer cells.

ND EPSCoR wants to hear your news

Given the opportunity to communicate with both the public and internally within our own program, the ND EPSCoR team invites you to provide content that can be used in stories, social media, press releases, and ND EPSCoR News and Notes.

Send us your news, events, accomplishments, and most importantly, your BRIGHT SPOTS!

Submit a story>>

The STTARS are out!

Apex Engineering Group, Aethero, and MBN Engineering Group participate in ND EPSCoR's STTAR (Students in Technology Transfer And Research) program.

STTAR provides college students (juniors through graduate students) studying STEM (science, technology, engineering, and mathematics) the opportunity to use their academic training and experience to address challenging science and technology-based problems faced by North Dakota companies.

Let's take a look at some of the STTAR companies and students participating in this summer.

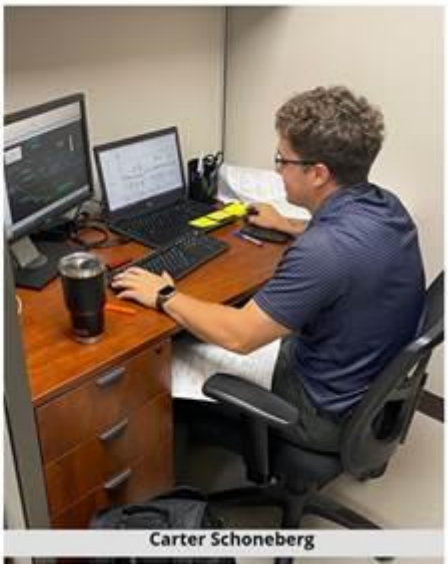
Tell us about Apex Engineering Group.
Apex Engineering Group is a civil engineering consulting firm providing solutions for water, transportation, municipal, and land surveying projects. We're growing and have openings at each of our five locations including survey technicians, graduate engineers, and lead engineers. www.apexenggroup.com

Who are Apex's STTAR interns and what are they doing?

Isaac Trefz (University of Mary, Electrical Engineering) provides CAD assistance creating usable documents within AutoCAD for various projects. He also assists with service calculations for multi-family housing projects and performs lighting calculations for projects that Apex is actively bidding. His work is important because he experiences and performs project tasks, typically completed by a senior technician or engineer, in an independent manner with minimal oversight. This leaves more time for the regular Apex staff and professionals to work on more complex projects.

Logan Fridgen (NDSU, Civil Engineering) and Carter Schoneberg (NDSU, Civil Engineering) assist Apex engineers and technicians with plan development, surveying, and construction field administration. Their work happens inside and out. By working in the office and at project locations, they are exposed to a tremendous project experience.


Logan Fridgen


Carter Schoneberg

How do STTAR interns benefit from working at Apex?
Many of our employees were once interns which makes the intern experience a win-win for everyone. Internships are a way for Apex to grow our talent pipeline and strengthen relationships with local colleges. Our interns are exposed to various aspects of our business, giving them real work, not just tasks that feel like an afterthought. They provide a comprehensive understanding of full-time employment after college and the duties they will have. Our interns even participate in department and client meetings.

How does Apex benefit from hiring STTAR interns?
From Apex's perspective, internships play a very important role for our company and our clients. Interns fill our additional staff needs during the summer months when our workload is typically the highest.

Has Apex previously partnered with STTAR?
This is the first year for Apex as a STTAR participant. We received an introductory email from ND EPSCoR, decided to apply, and are thrilled to be involved.

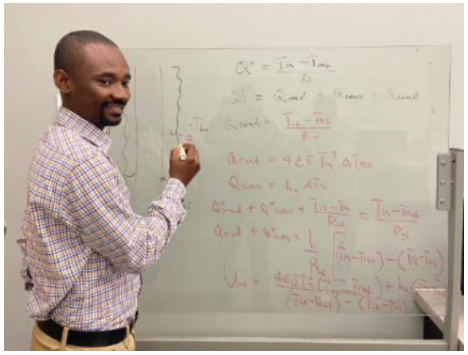
AETHERO

Tell us about Aethero.

Aethero provides holistic infrastructure exterior health analysis by combining unmanned aerial systems (UAS) with artificial intelligence and data analytics, along with software solutions, to understand the energy transfer profile of buildings and other infrastructure. The company takes this combination of elements to scan infrastructure and reveal a host of health and management data, which includes: component failures, façade anomalies, construction defects, water intrusion, super structure issues, and energy consumption data. Through the use of data analytics and artificial intelligence, urgent problem areas on building facades are identified and prioritized to create a predictive repair strategy. www.aethero.ai

Who are Aethero's STTAR interns and what are they doing?

Samuel Afari (UND, Petroleum Engineering) works with the product development team to redefine and improve our existing physics-based Artificial Intelligence back-end through his detailed knowledge of thermodynamics and fluid flow. Their work reduces error in the estimations we provide to our clients and helps improve our value proposition. Further, he is bolstering other projects undertaken by our product development team, especially with his experience in science-based research methodology.



Arun Gandikota (UND, Unmanned Aerial Systems) is currently working on executing various UAS-based missions for Aethero. He has shown outstanding awareness and foresight in all his missions. He is proficient with his knowledge of UAS and helps the leadership team make informed discussions on the entire UAS lifecycle (procurement till maintenance). He is also helping in the preparation of Standard Operation procedure documents for various UAS in Aethero's fleet.

How do STTAR interns benefit from working at Aethero?
Our STTAR interns benefit from a variety of varied experiences in business and applying their skills within our company. Our company works in an exciting and technology driven area, so the projects and research that we are performing are both integral to our operations but also professionally challenging.

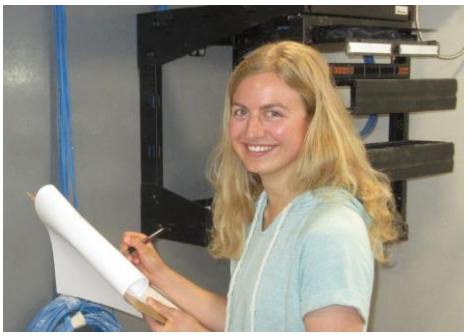
How does Aethero benefit from hiring STTAR interns?
Our STTAR interns bring new vigor, skills, insights, and ideas to our workplace. Utilizing these new ideas, processes, and knowledge they bring has been a boon to our company.

Has Aethero previously partnered with STTAR?
Yes, and we have loved the program more each time.

Tell us about MBN Engineering, Inc.

We are a leader in civil, electrical, mechanical, and transmission line engineering services. We offer our clients an efficient design solution, whether it is constructing a project from the ground up or renovating and upgrading existing facilities. Our main office is located in Fargo, ND. www.mbnengr.com

Who is MBN Engineering's STTAR intern and what is she doing?



Molly Rayhorn (UND Electrical Engineering) is learning to use lighting design software, Auto CADD drafting software, electrical design spreadsheets, and learning electrical design concepts. She assists experienced electrical engineers and designers in drafting and design of electrical systems for new buildings and buildings that are to be remodeled. She will also visit job sites to see her work being incorporated into real projects and occasionally meet with sales representatives. This is truly a hands-on experience offering firsthand knowledge of what her full-time career would encompass if she pursue a career as an Electrical Engineer.

How do STTAR interns benefit from working at MBN Engineering?

There are several benefits to partnering with this program such as offering firsthand experience to an eager-to-learn intern, which will in turn help them better prepare for their future career path. They have the opportunity to work on real time projects, software that is current and industry leading, as well the opportunity to work side by side with experienced and knowledgeable engineers.

How does MBN Engineering benefit from hiring STTAR interns?

Early spring is generally our busiest time, so the extra hands-on deck is beneficial for the completion of projects. We have been privileged to experience growth in

the number of projects we are involved in and pride ourselves in timely and accurate completion of these projects. This opportunity is definitely a win for both our firm and the intern and we hope to offer full time positions to successful and enthusiastic interns.

Has MBN Engineering previously partnered with STTAR?
We partnered with the STARR program last year for the first time by hiring an electrical engineering student to intern with us. ND EPSCoR staff introduced us to the program. MBN Engineering has hired graduates who had interned for us during the fall semester, so we are fully engaged in hiring interns that fit with our team of professionals.

Meet the researcher

Nicholas Galt, Ph.D.
Associate Professor/Science Department Chair
Valley City State University

What are your primary research and scholarly interests?
My background is in molecular physiology where I studies the relationship between muscle grown and stress in fish.

How does this tie into the work you are doing with ND-ACES?
I am able to use the same lab techniques to determine the molecular phenotype of cancer cell lines under normal cell culture conditions.

Where are you from and where did you pursue your education?
I grew up in Carrington, ND and complete my BS in Zoology at NDSU. I earned my

Ph.D. in Biology from the University of Alabama at Birmingham.

What excites you about ND EPSCoR?
It is a great opportunity to collaborate with experts across the state and provide my students here at VCSU with authentic research experiences.

What motivates you?
My curiosity. I love learning and exploring.

If you could time travel, where would you go?
I would join the Lewis and Clark Expedition to explore the Midwest before the prairies were broken.

If you could have coffee / tea with anyone, who would it be?
This is a tough one so I'll say a stranger because I enjoy meeting people.

What was your first job?
I trained and worked as an autobody technician for four years in high school.

What does your very best day include?
Catching walleyes with my kids and wife on the lake.

What's your favorite quote?
"I will either find a way or make one." – credited to Carthaginian commander, Hannibal

Meet the researcher

Danielle Condry, Ph.D.

Assistant Professor of Practice/Graduate Program Coordinator
NDSU Microbiological Sciences

What are your primary research and scholarly interests?
I love to explore whatever my students want to explore. When they come to me with an idea we see if we can make it happen. I started out interested in education action research in my own classroom, moved on to community engaged curriculum, then students took me into the directions of concept inventories to improve curriculum, teaching science communication and its impact on science literacy, and retention of students in programs and the field of STEM. We just keep branching out to discover more.

How does this tie into the work you are doing with ND-ACES?
Our research related to retention of students in STEM relates to the PROSPER element Education and Workforce Development, specifically working with the undergraduates and graduate students across ND-ACES. We implement opportunities to help them build skills that will help them be persistent and successful in a STEM related career, and measure their confidence in their abilities and desire to stay in STEM.

Where are you from and where did you pursue your education?
I am born and raised in North Dakota! Specifically Grand Forks, but spent some time on farms in Macintosh County and Walsh County. I earned my bachelors in biology with a certificate in 7-12 teaching from UND. I took a short hiatus to teach before returning to earn my Ph.D. in Microbiology and Immunology at UND Medical School. Despite having lived in ND my whole life I have visited 37 states and 7 countries, I love to travel.

What excites you about ND EPSCoR?
The people I work with excites me about ND EPSCoR. I have the wonderful opportunity to support undergraduate and graduate students from across the state with my role on the grant. I love helping people to reach their full protentional and reach their goals and the virtual professional development sessions we put on for students do just that. I also work with fantastic faculty in PROSPER that support each other and get to know one another as people in order to work effectively together. I am energized whenever we get together in person.

What motivates you?

Helping others motivates me every day.

If you could time travel, where would you go?
I like to set my mindset on living in the present.

If you could have coffee / tea with anyone, who would it be?
I can't pin point a specific person but I think everyone is worth having coffee/tea with because everyone has a unique story to tell.

What was your first job?
Assistant to an accountant (my dad). Tracking transactions for business accounts

What does your very best day include?
Time to read/snuggle with my kids.

What's your favorite quote?
I love the definition of the word "sonder" and try to shape my life by this awareness: "The profound feeling of realizing that everyone, including strangers passing in the street, has a life as complex as one's own, which they are constantly living despite one's personal lack of awareness of it."

Do you know a researcher whom others need to meet?
Please contact Mark Puppe, mark@ndsu.edu

UND, regional universities receive National Science Foundation Engines grant

Along with five other regional universities, UND has been awarded nearly $1 million from the U.S. National Science Foundation's Regional Innovation Engines (NSF Engines) program.

UND leads one of the 44 teams nationwide in receiving one of the first-ever NSF Engines Development Awards, which aims to help partners collaborate to create economic, societal and technological opportunities for their regions.

UND and its partners from across four states in the region will work to build a framework (the "engine") that catalyzes autonomous system development and fielding, enabling the accelerated realization of economic and humanitarian benefits from autonomous systems technology across a wide range of use cases.

UND will focus on uncrewed aircraft, transportation, energy, national security, and rural health initiatives. The other regional partners in the grant, as well as their focus areas, are: Tribal Nations Research Group (Turtle Mountain Band of Chippewa Indians), data protection, mining, management, and tribal partner outreach; Montana State University, smart optical sensors; Montana State University MilTech, technology transition from research to commercialization; South Dakota Mines, mining and autonomous mining equipment, and Boise State University, resource management and energy.

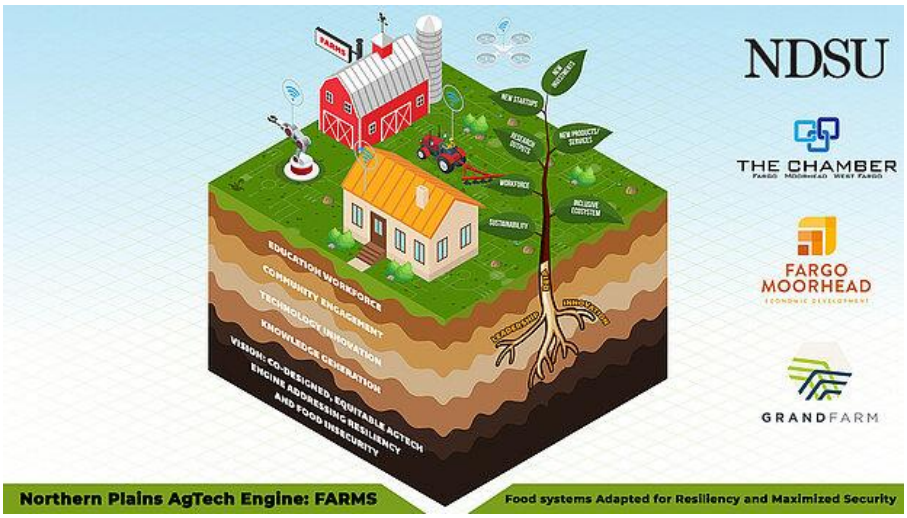
Learn more about the award.

NDSU project partnership selected as semifinalist for the inaugural NSF Region Innovation Engines competition

The U.S. National Science Foundation announced 34 semifinalists for the first-ever NSF Regional Innovation Engines (NSF Engines) competition, spanning nearly all key technology areas. and societal and economic challenges highlighted in the "CHIPS and Science Act." The NSF Engines will be led by universities, nonprofits, businesses and other organizations from across U.S. states and territories.

NDSU's collaborative partnership is known as the Northern Plains AgTech Engine for Food systems Adapted for Resiliency and Maximized Security or FARMS. The primary objective of the FARMS proposal is to optimize and leverage the existing agricultural opportunities and the AgTech ecosystem in North Dakota to best address global food challenges. The project will work to offset a diminishing agricultural workforce by improving farming efficiencies, maintaining/increasing yields, reducing environmental impacts, and enhancing ecosystems services.

Submitted in early 2023, the proposal aims to accelerate economic development in agriculture while focusing on issues such as food security and production for a rapidly growing global population. Partnerships, including those with North Dakota higher education institutions, are featured prominently and include United Tribes Technical College (UTTC) and Nueta Hidatsa Sahnish College from the North Dakota Tribal College System (NDTCS); University of North Dakota, Bismarck State College, and North Dakota State College of Science from the North Dakota University System (NDUS). Private sector and government partnerships were also key components of the project.



Learn more about the FARMS project.

Learn more about the NSF Engines program.

We're hiring!

Open positions

- **Commercialization Outreach Coordinator**
  Open until filled Learn more.

- **Administrative Coordinator** - currently reviewing candidates

Funding opportunities / Training sessions

- NEH: Dynamic Language Infrastructure - Documenting Endangered Languages Fellowships
- NIH: Interventions to Expand Cancer Screening and Preventative Services to ADVANCE Health in Populations that Experience Health Disparities
- NIH: Maximizing Investigators' Research Award for Early-Stage Investigators
- NIH: Neuroscience Development for Advancing the Careers of a Diverse Research Workforce - LIMITED

- NSF: Division of Chemistry - Disciplinary Research Programs
- USDA: AFRI - Education and Workforce Development
- EPA: Community-Based Research for Effective Programs, Policies, and Decisions to Mitigate Cumulative Health Impacts and Environmental Health Disparities in Underserved Communities

---

Have questions, ideas, or suggestions for News and Notes?

Contact Us

Acknowledgement

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.