

DAKOTA STATE UNIVERSITY

RESEARCH WEEK SYMPOSIUM

WEDNESDAY, MARCH 20
11 a.m. - 1 p.m.

THE BEACOM INSTITUTE OF TECHNOLOGY
COLLABORATION CENTER

2024





WELCOME TO RESEARCH WEEK!

Ashley Podhradsky, D.Sc.
Vice President for Research and Economic Development

Welcome to Research Week at DSU.

This year is particularly special as we celebrate the 40th anniversary of our mission change, marking four decades of unparalleled commitment to research, innovation, and academic excellence. As we reflect on our past achievements, we also look forward to exploring future opportunities and leading DSU forward in the ever-evolving landscape of cyber.

Our Doctoral Residency program, running concurrently with Research Week, provides an important opportunity for our online students to engage in meaningful in-person interactions with the DSU community. You can view the Residency Agenda [here](#).

While the week's full lineup is detailed [ON THE BACK COVER], I am eager to highlight some key features of Research Week 2024:

- » Our Data Analytics Competition, sponsored by Sanford Health, exemplifies DSU's dedication to the practical application of skills in data science and analytics. Enjoy the competition on Monday starting at 1:00 p.m. in East Hall 100.
- » On Tuesday, Dr. Josh Stroschein, Reverse Engineer @ FLARE with Google/Mandiant will speak with PhD students at a private luncheon.
- » Visit the Beacom Collaboration Space on Wednesday at 11:00 to participate in the Research Symposium where our faculty, staff, and students highlight their research and creative activities.
- » We are honored to welcome Jen Easterly, Director of the Cybersecurity and Infrastructure Security Agency (CISA), as our keynote speaker. Her leadership in cybersecurity at a national level brings invaluable insights into the protection of our digital ecosystem, making her address a must-attend for anyone interested in the future of digital security. Friday at 9:00 a.m. at the Playhouse.
- » Our celebration of innovation and academic pursuit wouldn't be complete without DakotaCon, DSU's flagship cybersecurity conference. This event stands as a testament to our ongoing commitment to cybersecurity education and research, providing a platform for experts, enthusiasts, and students to exchange knowledge and foster collaborations.

Research Week is not just a reflection of our storied past but our Rising future. Whether you're here for a single day, joining us for the residency, or engaging with the entire week, we warmly welcome you to this milestone celebration of Research@DSU.

FACULTY RESEARCH

ANDY BEHRENS, PHD

Assistant Professor of Information Systems
College of Business and Information Systems

Understanding Provider Perspectives on Intelligent Clinical Decision Support Systems

The study aims to understand the providers' perspectives of Intelligent Clinical Decision Support Systems (ICDSS). Providers are the key users of ICDSS. ICDSS uptake is heavily reliant on providers. However, providers have a strong sense of personal identity due to their prestige, high autonomy, and socially accepted role. Currently, providers are resisting ICDSS. ICDSS resistance is due to poor fit with workflow, lack of relevant output and usefulness, insensitivity to complex patients, autonomy challenges, and an impact on the provider-patient relationship.

Recently, researchers have overlooked the providers' contextual perspectives of ICDSS. The research gap was addressed by understanding the providers' perspectives on their experiences, the ICDSS clinical utility, and the providers' adaptation to the ICDSS. No known research exists explaining a comprehensive understanding of the providers' perspectives of ICDSS. Therefore, this research study empirically investigated the providers' perspectives to lay the foundation for tailoring ICDSS to providers' unique needs and preferences. As a result, provider satisfaction and patient care will improve.

The study used Grounded Theory as an overarching methodology for our qualitative case study research. The researcher grouped the perspectives into catalysts and challenges which included provider experiences, clinical utility, and adaptation.

TATE CARSON, PHD

Assistant Professor of Digital Sound Design
College of Arts & Sciences

Resonant Landscapes

“Resonant Landscapes” is an interactive sound art installation that immerses participants in the soundscape of South Dakota’s 13 state parks. Using ambisonic field recordings made by the researchers, the installation recreates the parks’ unique soundscapes on a scaled-down map of South Dakota overlaid on the DSU campus. Participants equipped with smartphones and headphones can access the recordings via a website. As they move closer to designated listening locations on campus, the corresponding park’s soundscape volume gradually increases. Reaching the designated location allows them to experience the complete 360° soundscape. They can control their listening direction by simply turning their phones, recreating the natural experience of turning their heads to hear sounds in their environment. The recordings are also the raw material for a series of soundscape compositions made by the researchers as well as faculty and student collaborators. These compositions offer a chance to experience the recordings in a creative way, drawing on the listener’s recollection and imagination of place.

JEFFREY ELBERT, PHD

Assistant Professor of Chemistry
College of Arts & Sciences

Ligand Linked Naphthalimides, Structure, Properties, and Relation to Biological Mechanism or Action

10-8-10 Naphthalimide is a compound that is being tested in the treatment of peripheral artery disease and the prophylactic treatment of arteriovenous fistula. How this compound works in this beneficial effect is currently unknown. Characterization of the structure of the naphthalimide in solution and as delivered to tissue is necessary and what effect the naphthalimide has on tissue during treatment requires study. This research is important to understand a drug in clinical trials and exploring new medical uses for this compound.

10-8-10 and two derivatives have been synthesized. The derivatizations are designed to increase the interaction with tissue by increasing hydrophobic interactions. NMR and SEM results showing evidence for micelle formation of 10-8-10 in solution and on collagen is presented. The initial photochemistry results shows a significant delay in heat evolution upon visible irradiation.

PENG GUO, PHD

Assistant Professor of Physics
College of Arts & Sciences

Advanced Computing and Quantum Simulation in Physics At DSU

The Faculty Research Initiative (FRI) and Supporting Talent for Research Trajectories (START) programs from Dakota State University support and launch Dr. Peng Guo's the advanced computing and quantum simulation research program in two separate frontiers of modern physics:

(i) Establishing a novel approach for reliable prediction of few-nucleon reactions by using advanced computing technologies, such as Artificial Intelligence/Machine Learning (AI/ML), GPUs computing and Quantum Computers;

(ii) Studying properties of novel parity-time (PT) symmetric quantum materials and exploring unusual features and phenomena of such materials and their applications.

Support from FRI and START will catalyze the PI's research program and allow the PI to achieve long-term career goals. It will improve the competitiveness of and build the capacity for the PI's future proposals.

SCOTT KLUNGSETH, EDD

Associate Professor of Education
College of Education

STACY ANDERSON

Instructor
College of Education

Student Perceptions of Flexible Seating in the College Classroom

69 students have so far taken part in classes in the redesigned room and complete the "Initial Survey." There will be a new group of students taking part in classes in KC 123 starting the first full week in March so we will have approximately another 40 students completing the "Initial Survey." The first group of students completing their instruction time in KC 123 is the first week in March and those students will be completing the "Post Survey." The rest of the students will be completing the "Post Survey" the last week of April. We will also be having every faculty member who taught in KC 123 during the Spring Semester complete a "Post Survey."

The "Pre-Survey" was conducted after one or two days of instruction in KC 123. This allowed students to try out the various forms of flexible seating prior to taking the "Pre-Survey." The "Post Survey" will be conducted during the final week of the 8-week class or full semester class. There are four full semester classes that are trading rooms the first week in March so two new classes can move into the room. The two classes moving out of the room will take the "Post Survey" as if they were finishing an 8-week course. Of the 15 students who have completed the "Post Survey" when asked, "Do you feel the Kinesthetic Based furniture helped you remained focused for longer period of time in class? and Why?" 73.3% of respondents said "Yes". Of the 15 students who have completed the "Post Survey" when asked, "Do you feel the Kinesthetic Based furniture helped you to achieve academic success? and Why" 60% of respondents said "Yes."

GRADUATE STUDENT RESEARCH

JOHN BONAR

Cyber Defense

Research Mentor: John Hastings, PhD

Digital Engineer Towards Information Systems

Digital Engineering is a new and exciting discipline that is seeing rapid adoption throughout engineering and acquisition organizations. The holistic approach for cradle to grave visibility and traceability is a powerful enabler for organizations. Such capabilities appear to be highly applicable beyond the current focus that is trending within the Digital Engineering Discipline. This research paper explores the possibility of how Digital Engineering practices may be applied to Information Systems with a focus on Information Assurance and Information System Lifecycle Management.

This project seeks to answer the following two research questions:

- » Is Digital Engineering required to meet current cyber security control frameworks for Information Systems?
- » How can Digital Engineering Reduce Operational Risk?

This research project utilized two different methods to answer these research questions, a design science experiment to demonstrate a model based approach to reduce operational risk, and a detailed review applicable cyber security controls with a particular focus on NIST Special Publication 800-53 Revision 5. The findings of this research project demonstrate a clear compliance driven need for organizations to utilize several aspects of Digital Engineering, while also showing that operational risks may be reduced by organizations.

BRAD FOWLER

Information Systems

Research Mentor: Omar El-Gayar, PhD

The Role Of Privacy in the Intention to Disclose Personal Driving Data Using Internet-Of-Vehicle Technology in Consumer Automobiles

Internet of Vehicle (IoV) technology is an area of Information Systems that is rapidly expanding. Automobile manufacturers are recognizing the potential benefits of IoV technology and are quickly adding it to their new car and truck offerings. Many car buyers seem to be enticed by the new features that are possible with this technology, such as advanced infotainment systems, real time data, and instant software updates and upgrades. This technology provides the ability for vehicles and drivers to create data that has not previously existed. Novel IoV data includes aspects of the user's driving habits, such as speed, acceleration, braking, and location, as well as video and voice recordings from inside the vehicle. As with all systems that collect personal data, privacy is a concern that directly impacts a user's interest and willingness to adopt a new technology. Previous studies in IoV have focused on car infotainment systems, telematic devices used by insurance companies, and data collection in autonomous vehicles. Whereas a few studies have explored the relationship between privacy concerns and a user's willingness to share personal driving data, no studies have adequately applied the Privacy Paradox and Privacy Calculus theories to their models. Further, no study has explored how the perception that a driver has about their own driving ability affects the relationship between their intention to disclose personal driving data. This study seeks to better understand the role that privacy plays in the user's decision to disclose personal driving data while using IoV technology in automobiles. The results from this study could have practical contributions for the automobile manufacturing industry and government regulatory bodies by offering insights into how customers would handle personal data disclosure if they were given the option to choose.

CHRISTOPHER KREIDER

Information Systems

Research Mentor: Omar El-Gayar, PhD

A Randomized Control Experimental Assessment for a Novel Model of Authentication for Augmented and Virtual Realities

Augmented and Virtual reality devices (AR/VR) have the potential to change the way we perform general purpose computing. These devices provide immersive environments that rely on interacting with the virtual elements to provide input. These devices, like traditional computing devices still have security needs, specifically knowledge-based authentication (KBA) needs. However, these devices are not constrained to using a keyboard. This provides unprecedented flexibility in the implementation of novel KBA schemes that are not based on the traditional textual password. We develop a multi-level theory based novel authentication scheme for use in VR devices and test it in a two-phase time lapsed, randomized controlled experiment. This experiment evaluates the memorability, security and usability properties of this proposed knowledge-based authentication scheme compared to a password of comparable strength. We report on our findings, and provide recommendations for research in this area moving forward.

TAYLOR MYERS

Cyber Defense

Research Mentor: Kyle Cronin, DSc

Bluetooth Frame Logging

As with Wi-Fi devices, Bluetooth devices are also susceptible to attacks. Being able to monitor the traffic created by these devices would help users detect when a potential attack occurs on a Bluetooth device. The project's objective is to use a Raspberry Pi and a Bluetooth receiver to be able to collect Bluetooth traffic and detect when there is an active attack on a device. The purpose and outcome of this project would be to help identify when Bluetooth devices are under attack and help locate the source of the attack to help prevent future attacks.

ROSS PATZ

Cyber Defense

Research Mentor: Kyle Cronin, DSc

Exploring the Value of Personal Data: A Q Methodology Study on Personal Data Value and Perceptions

“Who are you?” This seemingly simple and trivial question can be answered through the personal data collected about an individual; however, dichotomies exist between what is considered “public data” and what is considered “private data.” What data can be considered “personal data” also morphs into myriad forms within our data-centric society, attempting to balance convenience and confidentiality. This bifurcation regarding personal data is not only technical but deeply embedded in individual perceptions, where there lies a possible profound divergence regarding the individual sanctity of and value of personal data. Such disparities pose intricate challenges for academics, organizations, and the general populace in formulating robust data protection safeguards. Anchored in this context, our study seeks to unravel the multifaceted viewpoints on the value of personal data, employing Q methodology as a prism to reflect these diverse and nuanced perspectives. This investigation contributes to the academic discourse on data privacy and illuminates pathways toward more tailored and effective data stewardship.

BIJAY SHAKYA

Information Science

Research Mentor: Omar El-Gayar, PhD

Blending Attention Mechanism in YOLO Architecture for Small Object Detection

Object detection is considered a keystone for a myriad of computer vision applications. Object detection models like You Only Look Once (YOLO) and Vision Transformers are being widely used due to their remarkable accuracy, speed, and efficiency. However, these models fail to detect small objects in images. Ensemble methods like Non-Maximum Suppression (NMS), and IoU-based affirmative method are used as a post-processing technique to improve small object detection. However, these techniques were found to discard the useful bounding boxes. Our research leverages Weighted Fusion Boxes (WBF) for post-processing to avoid missing boxes by creating averaged boxes based on confidence scores of predicted bounding boxes. We employ the WBF method to combine the results of two prominent object detection models, YOLOv8 and FasterViT-DINO with different configurations on the COCO2017 dataset. The proposed method is expected to improve small object detection compared to the baseline models used individually.

BRENT VAN AARTSEN

Information Science

Research Mentor: Cherie Noteboom, PhD, EdD, MBA

An Analysis of the Adoption of Web Usage Mining Technologies in Higher Education Websites

Web usage mining, the process of analyzing the usage patterns of website users to gain insights into the users' needs, has been researched extensively in both industry and higher education. Higher education has successfully used web usage mining to analyze e-learning platforms and other student focused applications to improve learning outcomes, however, research about the adoption of web usage mining technologies in higher education public facing websites is lacking. This is surprising as these websites are typically used for recruitment/marketing purposes. This study addresses the lack of research by working to answer the research question, what factors influence the adoption of web usage mining technologies in higher education websites? Combining the Extended Unified Theory of Acceptance and Use of Technology (UTAUT2) and Technology Organization Environment (TOE) models, a survey instrument is created with the data collected used to both validate the model and answer the research question.

GARY ZHAO

Information Systems

Research Mentor: Omar El-Gayar, PhD

An NLP-Based Knowledge Extraction Approach For IT Tech Support/ Helpdesk Transcripts

In the IT support domain, extracting crucial information from diverse communication transcripts is essential for prioritizing customer-centric strategies and enhancing overall customer service. Beyond this, the extracted knowledge holds broader implications, ranging from decision support to product development and human resources policies. Traditional methods of extracting insights from unstructured text were time-consuming, but the potential of natural language processing (NLP) techniques became evident in various applications. However, their effectiveness in the context of domain-specific IT support transcripts faced limitations. This research follows the Design Science Research Methodology (DSRM) to devise an NLP-based knowledge extraction approach. The proposed method involves two key processes: domain knowledge extraction, encompassing off-topic content identification, domain stop-words identification, category extraction, and priority score determination; and transcript knowledge extraction, involving NLP preprocessing, adapted TFIDF keyword extraction, and TranGCN topic categorization. Experimental results showcase the hybrid algorithm's effectiveness, combining rule-based, unsupervised, and supervised machine learning methods. Notably, the study introduces the concept of category/keyword priority scores, demonstrating their efficacy in experiments. The adaptable nature of the approach suggests potential applications in various domains with customization and updates, promising advancements in keyword extraction and topic classification through a novel TF-IDF algorithm adaptation and optimized Graphical Convolutional Neural Network (GCN) method.



UNDERGRADUATE STUDENT RESEARCH

JOSEPH BOYD

Cyber Operations

The Beacom College of Computer and Cyber Sciences

Research Mentor: Robert Richardson, MS

Assessing Security Flaws in Modern Precision Farming Systems

The increasing interconnectivity of the digital age brings new vulnerabilities for cyber criminals and nation-state actors. The dawn of digitalization in the agricultural industry finds itself under the same threats. Because agriculture sits within the category of digital infrastructure, digitizing this industry should be accompanied by a special concern for implementing good security practices. This project aims to investigate potential security risks that accompany on-board precision farming equipment. A variety of attacks will be conducted against a test bench that simulates the core of an onboard precision farming system, which includes Bluetooth, a simulated Global Positioning System (GPS), and a touchscreen computer. Most attacks tested in this project focus on direct hardware attacks due to the lack of wireless interfaces on the test bench.

DENYCE BRAVO

Biology

College of Arts and Sciences

Research Mentor: Andrew Sathoff, PhD

Exploring Antimicrobial Potential of Honey from Alfalfa (*Medicago sativa*) Against Both Human and Plant Pathogens

Honey, renowned for its antimicrobial properties, aids human wound healing and protects plants from bacterial pathogens via its hygroscopic quality. Alfalfa, a widely cultivated plant, is the fourth most valuable crop in the U.S., yet certain honey varieties like alfalfa honey are underexplored for their antimicrobial potential. Performing various assays, including Kirby-Bauer disk diffusion, time-kill assay, and broth microdilution, this study aimed to examine the antimicrobial properties of alfalfa honey against both human wound and plant pathogens. Furthermore, chemical characterization assessing the amount of hydrogen peroxide was performed, as well as the Bradford assay to quantify the amount of protein in alfalfa honey. Alfalfa honey exhibited sensitivity in inhibiting the growth of *E. coli* and *S. aureus* in a concentration dependent manner but showed no bacterial inhibition against *K. aerogenes* and *S. epidermidis*. Additionally, the Bradford assay revealed that alfalfa honey lacks a significant amount of protein. This study integrates the characterization of bee defensins, another important honey component that contributes to its antimicrobial properties. Conducting a thorough evaluation of its efficacy against both human and plant pathogens will not only contribute valuable insights into the potential of honey as a novel antibacterial treatment but also highlight the role of defensins in enhancing its therapeutic capabilities.

JOHN BRUMELS

Cyber Defense & Cyber Operations

The Beacom College of Computer and Cyber Sciences

Research Mentor: Andrew Kramer, MS

Wireless Device Security

Evaluation of wireless technologies for replay attacks and rolling code vulnerabilities involved assessing the system's ability to detect and prevent unauthorized signal reuse. Security assessments were conducted to evaluate the system's ability to prevent unauthorized access via replay attacks, and the testers simulated these attacks by capturing and re-transmitting wireless signals, all while considering the specific requirements of ADA-compliant systems.

EPHRATA YARED FEYISSA

Business: Management & Marketing

College of Business and Information Systems

Research Mentor: Robert Girtz, PhD

The Impact of Family Business Ownership on Entrepreneurial Self-Identification

In this study, I analyze the impact that family business ownership has on the tendency of individuals to identify as being entrepreneurial. Drawing data from the 1979 cohort of the National Longitudinal Survey of Youth, I use two-sample t-tests and logistic regression models to explore the relationship between personal entrepreneurial aspirations and having come from an environment involving a family business. As part of this analysis, I control for several demographic factors, such as cognition, gender, and ethnicity. The outcomes from this research highlight the importance of family business as a key factor in fostering entrepreneurial mindsets, suggesting that the experiences and cultural context provided by family-owned enterprises are instrumental in encouraging future generations of entrepreneurship.

CARTER GORDON

Digital Arts and Design: Digital Sound Design
College of Arts and Sciences

Research Mentor: Tate Carson, PhD

Resonant Landscapes

“Resonant Landscapes” is an interactive sound art installation that immerses participants in the soundscape of South Dakota’s 13 state parks. Using ambisonic field recordings made by the researchers, the installation recreates the parks’ unique soundscapes on a scaled-down map of South Dakota overlaid on the DSU campus.

Participants equipped with smartphones and headphones can access the recordings via a website. As they move closer to designated listening locations on campus, the corresponding park’s soundscape volume gradually increases. Reaching the designated location allows them to experience the complete 360° soundscape. They can control their listening direction by simply turning their phones, recreating the natural experience of turning their heads to hear sounds in their environment.

The recordings are also the raw material for a series of soundscape compositions made by the researchers as well as faculty and student collaborators. These compositions offer a chance to experience the recordings in a creative way, drawing on the listener’s recollection and imagination of place.

CODY HAASE

Computer Game Design

The Beacom College of Computer and Cyber Sciences

LOGAN FRANK

Computer Game Design

The Beacom College of Computer and Cyber Sciences

Research Mentor: Erik Pederson, MS

Subversion: The Making of a Card Game in a Cornered Market

Our work covers the difficulties of creating a card game, testing and revising it, finding a way to produce it, the costs behind producing it, and the difficulties of entering a heavily cornered market. The creation of a card game requires much trial and error and simply having an idea is not enough. Constant revising of rules, prices, effects, player count, number of items, and so forth is required to get a working version of the game up for testing. With testing, you go through even more revision as player feedback and problems in design will have you fixing problems that you weren't previously aware of. The board/card game market is also heavily cornered by a few giants such as Hasbro, which makes it difficult to enter with new ideas. Even more so it can be difficult to make a profit as board and card games naturally have a lower profit vs revenue percentage compared to other markets.

EZRA HAGEN

Digital Arts and Design: Production Animation

College of Arts and Sciences

Research Mentor: Daniel Seman, MFA

Demon Trials

This project was inspired by a plush character I made that involved research about Salem and the origins of the witch trials. I was left with questions about why someone would make deals with a demon in situations like this. I turned to Christianity to see what demons would fit with the story and theme, and I took inspiration from some of my favorite animes and shows about demons or the devil. I also wanted this project to focus on angels and heaven.

CONNOR KEETER-HEISE

Computer Game Design & Computer Science
The Beacom College of Computer and Cyber Sciences
Research Mentor: Peter Britton, MFA

Dead Room

Dead Room is a one-room, rouge-like game where the player has to survive waves of zombies. The player has to board windows, shoot zombies, and feed the cellar to unlock new items and decoration pieces.

KARSTON KELLAR

Computer Game Design
The Beacom College of Computer and Cyber Sciences
Research Mentor: Peter Britton, MFA

Re-EXTERMINATION

Re-EXTERMINATION is a top-down twin-stick shooter game set in the far future. When a supernatural zombie plague resets a rogue AI's plans for world domination to square one, the only hope for recovery is a low-orbit strike of infantry. Launch into the chassis of commando drone 'Mannequin,' capturing key assets with the help of your robotic empire's drop pods.

DAVID MEDIN

Computer Science

The Beacom College of Computer and Cyber Sciences

AIDEN SCHRAMM

Cyber Operations

The Beacom College of Computer and Cyber Sciences

Research Mentor: Andrew Kramer, MS

Micromouse - Maze Solving Robot

A Micromouse is a path-finding robot designed to traverse and map a maze to determine the shortest path possible. These robots are typically entered in annual Micromouse competitions to compete against other teams to achieve the best possible time in solving the maze in the most efficient manner. To map and navigate the maze an infrared time-of-flight sensing system is used, which emits 940 nm infrared light pulsed at 10 MHz and measures the phase of the reflected signal to calculate distance. The microcontroller driving the Micromouse is an ATmega328, which was selected for its availability and reliability. Using feedback from both the infrared sensors and the motor controllers, a PID controller was implemented to allow the robot to move precisely and quickly to achieve optimal results in the time taken to traverse the maze. Repeated, iterative testing was conducted to identify and correct potential design issues and optimize the performance of the robot.

AUTUMN MEYER

Digital Arts and Design: Production Animation

College of Arts and Sciences

Research Mentor: Daniel Seman, MFA

Zodians

An animation portfolio project inspired by mythological creatures from multiple regions along with the Greek zodiac signs. Naia travels to Caustore to find answers about her grandma's untimely fate only to witness an unfortunate incident that leads her into more trouble than what she was expecting. This project takes inspiration from mythical creatures from multiple sources as well as from the Greek zodiacs to correlate with the story.

BEAU MILLER

Computer Science

The Beacom College of Computer and Cyber Sciences

Research Mentor: Mark Spanier, PhD

Natural Language Processing: Understanding Slang and Colloquial Speech

Within the field of Natural Language Processing, slang, and colloquial language provide a unique challenge for the training and use of language models. This speech holds an odd, transient space with public consciousness, as each instance has a variable time of relevance and popularity, amongst other factors such as their fluid definition, usage amongst certain groups, and relative lack of information and training data concerning new or evolving terms. These characteristics make it difficult for models to learn these phrases. This project focuses on how an NLP model could learn fast-moving colloquial language in a timely manner and keep up with quickly evolving language.

EMMITT ODNEY

Digital Arts and Design: Production Animation

College of Arts and Sciences

Research Mentor: Daniel Seman, MFA

Fallen Petals

Fallen Petals is a Warrior Cats inspired story about two young brothers growing up together and learning how to fit into the dangerous but wonderful world around them. Their paths are very different, and unknown dangers from the past lurk in the shadows. Peachpaw and Acornpaw must figure out the truth in order to protect their clan from evil.

ADAM PEAK

Biology

College of Arts and Sciences

BRANDON DANIELS

Biology

College of Arts and Sciences

Research Mentor: Andrew Sathoff, PhD

Surveying for *Ophidiomyces ophiodiicola*, the causal agent of Snake Fungal Disease in South Dakota

For the past decade, there has been an emerging disease plaguing wild snakes across the Eastern United States and Europe. In 2006, researchers started investigating the decline of Timber rattlesnake populations in New Hampshire. They discovered a fungal infection killing off the young to mid-juvenal snakes, thus known as Snake Fungal Disease or Ophidiomycosis. In 2011, Rulon Clark, et al, from the United States identified the pathogen that causes infection, the fungus *Ophidiomyces ophiodiicola*. *O. ophiodiicola* has now affected 30 different snakes from six families within at least 20 different states since its discovery. This study pertains to the prevalence of Snake Fungal Disease within South Dakota. During the summer months, we collected a variety of snake sheds, live swab samples, and soil samples from 4 different counties in Eastern South Dakota. The swab samples have been grown using Sabouraud's Dextrose Agar and antibiotics to isolate the fungal strains and we extracted DNA from the soil. The samples will go through TaqMan qPCR analysis to confirm if the fungus is in the soil and if the isolates are the fungus in question.

ETHAN PEEK

Computer Game Design

The Beacom College of Computer and Cyber Sciences

Research Mentor: Peter Britton, MFA

The Catalyst Acolyte

The Catalyst Acolyte is a tower defense game I took on as a project to forward my learning in the game design industry. With a combination of neat dialogue between characters and simple but fun gameplay. TCA is a Game aimed to provide a fun and meaningful way to kill time.

OLEKSANDRA RACHYNSKA

Biology & Chemistry minor
College of Arts and Sciences

Research Mentors: Kristel Bakker, PhD and Jeffrey Elbert, PhD

Differences in the chemical and molecular composition of berries from introduced vs. native woody species available during fall bird migration

The research project is a pilot study that will be conducted to gather and analyze data and create fundamental basics for further possible research (for example, literature review, bird surveys, and habitat analysis). This project aims to investigate the differences in the chemical and molecular composition of native vs. introduced berries from woody species in Eastern South Dakota. Deliverables will be in the form of descriptions comparing the chemical and molecular differences between the obtained samples of native and exotic berry species. An in-depth chemical composition analysis of the gathered berries will help to establish the fundamental molecular differences between the native vs. introduced berries. Based on the data obtained, recommendations for wildlife habitat guidelines, particularly what woody species are the most suitable for bird habitat, will be provided.

GRACE SCHOFIELD

Computer Science & Cyber Operations
The Beacom College of Computer and Cyber Sciences

Research Mentor: Austin O'Brien, PhD

Analyzing Positive and Negative Responses of American Voters to AI-Generated Political Advertisements

AI-generated political ads have entered the public sphere, but what responses do these ads get from American voters? If voters respond positively to the ads, those could be a viable path political campaigns can venture down. To determine voter responses, a survey will be delivered to a representative sample of the American voting population across age groups, gender, and political leaning, among other areas.

TRISTAN STAPERT

Cyber Operations

The Beacom College of Computer and Cyber Sciences

Research Mentor: Andrew Kramer, MS

Do Online Proctoring Software Abide by Standard Data Protections?

In the aftermath of the COVID-19 pandemic, schools adopted new software to allow for online learning. Online exam proctoring has seen rapid growth in both K-12 and higher education. Even high-stakes exit exams, such as the bar exam, have seen the use of online proctoring software since the pandemic. This rapid migration towards online proctoring has led to issues concerning test integrity and data security. The security of online proctoring suites is critical due to their extensive access to student devices and sensitive information. Online proctoring suites have the capabilities to assess and configure student devices, access the microphone and camera, and view student information in the scope of the exam. Unlike other eLearning software that mainly has access to student documents, these proctoring suites enjoy a level of access comparable to some malware. This case study investigates the security of data sent over the network using dynamic software analysis and network monitoring while using the Respondus Lockdown Browser. Any transmissions lacking encryption may leak information regarding a student or an exam. Exposing this sensitive information damages both the confidentiality of students using the software as well as diminishes exam integrity.

JONAH WORDEN

Biology

College of Arts and Sciences

Research Mentor: Andrew Sathoff, PhD

Interaction between Beauveria Bassiana and entomopathogenic nematodes for corn rootworm management

Western corn rootworm, *Diabrotica virgifera virgifera* are pests of corn in the United States. Populations have evolved resistance to the mainstream management tools including crop rotation, popular insecticides, and *Bacillus thuringiensis* (Bt) toxins. Entomopathogenic nematodes (EPNs) and fungi are alternative management approaches that have been shown to infect the larval stages of *D. virgifera virgifera*. However, research concerning the efficacy of EPNs and fungi alone, and in combination, is lacking for *D. virgifera virgifera*. The goal of this study was to investigate the interactions between *Beauveria bassiana*, an entomopathogenic fungi, and a species of EPN in the presence of *D. virgifera virgifera* in the greenhouse, we will prepare a container with soil treated with *B. bassiana*, A steinernema nematode, and a combination of both, accompanied by a third instar *D. virgifera virgifera* larvae and a corn seedling to simulate the outside field conditions. The containers were evaluated for mortality and infection type every seven days. The results of this study will be presented.

RESEARCH WEEK EVENTS

JOIN US FOR THESE OTHER EXCITING EVENTS DURING RESEARCH WEEK:

MONDAY

Data Analytics Competition,
Sponsored by Sanford Research
1-5 p.m., East Hall 100

TUESDAY

Doctoral Residents' Luncheon
Featuring Dr. Josh Stroschein of Flare/Google
Dakota Prairie Playhouse

WEDNESDAY

2024 DSU Research Symposium
11 a.m.-1 p.m., Beacom Institute of Technology Collaboration Center

THURSDAY

Doctoral Residency welcomes Alyssa Nolte

FRIDAY

DakotaCon kicks off at 8:45 a.m.
Research Week Keynote/Panel Discussion 9 a.m.,
featuring CISA Director Jen Easterly
Dakota Prairie Playhouse