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15th Annual Research in the Capitol [Program], February 21, 2022

University of Northern Iowa. University Honors Program.

Iowa State University. Honors Program.

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Authors

University of Northern Iowa. University Honors Program., Iowa State University. Honors Program., and University of Iowa. Honors Program.



Iowa Regent Universities present the

15th Annual Research in the Capitol

Monday, February 28th, 2022

11:30am - 1:30pm

Iowa State House, Rotunda



Welcome



Welcome to our fifteenth annual Research in the Capitol. In the last decade, over 500 undergraduates from our three Regents Universities have come to the Iowa Statehouse to present their work to legislators, members of the Board of Regents, and the public. These students have gone on to contribute to our state as doctors, educators, engineers, lawyers, nurses, and professionals in various disciplines. The opportunity for our students to share their knowledge and exuberance with legislators, Regents, and guests in the Iowa Capitol is a special honor that has stayed with them across the years.

Research involvement plays a central role in undergraduate education. Students who take part in research are more successful academically, are more developed in their career and professional preparation, and are more satisfied with their college experience. Research engagement provides the conditions for collaborative learning and critical thinking that benefit our students as they move into the workforce or on to graduate or professional training. The presentations before you today required countless hours of effort on the part of the students and their mentors outside of the classroom and represent the shared commitment our students, staff, and faculty place on the undergraduate experience.

As you speak with these outstanding students, you will learn first hand the impact research involvement has on Iowa's students and the impact those students have on the research conducted at our outstanding Iowa Public Universities.

Robert Kirby, PhD
Director, Iowa Center for Research by Undergraduates

Schedule

11:30am Opening Remarks

- Bob Kirby - Director, Iowa Center for Research by Undergraduates
- Student Speaker - Anvay Pradhan

11:45am-1:30pm Student Poster Presentations

Iowa Regents Universities Undergrad Research Contacts

Robert Kirby

The University of Iowa
Director, Iowa Center for Research by Undergraduates
6 Gilmore Hall
Iowa City, Iowa 52242
Phone: 319.467.0987
bob-kirby@uiowa.edu

Jessica Moon

University of Northern Iowa
Director, Honors & Scholars Programs
2401 College St.
Cedar Falls, Iowa 50614
Phone: 319.273.3175
jessica.moon@uni.edu

Svitlana Zbarska

Iowa State University
Coordinator for Undergraduate Research, Honors Department
2132 Jischke
Ames, IA 50011
Phone: 515.294.2064
szbar@iastate.edu

Student Presenters

1. Trishyan Anthony (University of Northern Iowa)

The Solar Eclipse of 1869 as seen in Illinois, Indiana, and Kentucky

2. Jazlyn Beeck (Iowa State University)

Carbonate Concretions in Iowa's Loess Hills: Modern Carbon Sink or Paleoclimatic Indicators?

3. Andrew Behrens (University of Iowa)

Using 3D Models to Analyze Changes in Foot Structure in Patients with Progressive Collapsing Flatfoot Deformity (Flatfoot)

4. Samantha Bennett (University of Northern Iowa)

Assessing and Meeting the Mental Health Needs of Student Athletes - A Case Study of The University of Northern Iowa

5. Daniel Bloch (University of Iowa)

Eastern Iowa Dune Orientation as a Proxy for Effective Wind-Direction During the Late-Wisconsinan

6. Emma Bock (Iowa State University)

The Effectiveness of a Plant Compound in Inhibiting Bacterial Growth

7. Lydia Butters (University of Northern Iowa)

Teaching Social Justice Issues Through Mathematics Curriculum

8. Lauren Cummings (University of Northern Iowa)

A Review of Selective Mutism in Immigrant Children

9. Drew Daly (Iowa State University)

Conceptualizing Air-Filtering Curtains and Curtain Rods

Student Presenters

10. Melissa Draves; Rebekah Muench (Iowa State University)

Genetic investigation of maize auxin response

11. Samuel Eliassen (University of Iowa)

Cypermethrin Induces Changes in Fetal Microglia Populations and in Placental Immune Cells

12. Nathan Erickson (Iowa State University)

Future Projections of the El Niño Southern Oscillation (ENSO): Effects of Climate Model Bias

13. Emmalee Fannon; Madison Kolbet (University of Northern Iowa)

Graduate Student Knowledge and Skills in Infant Feeding Following High-Emotion Simulator Training

14. Meghan Funk (University of Iowa)

Determining whether aberrant vasopressin concentrations persist postpartum

15. Noah Gilkes (University of Iowa)

The role of type I interferon signaling in mice following experimental traumatic brain injury.

16. Maria Gorham (University of Iowa)

Language, Social Stratification, and "Vínculos": How the paisa dialect constructs social identity in Medellín, Colombia

17. Daniel Howell (Iowa State University)

Chemical Upcycling of Plastic Using Metal-Nanoparticle-Loaded Silica Catalysts

18. Jace Leininger (Iowa State University)

Childhood physical activity experiences and affective attitudes during adulthood

Student Presenters

19. Alexandra Loren (University of Iowa)

Early Timepoint Prenatal Stress and its Effects on GABAergic Migration

20. Haley Losh (University of Iowa)

Overcoming aggressive p53 mutations in gynecologic cancer

21. Tyler Lux; Kailee Hopkins (Iowa State University)

Leisure Time Physical Activity and Lung Function in Older Adults

22. Beatrice Maule (Iowa State University)

Of Women and Land: How Gender Affects Successions and Transfers of Iowa Farms

23. Wilson McNaughton (University of Northern Iowa)

Analog Studies of Organic Pathways in Wind Cave through Cave Water and Crystals

24. Melanie Meyer (Iowa State University)

*Estimating population size and sex ratios of painted turtles, *Chrysemys picta*, in central Iowa*

25. Tyler Michalicek (University of Northern Iowa)

Towards Developing Flying Mesh Networks for Disaster Scenarios

26. Abigayle Moser (Iowa State University)

Wind Energy Production and Wake Recovery Over Hills

27. Sam O'Brien (Iowa State University)

Improving Sustainability and Profitability of Bioethanol production by the Thermochemical Treatment of Dried Distillers Grains with Solubles

Student Presenters

28. Rachel Orpano (University of Iowa)

Phosphorylated ezrin expression in the dentate gyrus of the rat hippocampus

29. Benjamin Pappas (University of Iowa)

iRhom2 mutations in humans cause colitis and associated colorectal cancer

30. Grace Petrzelka (University of Northern Iowa)

Maternal Mortality in the United States: Focusing on Societal Impacts and Potential Solutions

31. Anvay Pradhan (University of Iowa)

Low-Cost Robotic Solutions for Industry and Education

32. Josh Pulse (University of Northern Iowa)

Leveraging Machine Learning for Detecting IoT-based Interference in Operational WiFi Networks

33. Isaiah Sents (Iowa State University)

Des Moines Gay Men's Chorus, queer spaces, collective styles, and activist dress, 1984 to the present

34. Connor Sindt (University of Iowa)

A Novel, Wearable, Electronic Visual Aid to Assist Those With Reduced Peripheral Vision

35. Jacob Sindt (University of Iowa)

Development of Next Generation Mid-Infrared Sensors for Monitoring Emissions of Greenhouse Gases and Volatile Organic Compounds

36. Jamie Smith; Zoë Dekruif; Jennifer Godbersen (Iowa State University)

The ProWrite Project: Biometric technology for improving college students' writing processes

Student Presenters

37. Regan Smock (University of Iowa)

The Impact of Sexual Assault Prevention Education on Bystander Intervention at Iowa

38. Lukas Stuelke (University of Northern Iowa)

Chemical Substitution Induced Half-Metallicity in Heusler Alloys

39. Sandra Thiman (University of Northern Iowa)

The Gender Bias Burden on Business: Women's Access to Credit in Bahrain

40. Lauren Tidgren (Iowa State University)

The effectiveness of surface-bonded disinfectant on common swine viruses

41. Aaron Walker (University of Northern Iowa)

SocioApp: Detecting Your Sociability Status with Your Smartphone

42. Caden Washburn (Iowa State University)

Positionally-independent and extended read range resonant sensors applied to deep soil moisture monitoring

43. Grant Welk (University of Iowa)

Innate Immune responses associated with viral, bacterial, and parasitic infection stress of the NAD metabolome

44. Mackenzie Wisneski (University of Northern Iowa)

Using Color with Care: An Exploration of the Application of Psychological Color Theory within Language Classrooms

Abstracts

1. Trishyan Anthony - University of Northern Iowa

Hometown - Rockford, IA

Major - Earth Science

Mentor- Thomas Hockey

The Solar Eclipse of 1869 as seen in Illinois, Indiana, and Kentucky

The Solar Eclipse of August 7th, 1869, was the first recorded total eclipse of the Sun to pass over the United States. The altitude of the eclipse varied depending on the longitude of the viewer. Wanting to know what was the public reaction of this solar eclipse gathering newspaper articles of the time really showed a window to what they were seeing and feeling at that time, and leading up to the day. Following the eclipse through some of the Midwest down to Kentucky showed differing results, as it had got later in the day of viewing. Though there was common data that the different states shared, this event was highly anticipated.

2. Jazlyn Beeck - Iowa State University

Hometown - Denison, IA

Major - Geology and Environmental Science

Mentor- Elizabeth Swanner

Carbonate Concretions in Iowa's Loess Hills: Modern Carbon Sink or Paleoclimatic Indicators?

One landform that might not be attributed to glacial activity is the Loess Hills in western Iowa. Within these bluffs that are composed of wind-blown sediment from glacial meltwater floodplains, are carbonate concretions. Despite their prevalence, little is understood about their origins. Our main goals include determining what these concretions are and how they form. These questions allow us to examine the concretion's role as a modern carbon sink. With the current state of high carbon dioxide levels in our atmosphere, investigating possible ways of CO₂ drawdown is a very relevant, important topic and the formation of these concretions might represent a pathway of sequestering this atmospheric carbon. We have the possibility of these being paleoclimate indicators, that is, the study of their stable carbon and oxygen isotopic composition could provide us with records of how the climate was in the past.

3. Andrew Behrens - University of Iowa

Hometown - West Des Moines, IA

Major - Biomedical Engineering

Mentor - Kevin Dibbern

Using 3D Models to Analyze Changes in Foot Structure in Patients with Progressive Collapsing Flatfoot Deformity (Flatfoot)

Progressive Collapsing Flatfoot Deformity (PCFD), formerly termed adult-acquired flatfoot deformity, is a complex three-dimensional (3D) deformity of the foot characterized by partial dislocation of certain joints in the foot. This change occurs throughout the entire triple joint complex where adjacent structures may adopt different positions. We generated 3D models of the foot using weight-bearing computed tomography (CT) imaging and an automated segmentation program. Candidate bone-to-bone interfaces were selected for each case involved in this study. Coverage maps (CM) and Distance maps (DM) were created by taking the normal projections at each point on the articular interfaces. We then divided the articular interfaces into subregions to quantify shifts in coverage between control and PCFD cases. PCFD cases exhibited significant changes in coverage when compared to the controls. Usage of these Coverage maps may help in the decision to fuse the calcaneocuboid joint and assist with surgical optimization of PCFD correction.

4. Samantha Bennett - University of Northern Iowa

Hometown - Cedar Rapids, IA

Major - Math: Statistics & Actuarial Science

Mentor - Jennifer Schneiderman

Assessing and Meeting the Mental Health Needs of Student Athletes - A Case Study of The University of Northern Iowa

My research concerns the mental health of collegiate level student-athletes, whomst national data suggests experience greater stress and mental strain than non-athletes. My work sets out to confirm whether UNI's student-athletes are also in line with this trend of higher stress levels by surveying this population, and subsequently to propose solutions for addressing the discrepancy in mental distress levels. I have been studying solutions employed by other universities, both public and private institutions and of varying enrollment size, to meet the mental health needs of their athletics population. I am using this research to consider the different forms a mental health resource could take for our athletics department. With respect to budget and scale, I will use my findings to posit a solution catered to

the University of Northern Iowa's specific situation, as well as what the ideal solution would look like if we were not constrained by funding limitations.

5. Daniel Bloch - University of Iowa

Hometown - Ankeny, IA

Major - Environmental Hydroscience

Mentor - Phil Kerr

Eastern Iowa Dune Orientation as a Proxy for Effective Wind-Direction During the Late-Wisconsinan

The orientation of dunes in Eastern Iowa demonstrates the effective wind direction during the Late Wisconsin. The study area contains over 2,100 dune features mapped from 1m LiDAR-derived rasters and SSURGO-based parent materials. The highest concentration was found on the Iowan Erosion Surface (IES). This project derived the wind direction of nearly 700 parabolic dunes using their arm orientation. The resulting dataset showed a Gaussian distribution with a mean around 300 degrees (WNW). This unimodal signal indicates that there was one effective wind direction (WNW) across multiple landform regions during the active phase of dune formation. These findings support previous research indicating a WNW wind during the Late Wisconsin in the Midwest and strengthen the transport surface interpretation of the IES.

6. Emma Bock - Iowa State University

Hometown - Lisbon, IA

Major - Biology

Mentor - Qijing Zhang

The Effectiveness of a Plant Compound in Inhibiting Bacterial Growth

Campylobacter jejuni is a common foodborne bacterial pathogen that causes gastrointestinal illness in humans and abortion in ruminants. Due to its clinical significance and rising resistance to antibiotics, Campylobacter is a major concern to public health. Cryptolepine is derived from a West African plant root and has antimicrobial properties. The purpose of this study was to test whether cryptolepine was effective in inhibiting Campylobacter growth. We conducted MIC (minimum inhibitory concentration) tests, checkerboard assays, and time-kill curves. These tests served as several different methods to evaluate the effectiveness of cryptolepine against C. jejuni isolates derived from different animals. The testing showed cryptolepine is capable of completely killing Campylobacter. Future studies will assess whether cryptolepine is

effective in inhibiting *Campylobacter* colonization in animals. If shown to be effective in animal studies, cryptolepine may be developed as an antibiotic alternative to control antibiotic-resistant *Campylobacter*.

7. Lydia Butters - University of Northern Iowa

Hometown - Independence, IA

Major - Mathematics Teaching

Mentor - Heather Gallivan

Teaching Social Justice Issues Through Mathematics Curriculum

Learning about the social injustices diverse individuals face can be implemented into formal education, specifically mathematics instruction. Further, creating meaningful and relevant experiences for students in mathematics is essential. When students are provided opportunities to pose questions relevant to their lives, contest injustices, and challenge how the world is shaped, the true utility of mathematics becomes visible, and students can be active parts of the solution (Bush, 2019). My research consists of lessons from the textbook, *High School Mathematics Lessons to Explore, Understand and Respond to Social Injustice* (Berry et al., 2020) with revisions based on the interests and needs of my students (e.g. food deserts in the Midwest and ACT scores). Three lessons were taught in a statistics course at an urban high school in the Midwest, while two other lessons were conducted in a geometry content course for pre-service K-8 teachers at a Midwestern University. Overall, high school students showed growth in their understanding of social justice issues and the uses of mathematics. While pre-service teachers also showed growth in their understanding of social justice issues and the uses of mathematics; they also acquired the ability to make more specific claims.

8. Lauren Cummings - University of Northern Iowa

Hometown - Marion, IA

Major - Communication Disorders

Mentor - Ken Bleile

A Review of Selective Mutism in Immigrant Children

Selective mutism is an anxiety disorder that is characterized by a child's lack of verbal communication in certain situations where there is an expectation of speech. Children who are diagnosed with selective mutism typically have communication or cognitive difficulties and later display higher rates of psychiatric disorders in early adolescence and adulthood. The overall prevalence of selective

mutism is debated, but there is clear evidence that immigrant children are at least three times more likely to be diagnosed with selective mutism than the general population. As the number of immigrant children in the United States continues to rise, it is important to identify the factors that may contribute to the higher levels of selective mutism in immigrant children to determine comprehensive treatment techniques.

9. Drew Daly - Iowa State University

Hometown - Peosta, IA
Major - Industrial Design
Mentor - Dan Neubauer

Conceptualizing Air-Filtering Curtains and Curtain Rod

Given the topic of designing products for the home, I conceptualized an idea for air-filtering curtains to connect users to nature and address growing mental health concerns stemming from COVID-19. Drawing from past research in therapeutic photography (displaying photos of an entity to elicit a response), there is a connection in being able to view nature and reduce the growing concerns around mental health during COVID-19. Focusing on being able to use windows for fresh air, while factoring in air pollution, and viewing outside was the goal. This led to the redesigning of the curtain and curtain rod to help filter the air and allow for easier washing. The curtain contains technologies that trap particulate matter in the fabric as air passes through, and when washed, disposed of safely. To encourage washing, the curtain rod was redesigned to swing down to allow for easier access to remove and put the curtain back.

10. Melissa Draves; Rebekah Muench - Iowa State University

Hometown - Midland, MI; Bird Island, MN
Major - Genetics; Agronomy
Mentor - Dior Kelley

Genetic investigation of maize auxin response

Maize is a cornerstone crop of the Iowa economy, contributing to food, fiber, and fuel production. Maize shoot and root architecture is influenced by genetic factors and impacts yield. Auxins are a class of widely used agricultural plant growth regulators which control growth but their effects are not well understood. To address this knowledge gap, we performed a genome wide association study to discover genetic drivers of auxin-dependent maize growth. In this study we utilized a set of 627 Midwest-adapted maize inbreds. Phenotype analysis for shoots and roots was performed on >12,500

juvenile maize seedlings with and without auxin treatment. Statistical analysis identified 63 candidate genes that may regulate root and/or shoot traits in maize. Additionally, these data were used for a reverse genetic screen and uncovered three novel genes that contribute to maize auxin responses. This work may inform agricultural strategies to improve maize traits for yield and resilience.

11. Samuel Eliassen - University of Iowa

Hometown - LeClaire, IA
Major - Neuroscience
Mentor - Hanna Stevens

Cypermethrin Induces Changes in Fetal Microglia Populations and in Placental Immune Cells

Pyrethroids are a class of insecticide and neurotoxin. These chemicals are commonly used in the household and are present in products like pest sprays and pet leashes. Though normal dietary exposure to pyrethroids is commonly considered safe for adults, the subtle effects of certain compounds on the developing nervous system is understudied. Research has correlated high prenatal exposure to the pyrethroid cypermethrin to delayed cognitive development in humans. In animal models, studies have shown that similar exposure delays neuron progenitor migration and alters microglia development. We analyzed densities of microglia in the fetal forebrain of mice at embryonic day sixteen following ten days of maternal dietary exposure to the pyrethroid cypermethrin. Microglia populations were estimated with a stereological counting approach after brain sectioning and immunohistochemical staining. Our examination also included analyses of related placental macrophage populations using the same approach. We then compared each cell population to see whether changes in one group were recapitulated in the other. Our data show different dose-dependent response patterns for total macrophage densities in the placenta and for total microglia densities in the forebrain. These findings suggest that cypermethrin affects both microglia and macrophage cell populations differently after departure from the yolk sac

12. Nathan Erickson - Iowa State University

Hometown - Olathe, KS
Major - Meteorology
Mentor - Christina Patricola

Future Projections of the El Niño Southern Oscillation (ENSO): Effects of Climate Model Bias

The El Niño Southern Oscillation (ENSO) is an important mode of

variability in Earth's climate system, but prior studies demonstrate that state-of-the-art climate models can struggle to simulate ENSO accurately. We use 29 model members (a total of 173 simulations) from the Coupled Model Intercomparison Project, version 6 (CMIP6) ensemble to analyze climate model biases and future projections of ENSO. To perform our analysis, we utilize the ENSO Longitude Index (ELI) and the Niño 3.4 Index. Our study agrees with the work of previous studies that found a persistent warm sea surface temperature (SST) bias among GCMs. Both ELI and Niño 3.4 have a preponderance of models (62% for each) that favor an El Niño-like state much more strongly than observations, with very few models that produce an average ENSO state comparable to the observed distribution or in a more La Niña-like state (10% and 13% for ELI and Niño 3.4, respectively). Additionally, ELI showcases a statistically significant trend towards more El Niño-like states in future climates when compared to preindustrial times (77% of simulations indicate a shift towards a more El Niño-like mean state; 49% indicate a statistically significant shift towards a more El Niño-like mean state), while Niño 3.4 does not produce a statistically significant trend

13. Emmalee Fannon; Madison Kolbet - University of Northern Iowa

Hometown - Sioux City, IA; New Hampton, IA

Major - Communication Disorders, Elementary Education;
Communication Disorders

Mentor - Laura Pitts

Graduate Student Knowledge and Skills in Infant Feeding Following High-Emotion Simulator Training

Graduate training in NICU feeding techniques is inconsistent and insufficient. UNI is the first speech-language pathology (SLP) program in the U.S. to utilize a novel technology known as 'Paul,' a computer-controlled and interactive infant simulator that mimics a premature infant through adjustable cries, breathing patterns, vitals, cyanosis, and abdominal distention. The present study explored differential gains in graduate students' acquisition of knowledge and skills of NICU feeding techniques through a randomized control pilot comparing one-hour of classroom teaching (control) with one-hour of training with the infant simulator (experimental). SLP graduate students completed pre-/post-testing of both a written examination and an interactive feeding session with Paul to assess their knowledge and skills. After the conclusion of the study, the control group received the interactive simulator training. Technology-advanced infant simulation brings a unique contribution to training graduate students to care for medically-fragile infants without introducing risk to premature infants.

14. Meghan Funk - University of Iowa

Hometown - Underwood, IA

Major - Mathematics

Mentor - Donna Santillan

Determining whether aberrant vasopressin concentrations persist postpartum

Preeclampsia (PreE) is a common hypertensive disorder during the latter half of pregnancy. It is estimated to affect 5-7% of all U.S. pregnancies. PreE leads to increased risks of fetal abnormalities, pregnancy complications, chronic hypertension, and cardiovascular disease. Arginine vasopressin (AVP) is a hormone which functions as blood pressure regulator. AVP is secreted by the hypothalamus as a proprotein with copeptin. Because copeptin and vasopressin are secreted in a 1:1 molar ratio, copeptin measurements can be used a surrogate measure of vasopressin. Our lab previously demonstrated that vasopressin is elevated throughout preeclamptic pregnancies. However, we do not know if vasopressin remains elevated chronically. To fill this knowledge gap, we measured AVP concentration in urine from both non-preeclamptic and preeclamptic subjects 1-4 years postpartum. Urine samples (IRB# 201808705) were investigated for copeptin concentrations via an automated immunoassay (Brahms KRYPTOR), creatinine concentrations via a QuantiChrom assay, and total protein concentrations via a bicinchoninic acid (BCA) protein assay. We did not identify a statistically significant difference in AVP in the postpartum period between non-preeclamptic and preeclamptic women. Therefore, vasopressin concentrations are not chronically altered by preeclampsia.

15. Noah Gilkes

Hometown - Robins, IA

Major - Neuroscience

Mentor - Elizabeth Newell

The role of type I interferon signaling in mice following experimental traumatic brain injury

Traumatic brain injury (TBI) is a leading cause of morbidity and mortality worldwide, impacting an estimated 3 million people annually in the United States. Traumatic brain injury has also been shown to cause significant morbidity and mortality in children, with nearly 500,000 emergency room visits for children each year. TBI during childhood can have detrimental effects on neurodevelopment, and often results in long-term neurological dysfunction. Following a TBI, secondary injury responses can exacerbate neurodegeneration, as seen in previous experimental and

clinical studies. Adult and juvenile male C57BL/6J mice underwent either fluid percussion or sham injury. TBI leads to significant increase in the expression of type I interferon stimulated genes in localized brain tissues at subacute timepoints. Subject age may account for interferon response and subsequent TBI recovery. Adult mice deficient in the interferon receptor (IFNAR $-/-$ mice) were used to characterize the impact of type I interferon response on TBI recovery. Genetic knockout of the interferon receptor (IFNAR $-/-$) alleviated the gene expression of several critical type I interferon pathway modulators. Studies are underway to assess the impact of type I interferon deficiency on neurodegeneration and neurologic function following experimental TBI.

16. Maria Gorham - University of Iowa

Hometown - Elkhart, IA

Major - Spanish

Mentor - Kristine Muñoz

Language, Social Stratification, and “Vínculos:” How the paisa dialect constructs social identity in Medellín, Colombia

Medellín is the second largest city in Colombia and is best known for media images of violence and narcotrafficking. This research project took a sociolinguistic approach, showing how the unique system of language use, known as the paisa dialect, serves to illustrate personal identity, social ties (“vínculos”), and position in a hierarchical class system. Through literature, film, and speech samples, we show how language use constructs identity, creates social ties, and maintains a collectivist cultural ideology present throughout this region. Evidence on semantic, pragmatic, and phonetic levels of this dialect show a distinctive system of language use in which people connect with one another socially and depend on each other for both survival and status in Medellín. A further aspect of the project was its destination and audience: a public digital humanities website intended for educational use by students and teachers of Spanish.

17. Daniel Howell - Iowa State University

Hometown - Cumming, IA

Major - Chemistry

Mentor - Wenyu Huang

Chemical Upcycling of Plastic Using Metal-Nanoparticle-Loaded Silica Catalysts

Globally, plastics are manufactured and used on a massive scale, with a wide array of applications. Given the importance of plastics to modern society, the issue of plastic waste poses major scientific and economic challenges, and has significant ramifications for the environment.

Currently, plastic waste can be diverted from landfills and the environment by recycling. However, conventional recycling is often economically disadvantageous because recycled plastic is often of lower quality than virgin plastic. Thus, chemical recycling of plastics, or “upcycling,” which converts polymers into other industrially valuable chemicals, is an attractive alternative. Previous research demonstrated that polyethylene, a common plastic, can be converted into useful alkanes using catalysts and hydrogen gas. Catalysts were platinum-loaded silica cores with mesoporous silica exterior shells. One benefit of this type of catalyst is architectural versatility. Here, we investigate how catalytic performance varies with architectural changes.

18. Jace Leininger - Iowa State University

Hometown - Mason City, IA

Major - Kinesiology and Health

Mentor - Spyridoula Vazou

Childhood physical activity experiences and affective attitudes during adulthood

Transitioning from childhood to adulthood marks a substantial decrease in physical activity (PA) levels. Interventions aimed to increase PA through cognitive constructs have limited effectiveness. How we feel about PA could contribute to a better understanding of future PA behavior. This study examined differences on current affective attitudes towards PA (e.g., attraction or dislike) based on childhood PA experiences. A retrospective, online survey was completed by 1739 adults (M age=27.15; 60% college students). Information regarding demographics, childhood PA experiences, and current affective attitudes towards PA were collected. Participants with higher levels of PA during childhood had significantly higher affective attitudes towards PA as adults. Participation in organized sports and the quality of those experiences, contributed in shaping affective PA attitudes as adults. It is paramount that children are provided with supportive PA opportunities for lifelong PA participation.

19. Alexandra Loren - University of Iowa

Hometown - North Liberty, IA

Major - Neuroscience

Mentor - Hanna Stevens

Early Timepoint Prenatal Stress and its Effects on GABAergic Migration

Prenatal stress on embryonic day twelve is known to cause GABAergic interneuron migration delay in the developing cortex of mouse embryos. This project will assess whether the same effects are present

if the stress occurs two days prior on embryonic day ten using antibody staining and fluorescence microscopy.

20. Haley Losh - University of Iowa

Hometown - West Des Moines, IA

Major - Neuroscience

Mentor - Kimberly Leslie, Kristi Thiel

Overcoming aggressive p53 mutations in gynecologic cancer

p53 is the most frequently mutated gene in cancer, especially in aggressive ovarian and endometrial tumors. p53 mutations are associated with poor prognosis and resistance to chemotherapy, the most common treatment for advanced gynecologic cancers. We hypothesized that p53 mutations can be used as a biomarker to inform personalized medicine to improve outcomes for women with gynecologic cancers. We determined the p53 status in gynecologic cancer cell models and patient tumor specimens using a combination of sequencing and approaches to assess protein expression level. Missense mutations were associated with overexpressed p53 protein, whereas frameshift mutations resulted in loss of protein expression. We next examined the efficacy of a histone deacetylase inhibitor and a proteasome inhibitor, a regimen used in other cancer types. In general, cells with missense mutations in TP53 were sensitive to the dual treatment, whereas p53-null cells were resistant. Mechanistic studies identified induction of autophagy as one potential mediator of resistance. Confirming this, treatment with an autophagy inhibitor promoted cell death both in vitro and in vivo in a mouse model. These data set the stage for a future clinical trial of a histone deacetylase inhibitor and proteasome inhibitor in gynecologic tumors with mutated or overexpressed p53.

21. Tyler Lux; Kailee Hopkins - Iowa State University

Hometown - Carroll, IA; Spencer, IA

Major - Kinesiology and Health; Kinesiology and Health

Mentor - Duck-chul Lee

Leisure Time Physical Activity and Lung Function in Older Adults

This cross-sectional study examined the relationship between lung function and leisure-time physical activity (LTPA) in 163 adults aged 65-95 enrolled in the Physical Activity and Aging study. Participants' self-reported LTPA over the last three months was divided into four categories: meeting aerobic and muscle strengthening guidelines, meeting either one of the two, or meeting neither. Lung function was

assessed using standard spirometry procedures. Forced expiratory volume expelled in one second (FEV1) and forced vital capacity (FVC) were used as indicators of lung function. FEV1 values indicated those meeting aerobic or both guidelines have greater lung function. FEV1/FVC % predicted was greater among those that met one or both guidelines. This evidence suggests that LTPA is associated with better lung function in older adults. Poor lung function is a risk factor for disease. Programs increasing geriatric populations' LTPA may have positive implications for the prevalence of lung disease.

22. Beatrice Maule - Iowa State University

Hometown - Vicenza, Italy

Major - Economics, Agricultural Business

Mentor - Wendong Zhang

Of Women and Land: How Gender Affects Successions and Transfers of Iowa Farms

Using 587 crop and livestock farmers' responses to the 2019 Iowa Farm Transfer Survey, we examine factors driving gender imbalance in farm successor choices among Iowa farmers with a focus on female successors and landowners. Our data reveals a large gender gap—58% of farmers chose sons and 8% chose daughters as main successor. We develop four conceptual hypotheses from a model linking farmer and successor characteristics with the farmer's probability of choosing a daughter as successor. Our models reveal the probability of choosing daughters as main successor increases when the farmer is female, when the farmer only has daughters, when the daughters have farming experience or an agriculture-related job, and when the farm operation is a partnership with the wife. We find an 11.1% probability of a female farmer choosing a daughter as a successor, but only 4.6% for a male farmer. A daughter having an agriculture-related job increases the probability from 4.4% to 17.0%; the same related experience increases a son's chance from 34.7% to 59.4%. With half of Iowa farmland owned by women, our paper reveals striking evidence of gender imbalance in farm succession, transfer, and inheritance decisions of U.S. farms.

23. Wilson McNaughton - University of Northern Iowa

Hometown - Lawton, IA

Major - Chemistry

Mentor - Josh Sebree

Analog Studies of Organic Pathways in Wind Cave through Cave Water and Crystals

In Wind Cave, organic molecules from the surface dissolved in water

will slowly filter down into the cave through the porous limestone. While water slowly proceeds through the limestone, it dissolves the limestone along the way. This dissolving of the limestone causes a quasi-equilibrium that deposits the organic molecules into the calcite structures found in Wind Cave. These large trapped organic molecules, mainly humic and fulvic acid, can be tracked by using UV light. UV light causes these molecules to fluoresce blue, while the calcite structures generally do not have a strong blue fluorescence. Water from the cave shows a similar but stronger signal to that of the organic laced calcite. This water was used to replicate the fluorescence of the crystals in the cave by using the cave water to dissolve calcium chloride and reacted with ammonium carbonate. The fluorescence of the water after being reacted showed that the organic molecules were precipitated out with the calcite. This reaction resulted in the synthesized crystals having a shifted λ_{max} and a different crystal morphology when compared to cave crystals.

24. Melanie Meyer - Iowa State University

Hometown - Wauconda, IL

Major - Biology, Animal Science

Mentor - Nicole Valenzuela

Estimating population size and sex ratios of painted turtles, *Chrysemys picta*, in central Iowa

Turtle populations are vulnerable to anthropogenic habitat disturbance, including urbanization and climate change, which particularly affect species that possess temperature-dependent sex determination (TSD), prompting the need for surveillance of population sizes and sex ratios. Here we studied a population of painted turtles, *Chrysemys picta*, inhabiting Iowa State University's Horticulture Research Station and several locations in Story County. Turtles were trapped and tagged as adult females were collected for another project. Trapping data was used to estimate this population's size and sex ratios using the Schnabel Index which includes a formula wherein the sum of marked and captured at a time i is divided by the sum of the number of marked animals caught at time i . The sex ratios determined based on a simple calculation of captured individuals resulted in 31.9% male and 68.1% females. Our findings imply that there is a large female bias in this population.

25. Tyler Michalick - University of Northern Iowa

Hometown - Cedar Falls, IA

Major - Computer Science

Mentor - Dheryta Jaisinghani

Towards Developing Flying Mesh Networks for Disaster Scenarios

Disaster scenarios present unique challenges and risks to those assessing the situation. These risks can be dangerous, if not fatal, to humans and render this task to be better suited for coordinated robots. We present our solution of a flying mesh network built upon Crazyflie drones and cost-effective IoT nodes. The IoT nodes collaborate with each other via OpenThread - the latest open-source mesh networking protocol released by Google. In this paper we present the development and demonstration of the flying mesh network for exploration and assessment of disaster scenarios.

26. Abigayle Moser - Iowa State University

Hometown - Clarendon Hills, IL

Major - Aerospace Engineering

Mentor - Luciano Castillo

Wind Energy Production and Wake Recovery Over Hills

Moving to renewable energy systems creates opportunities an equitable transition to serve the needs of remote communities. This study outlines a multifaceted approach to wind turbine siting over a complex terrain through both computational modeling and experimental work. Wind turbine siting criteria includes integrating atmospheric dynamics and quantifying uncertainty in power output over complex terrain to evaluate their performance. Topographical and meteorological data were used to assess wind turbine siting based on wind resource availability. In order to examine the effect of complex terrains on wind power production, wind tunnel experiments were performed with a scaled-down model wind farm. Computational fluid dynamics (CFD) simulations were performed to validate the experimental data and investigate wind-farm wake interaction with complex topographies. Results from the modeled wind farm demonstrate the role of high-gradient topographic slopes on wind-farm power output and wake recovery by means of energy entrainment.

27. Sam O'Brien - Iowa State University

Hometown - Waterloo, IA

Major - Biological Systems Engineering

Mentor - Jacek Koziel

Improving Sustainability and Profitability of Bioethanol production by the Thermochemical Treatment of Dried Distillers Grains with Solubles

The bioethanol industry continues improving sustainability, specifically focused on plant energy and GHG emission management. Dried distillers grains with solubles (DDGS) are a byproduct of ethanol fermentation and are primarily used for animal feed. The aim

of this research was to find an alternative, value-added-type concept for DDGS utilization. Specifically, we aimed to explore the techno-economic feasibility of torrefaction, i.e., a thermochemical treatment of DDGS requiring low energy input, less sophisticated equipment, and resulting in fuel-quality biochar. Therefore, we developed a model that addresses both bioethanol production sustainability & profitability due to synergy with the torrefaction of DDGS and using produced biochar as marketable fuel for the plant. The application of DDGS torrefaction and carbon recycling may be a source of new, more valuable revenues and bring new perspectives to the bioethanol industry to be more sustainable and profitable during the COVID-19 pandemic and other shocks to market conditions.

28. Rachel Orpano - University of Iowa

Hometown - Lindenhurst, IL

Major - Biochemistry

Mentor - Chi-Lien Cheng

Phosphorylated ezrin expression in the dentate gyrus of the rat hippocampus

Perisynaptic astrocytic processes (PAPs) ensheath the neuronal synapse to create the tripartite synapse and modulate neuronal transmission. One of the many proposed mechanisms for the role of astrocyte dynamics on learning is PAP activity and motility. Previous research has discovered that suprachiasmatic nucleus (SCN) disruptions interfere with hippocampal-based learning. Our goal is to determine whether PAP activity shows oscillations similar to the SCN, and if this is one of the mechanisms connecting the SCN and hippocampus. Phosphorylated ezrin is required for PAPs to ensheath synapses, and serves as a marker for PAP activity. Our hypothesis was that p-ezrin expression would show oscillations in the dentate gyrus similar to the SCN. Using western blots, we analyzed p-ezrin expression in the dentate gyrus to determine if there is a significant difference between time points. Our research showed that the concentration of p-ezrin and ezrin expression did not show a significant trend among the different time points. This data indicates that p-ezrin expression does not follow a diurnal pattern as expected, and suggests that expression is not regulated by the SCN.

29. Benjamin Pappas - University of Iowa

Hometown - Mason City, IA

Major - Biomedical Sciences

Mentor - Thorsten Maretzky

***iRhom2* mutations in humans cause colitis and associated colorectal cancer**

Patients with defects in the inactive rhomboid homolog 2 (iRhom2) are more susceptible to inflammatory bowel disease (IBD), with an increased risk of developing colitis and associated colorectal cancer (CAC). Tumor necrosis factor (TNF) and epidermal growth factor receptor (EGFR) signaling cascades are important for constant renewal and proliferation of the intestinal epithelium, but when dysregulated can function as drivers in CAC. A disintegrin and metalloprotease (ADAM)17 is essential for the release of active TNF and EGF family ligands. Recently, iRhom2 has been identified as a crucial regulator for ADAM17. We hypothesize that loss of iRhom2-dependent signaling pathways promote the onset and progression of CAC. In this study, we crossed *iRhom2*^{-/-} animals with mice carrying a mutant allele to further evaluate the development of intestinal adenoma formation. We also assessed missense/nonsynonymous iRhom2 variants in the human genome and identified potentially pathogenic iRhom2 mutations in CAC.

30. Grace Petrzelka - University of Northern Iowa

Hometown - Vinton, IA

Major - Psychology, Public Health: Community Health

Mentor - Michele Devlin

Maternal Mortality in the United States: Focusing on Societal Impacts and Potential Solutions

This research project explores the available literature on maternal mortality in the United States, and examines social, environmental, and cultural factors for their impact. With a public health focus, included are discussions on forming safer maternal health practices in our country, comparison of statistics on maternal and infant deaths, and using the available data to create potentially life-saving solutions. Specific topics include race, biology, health policy and legislation, insurance coverage, infant mortality, and family planning. This research project covers a span of academic disciplines, and was created to bring these areas together to promote awareness to a sobering, but meaningful topic. This project serves to explain why maternal mortality occurs today, and what we can do to help prevent maternal deaths in the United States in the future.

31. Anvay Pradhan - University of Iowa

Hometown - West Des Moines, IA

Major - Mechanical Engineering, Computer Science

Mentor - Phil Deierling

Low-Cost Robotic Solutions for Industry and Education

Due to increased customer demand, limited workforce, and

hazardous working conditions, there is a growing need for robotic and autonomous solutions in industry. However, access to such systems is often impeded by cost. Our work sought to develop a low-cost vision system such that companies can introduce or adapt existing robotics arms for autonomous functioning. Further, as a result of such trends, students need to be prepared in areas of robotics and automation for their future careers. While theoretical approaches to robotics education are valuable, a laboratory portion of these classes allows students to apply their knowledge in a real product/system. Again, the high cost of modern robots proves to be an issue. Our work also sought to develop a small, cost-effective robotic arm that students would create during the lab portion of their robotics class as a mode to teach the prototyping, programming, and troubleshooting associated with modern robotics.

32. Josh Pulse - University of Northern Iowa

Hometown - Pleasantville, IA

Major - Computer Science

Mentor - Dheryta Jaisinghani

Leveraging Machine Learning for Detecting IoT-based Interference in Operational WiFi Networks

IoT (Internet of Things) devices have become increasingly popular in recent years. IoT includes many smart home devices such as an Amazon Echo, smart lightbulbs, and smart sensors. These devices often include different networking protocols than are used in most WiFi devices but are in the same wireless band, leading to the possibility of interference. With the rise in the number of IoT devices, it is important to understand how they impact the existing WiFi networks that many people deploy in their home or business. In this research project, wireless traffic data will be collected in an environment containing both WiFi devices and devices using protocols commonly found in IoT devices, such as Zigbee. We aim to answer if the co-existence of WiFi and IoT networks have a negative impact on the performance on WiFi networks and if so, can machine learning techniques be applied to detect this interference.

33. Isaiah Sents - Iowa State University

Hometown - Columbus City, IA

Major - Apparel Merchandising and Design

Mentor - Kelly Reddy-Best

Des Moines Gay Men's Chorus, queer spaces, collective styles, and activist dress, 1984 to the present

During the 1970s, people in the United States founded gay and

lesbian choruses for activism, coming out, and celebration. We examined the history of one chorus, the Des Moines Gay Men's Chorus (DMGMC). How do their bodies and styling-fashioning-dressing negotiate queer representations? How can these style-fashion-dress acts open multiple interpretations? To answer these questions, we analyzed the original DMGMC slogan T-shirt, an archive of LGBT T-shirts, performance videos, lyrics, articles, and oral histories. Chorus members negotiated queer sensibilities, choral traditions, activism, and community building through their dress in complex ways. They negotiated representation by creating temporary queer spaces during the AIDS crisis and highlighting how community and visibility have been significant in gay history. The chorus prioritized an "appropriate" gay man via dress, reinforced through racial-power dynamics, gendered tuxedos, and cabaret costumes. The chorus' styles represent how such choruses navigate entanglements of tradition, gayness, and music while reclaiming oppressive symbology.

34. Connor Sindt - University of Iowa

Hometown - Dubuque, IA

Major - Computer Science and Engineering

Mentor - Terry Braun, Stephen Russell

A Novel, Wearable, Electronic Visual Aid to Assist Those With Reduced Peripheral Vision

The low-vision enhancement optoelectronic (LEO) belt is a non-invasive wearable device that is designed to help people with partial vision loss. This is accomplished using a depth-sensing camera that splits the environment in front of the user into eight sections and sending signals to vibrating boxes corresponding to these sections placed on the chest, waist, and legs. The vibration of these boxes increases the closer an object is to the user. This offers the user a better sense of immersion in their surrounding environment. The device is completely portable and is lightweight to not affect the user's mobility.

35. Jacob Sindt - University of Iowa

Hometown - Dubuque, IA

Major - Electrical Engineering

Mentor - Fatima Toor

Development of Next Generation Mid-Infrared Sensors for Monitoring Emissions of Greenhouse Gases and Volatile Organic Compounds

Satellite spectrometer data is inhibited in spatial resolution due to

atmospheric conditions and locations of detection on Earth. With the implementation of portable, high spatial and temporal resolution terrestrial sensors, the gaps within satellite emission data can be closed and conclusions on the climate changing emissions can better be drawn. The development and implementation of mid-infrared technologies allows for high accuracy concentration detection for both greenhouse gases and volatile organic compounds

36. Jamie Smith; Zoë Dekruif; Jennifer Godbersen - Iowa State University

Hometown - New Virginia, IA; Cedar Rapids, Iowa; Ida Grove, Iowa
Major - Communication Studies and Spanish; Linguistics; Linguistics
Mentor - Evgeny Chukharev-Hudilainen

The ProWrite Project: Biometric technology for improving college students' writing processes

ProWrite is an innovative project within Iowa State's Language Processing, Acquisition and Change Laboratory (PACE Lab), funded by the National Science Foundation. The goal of ProWrite is to improve undergraduate students' writing abilities by developing an automated intelligent tutoring system that integrates biometric technology, including keystroke logging and eye tracking. The ProWrite system provides individualized and process-based feedback by analyzing a writer's unique writing-process behavior, including eye gaze movements, pausing behavior, and revision patterns. Essentially, ProWrite analyzes how a student naturally writes in a diagnostic session and uses that data to give automated scaffolding for improving writing skills. The present study utilizes a design-based research approach to develop and evaluate, in multiple design iterations, a viable prototype of the system. Effects on student behavior will be determined through analysis of writing-process data before and after remediation. If effective, ProWrite has the potential for massive application and educational gain.

37. Regan Smock - University of Iowa

Hometown - Coggon, IA
Major - BS Sociology
Mentor - Mary Noonan

The Impact of Sexual Assault Prevention Education on Bystander Intervention at Iowa

My project utilizes the University of Iowa's 2015 Speak Out Iowa, sexual assault campus climate survey data to examine the most effective forms of sexual assault prevention educations and trainings

offered by the University. To understand effectiveness, I have utilized students' reported bystander intervention practices in a regression analysis and compared three different forms of education and trainings to find which programs had the greatest impact on behaviors. Leveraging multiple academic publications, I am able to tie the change in these behaviors to a reduced risk of sexual assault occurrence in the community as a whole.

38. Lukas Stuelke - University of Northern Iowa

Hometown - Waterloo, IA

Major - Physics/Mathematics

Mentor - Paul Shand

Chemical Substitution Induced Half-Metallicity in Heusler Alloys

Half-metals are a class of materials that combine properties of electric conductors and insulators. Here we study $\text{CrMnSb}_{0.5}\text{Si}_{0.5}$. It is shown that the parent Heusler compound — a compound which consists of two transition metals and an element from the p-block — CrMnSb is not half-metallic in its ground state; however, it undergoes a half-metallic transition under a uniform compression of $\sim 1.5\%$, which is something achievable in practice. We demonstrate a thermodynamic stability of this compound, its half-metallic electronic structure, and ferrimagnetic alignment. At the same time, it is shown that in thin-film geometry the spin-polarization of this material is reduced due to the emergence of surface states in the minority-spin energy gap. This research is supported by the National Science Foundation (NSF) under Grant Numbers 2003828 and 2003856 via DMR and EPSCoR.

39. Sandra Thiman - University of Northern Iowa

Hometown - Cedar Falls, IA

Major - Political Science

Mentor - Chris Larimer

The Gender Bias Burden on Business: Women's Access to Credit in Bahrain

Entrepreneurship is essential to virtually every economy; however, Bahraini women face many challenges accessing business development. In particular, a major constraint for these women is their access to capital support. In 2020, the government signed a law prohibiting gender-based discrimination in access to credit to help the issue; nonetheless, its effectiveness has yet to be systematically examined. Using data from several sources, I test whether the law significantly affected the gender gap in borrowing for business

purposes while controlling for other variables. Importantly, I find that women's labor force participation is a significant factor in reducing the borrowing gap between men and women and that the gender-based discrimination law is only relevant for states with low labor force participation. These results are robust across multiple regression models. Hence, a culture supporting women's economic involvement is the foundation for their credit access, and work-based legislation should focus on women's workforce participation.

40. Lauren Tidgren - Iowa State University

Hometown - Carroll, IA

Major - Animal Science

Mentor - Derald Holtkamp

The effectiveness of surface-bonded disinfectant on common swine viruses

Porcine reproductive and respiratory syndrome (PRRSV) and porcine epidemic diarrhea (PEDV) are two highly detrimental diseases to the swine industry with each accounting for a tremendous economic impact. A reliable, long-term disinfectant could potentially be a vital layer in biosecurity measures. The objective of this study was to test the effectiveness of quaternary ammonium compounds, a category of residual disinfectant, for inactivating PRRSV and PEDV at set timepoints on experimentally contaminated rubber surfaces commonly used in swine facilities. This experimental study was done under controlled conditions. The Nyracord rubber surfaces were cut into uniform 127 mm x 127 mm coupons and broken into three treatment groups. Each treatment group received one of two brand name disinfectants or MEM 21 days prior to coupon contamination. On day 0, 1 ml of inoculum matrix (MEM) was mixed with 2 ml virus or sham inoculum (MEM) and applied to the coupons. The contaminated coupons were then allowed to dry for 180 minutes. For virus recovery, 4 ml MEM was eluted over the coupons and collected in a Petri dish. The coupons were swabbed and eluted ten more times, then lastly swabbed a second time. Finally, the eluted material was recovered and placed in a snap cap tube with the swab tip. Viral titration was used to determine the quantity of active virus. The lesser the viral load determined, the greater the efficacy of the disinfectant.

41. Aaron Walker - University of Northern Iowa

Hometown - Cedar Falls, IA

Major - MIS: Information Systems Dev

Mentor - Dheryta Jaisinghani

SocioApp: Detecting Your Sociability Status with Your Smartphone

Loneliness, isolation, and anti-social behaviors have increased in the past few years, whether that be due to social media, people paying more attention to their devices, or due to the COVID-19 pandemic. These behaviors are proven to decrease a student's academic performance, causing their grades to decline, and disabling their motivation to learn. We aim to gain insight on this issue via the application of smartphone technology and machine learning, enabling those that use our app to understand if their being social or anti-social. We use a variety of sensors, location devices, and speaker recognition algorithms to identify behaviors that help us let the user know when they're being negatively affected by their social behavior. Our end goal is to be able to tell students and users a "social score" after an interval of time, helping them identify and fix when they're being overly isolated or lonely.

42. Caden Washburn - Iowa State University

Hometown - Le Mars, IA

Major - Chemical Engineering

Mentor - Nigel Reuel

Positionally-independent and extended read range resonant sensors applied to deep soil moisture monitoring

Growers and agronomists interested in measuring soil moisture content use commercial soil moisture probes. These probes require power supplies and above-ground enclosures which increases the cost point per sensor node limiting the density of nodes that can be deployed in a field. This project focused on creating a cost-effective method of measuring soil moisture in commercial fields that could be buried beneath the ground and wirelessly powered. A novel positionally independent resonant (LC) spiral sensor with an inductively coupled extender (ICE) was produced. The ICE-LC sensor utilizes a top read coil and a bottom sensor coil to measure the soil moisture at a depth of one meter. By coupling the two sensors, the range of the device was increased to showcase moisture at a realistic depth for water management. Experimentation indicated a decrease in resonant frequency with increased soil moisture and mitigated positional sensitivity between the external reader and ICE-LC sensor.

43. Grant Welk - University of Iowa

Hometown - Ames, IA

Major - Biochemistry

Mentor - Charles Brenner

Innate Immune responses associated with viral, bacterial, and parasitic infection stress of the NAD metabolome

The NAD system is disrupted in conditions of obesity, heart disease, peripheral neuropathy, noise-induced hearing loss, and aging. Most recently, the NAD system has been shown to be disrupted during infection, which correlates with the induction of IFN-sensitive PARP enzymes. We sought to expand our understanding of the effect of inflammatory cytokines and viral infection on the NAD system. To this end, publicly available datasets including models of cytokine treatment and viral infection were analyzed for changes in expression of NAD-related genes. It was observed that Class I and II interferon (as well as TNF α , TGF β , and certain classes of interleukins) consistently upregulate IFN-responsive PARP enzymes across a variety of studies and conditions of infection. In Nanostring and Calu qPCR analysis, it was further observed that interferon was sufficient to induce the expression of non-canonical PARPs, which leads to a depletion of cellular NAD⁺ levels. These results suggest that various mechanisms of viral infection perturb the NAD metabolome by induction of IFN-responsive PARP enzymes and that IFN signaling alone is sufficient to stress the immune system.

44. Mackenzie Wisneski - University of Northern Iowa

Hometown - Le Claire, IA

Major - Teaching English to Speakers of Other Languages

Mentor - Hilal Ergul

Using Color with Care: An Exploration of the Application of Psychological Color Theory within Language Classrooms

In this ongoing project, I explore the application of color and emotion within the field of Teaching English to Speakers of Other Languages (TESOL). Developing practices that strengthen color and emotion is beneficial for the psychological regulation of those within any environment (Güneş & Olguntürk, 2020), and is especially beneficial for emergent bilingual students. These learners are disproportionately exposed to additional academic, emotional, socio-economic, and cultural challenges both within and outside of the classroom (Benesch, 2012; Beyer, 2017; Heineke & Vera, 2021). These findings suggest that color may be used as a social-emotional tool to facilitate language acquisition and learning. To investigate this possibility, several language teaching professionals will be surveyed on their uses of color in their classrooms. The potential implications of this evaluation of current visual-based strategies and practices used within the TESOL field will be discussed in relation to current theory and practice in the field.



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