Poster Number	Title of Poster
1	The Role of the 26s Proteasome in the Second Meiotic Progression
2	Acuity of the Lateral Line Sense of African Clawed Frogs (Xenopus laevis): Ability to Differentiate between Paired, Adjacent Wave Sources
3	Investigating the role of the N-terminal Stag1 domain in Globin gene expression during Terminal Eryths (r)3 (2n0 (t)

Poster Number	Title of Poster

Poster 1

Acuity of the Lateral Line Sense of African Clawed Frogs (Xenopus laevis): Ability to Differentiate between Paired, Adjacent Wave Sources

College of Arts and Sciences

Student Researcher: Julia Rigaud

Faculty Advisor: Jeffrey Dean

Abstract

Adult African clawed frogs use their lateral line system to sense and orient towards potential prey falling into the water. Our current experiments focused on the quantitative and qualitative ability to respond to paired, simultaneous stimuli at various separations in order to test the acuity of the lateral line, i.e., its ability to resolve the paired stimuli as separate stimuli. A computer commanded plastic rods to briefly touch the surface of the water: 3 rods were used for single stimuli, and the fourth and fifth rods were paired for the acuity tests. Responses to all stimuli were video-taped and then analyzed with Python to measure stimulus angle and distance, turn angle and swim distance, latency, movement descriptors, and, for two stimuli, choice. Based on preliminary results with three frogs, 601 trials, and a 4.5 cm separation distance, frogs responded equally often to single and double stimuli. Stimulus distance, proximity to wall, frog depth and individual were significant factors but explained only 5% of deviance. Neither did stimulus number affect the frog's swim distance. Overall, frogs did not treat the paired stimuli as a single stimulus at the midpoint: linear regressions of turn angle versus the pair's mean position or versus single stimuli positions indicated similar slopes (0.73°/° vs 0.76°/°) but larger standard errors of the estimate (30.7° vs 18.4°), mean absolute errors (20.3° vs 14.0°) and less variance explained (80% vs 92%). Surprisingly, response latencies were approximately a half a second longer for two stimuli.

Investigating the role of the N-terminal Stag1 domain in Globin gene expression during Terminal Erythropoiesis

College of Arts and Sciences

Student Researchers: Dev R. Savaliya, Sarah Adams, Anita R. Dhara, Rachael White, Mehrael Roman, Adam Musleh, and Raja S. Sundaram*

Faculty Advisors: Merlin Nithya Gnanapragasam and Mahesh Ramamoorthy

Abstract

The human genome consists of approximately 3 billion nucleotide pairs and therefore requires complex organization principles to bring precise regions of the genome together for satisfying complex DNA transactions. Some examples of these organization principles involve the formation of chromatin loops and topologically associated domains (TADs), important for transcription and recombination. The cohesin complex made up of proteins SMC1, SMC3, and Rad21 along with accessory factors, Stag1 and Stag2, mediates the formation of TADs and loops. The organization of the genome affects biological processes such as organ development, and cell differentiation, and its corruption, leads to disease.

Here, we sought to study the role of the cohesin protein Stag1 in the expression of globin genes during erythroid cell differentiation. This was done by either knocking down Stag1 gene expression using short hairpin RNAs against Stag1 mRNA or completely knocking out Stag1 gene using Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) directed against the Stag1 gene. Our results demonstrate that the reduction or elimination of Stag1 significantly reduced the globin gene expression in erythroid cells. Our next step is trying to identify the exact mechanism by which Stag1 mediates the expression of globin genes. Towards this goal, we are evaluating the role of Stag1 in affecting the chromatin profile of the active genes during terminal erythropoiesis and in changing the genome organization that affects the interaction of the globin promoter with their cis-acting genome elements. Understanding how Stag1 affects globin gene expression in erythroid cells could have significant implications in the treatment of diseases such as thalassemia and sickle cell anemia, where globin expression is compromised.

* Post-Doctoral Fellow

Evaluating Stag1's role in the maintenance of genome integrity during terminal erythropoiesis

College of Arts and Sciences

Student Researchers: Mehrael Roman, Sarah Adams, Dev R. Savaliya, Anita R Dhara, Rachael White, Adam Musleh, and Raja S. Sundaram*

Faculty Advisors: Mahesh Ramamoorthy, Merlin Nithya Gnanapragasam

Abstract

During cell replication, sister chromatids are held together by the cohesin complex which ensures proper replication, DNA repair, and recombination. The cohesin complex consists of proteins that form a ring-like structure and are made up of Smc1, Smc3, Rad21, and accessory proteins Stag1 or Stag2. Further, the rings are removed during mitosis, allowing proper separation of genetic material between newly replicated cells.

The cohesin components Stag1 and Stag2 have been studied extensively in different developmental backgrounds and it has been shown that they perform both redundant and exclusive functions. This observation has prompted studies on the possibility of targeting Stag1 in Stag2 mutated cancers. In this study, we evaluate the role of Stag1 in erythroid cells during their differentiation. Knockdown of Stag1 gene expression in erythroid cells and knockout of Stag1 using CRISPR were done, and the cells were then arrested at the prometaphase stage of the cell cycle, swelled in a hypotonic buffer, and dropped onto glass slides to generate metaphase spreads. The metaphase spreads were imaged and analyzed.

We observed that, in comparison to the wild-type cells, both the Stag1 knockdown and knockout cells showed defects in their metaphase spreads, from chromosomes appearing in a distinct railroad-type pattern to a few that showed complete loss of cohesion. Therefore, we conclude that Stag1 has a role in maintaining proper sister chromatid cohesion in erythroid cells and that Stag2 is unable to compensate for this function when Stag1 is lost. Further studies will expand on the mechanisms behind this observed phenotype. Upon completion, this data may yield us valuable information on why targeting Stag1 in Stag2 mutated cancers may result in inadvertent complications.

*Post-Doctoral Fellow

Plumes and pigments: Hyperspectral tools for water quality monitoring

College of Arts and Sciences

Student Researcher: Emily Hyland

Faculty Advisor: Brice Grunert

Abstract

Water quality in the Great Lakes is increasingly threatened by human activities such as agriculture and sewage. Alongside climate change, these stressors are resulting in biogeochemical variability not previously observed, with often detrimental impacts on water quality. These changes can be observed at high spatiotemporal frequency using satellite sensors, provided the observations constrain dynamic, visible components of the aquatic system such as river plumes and pigment-rich algal blooms. These plumes and pigments are readily visible from hyperspectral sensors due to the specific ways they interact with visible light. However, to monitor these changes, flexible tools are needed to turn spatiotemporally dense hyperspectral satellite observations into meaningful data for water quality monitoring. Here, we present data from a sediment resuspension event in Lake Erie and discuss how next generation hyperspectral satellite sensors, alongside advanced tools, will change the way water quality is monitored.

Tagging Endogenous TbRNaseH1 for Examination of its Regulation by TbRAP1

College of Arts and Sciences

Student Researchers: Delaney Brown* and Elaina Casteel*

Faculty Advisor: Bibo Li

Abstract

(Trypanosoma brucei) (t)-73c05pai bllbuTT C2pttonCMCI2fId/i727 (it)2-1.9ho[.it.51 11p.51 110nhg ibtype 2/

Characterize TbRAP1 Myb domain functions by mutagenesis

College of Arts and Sciences

Poster 8

The Influence of Wax on Leaf Reflectance in Diverse Tree Species

College of Arts and Sciences

Student Researcher: Cyenna Ulrich-Cech

Faculty Advisors: Kevin Mueller, Brice Grunert, and Daniel Griffith*

Abstract

New hyperspectral sensors on satellites and planes monitor electromagnetic radiation covering most of the Visible to ShortWave InfraRed (VSWIR) range, enabling deeper investigation into absorbance and reflectance patterns of earth's features.[1] The improved measurements provide more context for ecosystem processes; for example, using remotely sensed data from imaging spectrometers to quantify net primary production (NPP).[2] Light interacts with plants through absorbance, transmittance, and reflectance, dependent on

Potential Impacts of Beech Tree Decline on Red-Backed Salamanders, Plethodon cinereus

College of Arts and Sciences

Student Researchers: Brayden Norris, Elijah Williams, and Allison Wierzbowski

Faculty Advisor: B. Michael Walton

Abstract

The red-backed salamander (Plethodon cinereus) is a fully terrestrial amphibian commonly found in beech-maple forests of eastern North America. It plays a crucial role in the forest floor ecosystem, regulating invertebrates and contributing to proper nutrient cycling and leaf litter decomposition. However, beech trees of its preferred habitat are currently threatened by several invasive species. This study aims to determine if a significant decline in beech trees could have negative impacts on the abundance of P. cinereus.

Lectin-Mediated Insights on Desialylation of Macrophages during LPS Stimulation

College of Arts and Sciences

Student Researchers: Jonathan 1itardy and Majdi A. Aljohani

Faculty Advisor: Xue-Long Sun

Abstract

Sialylation is a regulated process, and its pattern and density can vary depending on the cell type, developmental stage, and physiological environment. This process can be described as the addition of Sias to the terminal ends of Glycans. Contrarily, desialylation

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Poster 13

Identification of Drug Molecules Suppressing the Expression of HIF-1 *D* to Treat Hepatocellular Carcinoma (HCC)

College of Arts and Sciences

Student Researchers: Gena Asi and Uthman Alghamdi

Faculty Advisor: Aimin Zhou

Abstract

The most common primary liver cancer in adults is hepatocellular carcinoma (HCC), which is the third highest cause of cancer-related death worldwide. During solid tumor growing, due to insufficient blood supply, the tumor usually is devoid of oxygen and nutrients, resulting in the formation o04 -al fon o6 (a)12 (r)3.7 7l .7 (M)orme12.12.1 (

Documentary Storytelling and Community Narratives: Local Stories with Global Resonance

College of Arts and Sciences

Student Researcher: Jonathan Carpenter

Faculty Advisor: Cigdem Slankard

Abstract

This project focuses on three documentary films exploring narratives from Northeast Ohio, with a specific focus on marginalized communities in three different contexts, including refugee resettlement, Covid 19 pandemic, and lead poisoning.

Equations and Symmetry

College of Arts and Sciences

Student Researchers: Garrett Peet and Shereen ElFadil

Faculty Advisor: Federico Galetto

Abstract

A system of polynomial equations may be qualitatively studied using algebra and geometry. KnowledgSP21t2eA.3(now2F)-8 (e2nd)8.3 (g) (al0 0 12 302.01 (R)6 >>BDc

Coding Theory: Diving into Linear Codes

College of Arts and Sciences

Student Researchers: Taylor Vidmar and Justin White

Faculty Advisor: Hiram Lopez

Abstract

Coding theory is a critical topic of research that examines reliable forms of communication through different channels. We assess types of linear codes through finite fields using Macaulay2. We focus on linear codes, specifically Subfield Subcodes and Reed-Solomon Codes.

In addition, we provide an algorithm for finding codewords in a restricted finite field.

Poster 17

Characterizing Pentacene Thin Film Growth on HOPG

College of Arts and Sciences

Student Researcher: Grace M. Miller

Faculty Advisor: Jessica E. Bickel

Abstract

While they are generally more cost-effective and environmentally friendly compared to their inorganic counterparts, organic semiconductors are typically less conductive. Their conductivities can be improved by creating crystalline films, which makes the distance between adjacent molecules uniform and allows for easier electron movement between adjacent molecules. One method for crystallizing organic materials is self-assembly on atomically ordered surfaces. In this work, Pentacene is thermally evaporated onto HOPG using a line-of-sight evaporation method. The resulting films are characterized by Scanning Tunneling Microscopy (STM) with the goal to determine ideal pentacene parameters for thin-film evaporation. While most trials tended to have disorganized depositions, we observed pentacene forming organized structures in two trials. In the first, we observed a honeycomb structure with a periodicity of 9.4nm. We compared the unit cell spacing to the dimensions of both a single pentacene molecule and pentacene's general triclinic crystal structure but neither fit our sample. A second organized trial showed a slightly smaller repeating pattern along a step edge with a spacing of 4.4nm. While not crystalline, this structure was periodic in the single dimension of the step edge. This structure was only compared to a single pentacene molecule, as the structure was a similar height to a monolayer of pentacene, but again the values do not quite match our structure. While we were unable to determine exactly how the pentacene molecules were forming on the substrate, our work shows pentacene's ability to form organized structures.

Achieving Reproducible Atomically Smooth Au(111) Surfaces

College of Arts and Sciences

Student Researcher: Jordan A. Miller

Faculty Advisor: Jessica E. Bickel

Abstract

Organic electronics can be more eco-friendly but struggle to compete with inorganics due to their low conductivity. The conductivity can be increased through crystallization, and we examine surface reconstruction driven self-assembly. This work aims to obtain an atomically flat Au(111) surface reconstruction through flame annealing. The sample is held in a nitrogen environment and heated at one or two temperatures for fixed times then allowed to cool to room temperature. In this work, we vary the temperatures and time of the anneal process and characterize the results using scanning tunneling microscopy (STM). We find that temperatures above 730°C roughen the Au (111) surface or take the Au (111) off completely. Examining the effect of time at the highers3nw6mthe 8>eaimtpeai

Study of Micromixing Systems using Extensional Flows

College of Arts and Sciences

Student Researcher: James Taton

Faculty Advisors:

Analysis of Marine Stratocumulus Clouds With and Without a Diurnal Cycle Using Large Eddy Simulations

College of Arts and Sciences

Student Researcher: Jeremiah Greene

Faculty Advisor: Thijs Heus

Abstract

Fog and Marine Stratocumulus Clouds are one of the largest unknowns in climate, and crucial for aviation, agriculture, and solar energy. In this study, we use a detailed computer model (LES) to study the diurnal cycle of these clouds.

The simulations used unique combinations of initial boundary conditions for specific humidity, temperature, and subsidence with, and without a diurnal cycle.

The clouds properties are analyzed once the LES reaches equilibrium. The cloud top, cloud base, and total liquid water content.

The simulations show cloud formation and thickness are dependent on the difference in humidity and temperature between the sea surface and the tropospheric layer.

Solvent Effects on the Interaction of Charged Nanoparticles

College of Arts and Sciences

Student Researcher: Joseph Ball

Faculty Advisor: Sebastian Sensale-Rodriguez

Abstract

Self-assembly is ubiquitous in nature, allowing for the bottom-up construction of ordered structures via non-covalent interactions. These mechanisms have found multiple applications in chemistry and materials sciences, providing low-cost, highly reproducible, highly tunable strategies for the construction of multidimensional structures with very high yield. The goal of this project is to computationally demonstrate a novel technique for tuning nanoparticle aggregation by controlling nanoparticle-solvent interactions at the molecular-level.

Poster 22

Developing SAXS Methodology for Solutions of Polystyrene Spheres

College of Arts and Sciences

Student Researchers: Collin Douglas and Patrick Herron

Faculty Advisor: Kiril A. Streletzky

Abstract

Attempts to study solutions of hydroxypropyl cellulose (HPC) microgels using small angle x-ray scattering (SAXS) were performed at Kent State University's AMLCI lab to expand on and verify previous results from static and dynamic light scattering. However, the results gathered from our initial methodology did not reflect the results previously gathered nor made sense within the context of SAXS. From these issues an entirely new methodology for running and analyzing SAXS results needed to be created by adjusting parts of the initial methodology. By deciding to use water-based solutions of Polystyrene ,c[.6 (d f)12.2rhnd vt--e5 ((t--e5e(hi)8.59 dioEg (so)8.2 (lu)i8(t--e5 (odt--e5 (the)3.5 (s)8.4)

Inclusive Strategies for Student Success in Health Professional Education

College of Health

Student Researcher: Ashley Banas

Faculty Advisors: Manuella Crawley, Jodi DeMarco, and Gina Kubec

Poster 27

Effects of speed on measures of stability during quadrupedal locomotion

College ofHealth

Student Researcher: Catherine A. O. Cornelius

Faculty Advisor: Andrew R. Lammers

Abstract

Stability during locomotion is essential for the survival of animals. Animals (and humans) can improve their stability by moving slower, increase the duration of the stance phase of

Understanding the Clinical Research Associate Profession

College ofHealth

Student Researcher: Aya Al-Hayali

Faculty Advisors: Joanna DeMarco and Anne Su

Abstract

A Clinical Research Associate manages a clinical research experimental study. AThe CR

Poster 30

Integrating Music Therapy and Speech-Language Pathology: Application of an Interprofessional Education Training Model to Treat Children with Communication Disorders

College of Health

Student Researcher: Leanne Eichorn

Faculty Advisors: Lori Lundeen-Smith and Deborah Layman

Abstract

This feasibility study explored the development and implementation of a collaborative model for integrating music therapy with speech and language pathology to treat individuals with autism and communication disorders. This project examined the effectiveness and acceptability of this model, with a focus on the responsiveness of clients, students, and supervisors. The outcome of this project was a foundational pediatric clinical training model that can be used during future collaborations between student professionals and supervisors within a university clinic environment.

The collaborative model was designed prior to the integrative treatment with the client, and implementation and refinement of the model continued throughout the semester. The speech-language pathology grad student developed goals for the client and the music therapy student, with guidance and coaching from the music therapy faculty supervisor, explored the methods in which music therapy could effectively support and enhance the client's progress in therapy. Both faculty supervisors (music therapy and speech-language pathology) observed each session and gave collaborative training feedback to both students. Within these feedback training i5mus3.5 (d)e.6 (t)8.5 (i)88.3 (g).3 (g s6.1 (w)e) cags fnd imobj.5 (e)3.5 (n)12.1 (ti)8.5 (ve)12.1 (lys)3.6 (n)8the mogrm theusic th.5 (t)88.3 (

Knee flexion as an indicator of instability in balance exercises

College of Health

Student Researchers: Kaitlyn Boellner, Bilikisu Amunikoro, Megan Bell, and Zimiego Smith

Faculty Advisors: Debbie Espy and Anne Su

Abstract

Introduction: As people age, their balance tends to decline which impacts their safety and independence [1]. Balance exercises are a necessary component of preventing falls and retaining independence in older adults [1]. In order to accurately prescribe the best exercise treatments for patients, a clinician must consider the frequency, intensity, type, and time of exercise [1]. In order to quantify balance intensity, Espy et al. created the Rate of Perceived Stability, a 10-point scale similar to the established Rate of Perceived Exertion [2]. Due to the subjective nature of the self-rated RPS, more objective, behavioral indicators of instability are needed to help correctly dose balance exercises at appropriate intensities.

Purpose: This project aims to evaluate changes in knee flexion as a behavioral method of maintaining balance. This project will analyze changes in knee flexion during balance exercises on different surfaces to provide a visible, objective measure of instability that can be used to correctly dose intensity of balance exercises.

Methods: ts Re iii ttheece i2-2 (t)-12 (y)10 (t)-2 an be(an)-d(e)4 (of)-7 ((e)4 (d)60 (R)-3 us)-1 (i)-2 ((a)4 (

Let’s Talk About Sex…Education!

Levin College of Public Affairs and Education

Student Researchers: Daylun Armstrong and Harper Mancuso

Faculty Advisors: Elizabeth Goncy, Katherine Clonan-Roy, Kimberly Fuller, and Shereen Naser

Abstract

Through this project we provided an in-depth review of a comprehensive, inclusive sex educatio Td [(de)12.1 (p3[ )]TJ (ougo (,)6.[(ThC ET /P 2 ( )-5)-8 (f [(e)3u)h)-8.2 (r)3r [(e)3
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The Use of Artificial Intelligence in the Diagnosis, Treatment, and Intervention of Individuals with Special Needs

Levin College of Public Affairs and Education

Student Researchers: Allison Delmonico and Nina Abercrombie

Faculty Advisor: Xiongyi Liu

Abstract

In this sponsored research project, we seek to assess the various implementations of

Parenting Practices of the Newly US Resettled Families: A Cross-Cultural Comparison

Sustainable Solutions for Waste Management - Fluid Dynamics Considerations in the Gasification of Household Recyclables

Washkewicz College of Engineering

Student Researcher: Rushi R. Viradiya

Faculty Advisor: Jorge E. Gatica

Abstract

In this work, carbon and alumina catalyst supports are used to investigate the gasification

Poster

Effect of Freeze and Thaw on Structural Wood

Washkewicz College of Engineering

Student Researchers:

Quantum Neural Network for Cancer Detection

Washkewicz College of Engineering

Student Researcher: John Parker

Faculty Advisor: Sathish Kumar

Abstract

Breast cancer is the most commonly occurring cancer, affecting approximately 13 percent of women in the United States. Early diagnosis and treatment are vital to improving chances of recovery for affected individuals. Recently, machine learning models, specifically convolutional neural networks have been employed to perform automated image analysis. The use of such models for microscopic analysis of breast tissues saves pathologists time in performing specialized analysis and greatly improves breast cancer detection accuracy. As quantum computing continues to evolve, machine learning researchers aim to harness it's power in hopes of faster and more accurate image classification. The aim of this research is to implement various quantum machine learning models to accurately

Intrusion Detection Framework for Security Attacks in Software Defined Networking Environment

Washkewicz College of Engineering

Student Researcher: Carmen Garcia

Faculty Advisor: Sathish Kumar

Abstract

Since the introduction of Software Defined Networking (SDN), our perspective on network strategies has changed. The rapid embrace of SDN has transformed our perception on the way networks are managed and deployed. However, it has also presented new challenges in the aspect of security. In this article, we present a comprehensive intrusion detection framework designed to address security attacks in SDN environments, with a focus on Distributed Denial of Service (DDoS) attacks. Our suggested framework uses the full potential of SDN's capabilities to monitor, analyze and detect the real-time network traffic on DDoS attack. Additionally, it utilizes the gathered data to create a DDoS dataset, which is employed for training and prediction through machine learning algorithms (ML).

The primary objective of this study is to offer an evaluation of the accuracy and an effective method for detecting DDoS, with the utilization of Mininet and the Ryu controller to simulate the network environment.

Keywords – SDN, ML, DDoS, Ryu, Logistic Regression, Naïve Bayes, SVM, Decision Tree, Random Forest, K-NN, ICMP, UDP, TCP-SYN, PCA.

Performance Evaluation of Pre-Trained Encoders for Microscopy Image Tasks

Washkewicz College of Engineering

Student Researcher: Joshua Wiess

Faculty Advisor: Sathish Kumar

Abstract

One of the most important factors that exist in creating an effective convolutional neural network is the amount of data that is available to train the model on. Despite most

Introduction to Zero Knowledge Proofs

Signal Localization with Unmanned Aircraft System

Washkewicz College of Engineering

Student Researcher: Domenic M. Ticchione

Faculty Advisor: Ye Zhu

Abstract

By measuring signal values at various points, it becomes possible to estimate the relative location of the source of the signal. Our aim is to implement an unmanned aircraft into this process. Specifically, we seek to create a flight program for this unmanned aircraft which will cause it to automatically travel to a sequence of coordinates to better collect the signal strength data necessary for the signal localization process. For this, we used a DJI Mini 3 Pro aircraft and modified a sample program which includes a copy of DJI's Android software development kit. The program is modified such that the Return-To-Home (RTH) function, which would by default cause to aircraft to fly back to its takeoff location, now flies

Design and Performance Analysis of Underwater Wireless Optical Communications

Washkewicz College of Engineering

Student Researcher: Garrett Pazey

Faculty Advisor: Mehdi Rahmati

Abstract

Having an effective wireless communication system underwater is crucial to the success of many different types of underwater exploration. In the past, acoustic waves have been the most reliable way to send messages underwater. With modern optical technology, underwater wireless optical communication (UWOC) has become a much better and more efficient way to communicate underwater. This summer, we researched different modulation types for UWOC such as on-off-keying (OOK) and orthogonal frequency division multiplexing (OFDM). We developed a working OOK system to conduct performance analysis to maximize the effectiveness of our system. We found data such as the best color of LED and how the system performs in clear vs murky water. Our underwater system proved the potential for this area of study and with the implementation of our OFDM code and a laser diode transmitter, the

Rapid Detection of Methicillin Resistant Staphylococcus Aureus

Washkewicz College of Engineering

Student Researcher: Genevieve Mann

Faculty Advisor: Siu-Tung Yau

Poster 48

Develop a Virtual Environment for Learning Community-Based Cybersecurity Training

Washkewicz College of Engineering

Experimental Investigation on Effects of Boron Nitride Reinforcements in Titanium Matrix Composites

Poster 51

Hybrid Wind-Solar Energy Powered EV Charging Station

Washkewicz College of Engineering

Student Researcher: Ali Almusalli

Faculty Advisor: Navid Goudarzi

Abstract

Poster 52

Material Characterization of Natural Hydrogels for the Development of Nerve Scaffolds in Tissue Regeneration Applications

Washkewicz College of Engineering

Student Researchers: Kylie Schmitz, Colin Overy,