

WELCOME TO CELEBRATE PURDUE'S THINKERS, CREATORS, & EXPERIMENTERS

April 18, 2023 | 11am-1pm | PMU South Ballroom

Enhancing Cognitive Flexibility by Offering Performance-Noncontingent Rewards

Luke Dubec, *College of Health & Human Sciences*

Mentors: Yu-Chin Chiu and Corey Nack, *College of Health & Human Sciences*

Closing Excellence and Opportunity Gaps for Students from Traditionally Underserved Populations in Gifted Education: A Multi-Tier Systems of Support Approach

Annabelle Hock, *College of Education*

Mentors: Nielsen Pereira, Brenda Vieira, and Sarah Bright, *College of Education*

The Emergence of Covenant-lite Debt

Katrina Hu, *School of Management*

Mr. Burns Character Heads

Samara Kurdelak, *College of Engineering*

Nell Fahey, *College of Engineering*

Mentors: Tony Sirk and Mae Berg, *College of Liberal Arts*

Crafty Corner VR

Mary Neuman, *College of Liberal Arts*

Project Railmaster

Ramon Pardo, *College of Engineering*

Testing what happens to MuDR when it is being killed in a Mop1 background

Nicholas Roberts, *College of Agriculture*

Mentor: Damon Lisch, *College of Agriculture*

Sole-Spand: The Aesthetic Shoe for Patients with Severe Lymphedema

Carl Russell III, *College of Engineering*

Anjollie Ramakrishna, *College of Engineering*

Adaugo Ufomba, *College of Engineering*

Christopher Johns III, *College of Engineering*

Alana van Wijnen, *College of Engineering*

Mentor: Asem Aboelzahab, *College of Engineering*

Home-based leg heat therapy to improve walking performance in elderly individuals

Michael Sullivan, *College of Engineering*

Mentors: Bruno Roseguini and Bohyun Ro, *College of Health & Human Sciences*



Enhancing Cognitive Flexibility by Offering Performance-Noncontingent Rewards

Author(s):

Luke Dubec, *College of Health & Human Sciences*

Abstract:

Cognitive flexibility is a critical cognitive mechanism that is not yet understood well enough to reliably improve among populations which would benefit most from successful interventions. Current interventions rely heavily on providing participants with practice switching between different tasks. While this method does increase flexibility on the tasks used, few improvements are seen beyond the training context. According to Dreisbach and FrÃ¼ber (2019), performance-noncontingent rewards signal that important reward sources are being overlooked and acting with a more flexible cognitive state will aid in finding and exploiting them. We tested this hypothesis by offering participants performance-noncontingent vs. contingent rewards in a task-set shifting paradigm and measuring how rewards impact cognitive flexibility. As with prior research, we hypothesize that switches are easier in the performance-noncontingent reward condition. By testing a novel idea for modulating cognitive flexibility, this study lays the foundation for improving flexibility interventions among clinical, workforce, and aging populations.

Mentor(s):

Yu-Chin Chiu

Corey Nack

Closing Excellence and Opportunity Gaps for Students from Traditionally Underserved Populations in Gifted Education: A Multi-Tier Systems of Support Approach

Author(s):

Annabelle Hock, *College of Education*

Abstract:

This study aims to increase the enrollment of underrepresented gifted populations—Black, Latino, and Native American students, English learners, and students of lower socioeconomic status—in STEM programs in grades 6-12. This 5-year, multi-tier intervention combines STEM enrichment with affective (social-emotional) curricula and STEM career guidance for students. The project also offers training and support for teachers in identifying and supporting underserved gifted students in STEM. This Integrated STEM Talent Development Model (INSTEM) is based on the principles of Every Student Succeeds Act and the Schoolwide Enrichment Model and focuses in improving student engagement, motivation, self-efficacy, and interest in STEM. Tier 1 is available for all students in the specified grades and includes STEM enrichment, relationship-focused teaching training, and a universal screening of each students’ STEM-related academic potential. Tier 2 offers more advanced STEM curriculum and emphasizes achievement motivation and STEM career guidance within the curriculum. Lastly, students who participate in Tier 3 work individually with professional mentors on hands-on projects designed to solve real-world challenges. Data to assess the effectiveness of the model include student interviews, teachers’ evaluation of students’ engagement in STEM courses, student artifacts from the curriculum, and students’ achievement scores and grades. The project is funded by the Jacob K. Javits Gifted and Talented Students Education Program from the U.S. Department of Education.

Mentor(s):

Nielsen Pereira

Brenda Vieira

Sarah Bright

THE EMERGENCE OF COVENANT-LITE DEBT

Author(s):

Katrina Hu, *School of Management*

Abstract:

Debt covenants (Peterdy, 2023) are a set of rules or restrictions imposed by lenders on borrowers to ensure that the borrower will continue to perform or behave in a certain way regarding their finances. The purpose of these covenants is to protect the interests of the lenders by reducing the risk of default or other adverse events that could harm the borrower's ability to repay the loan. They are usually part of loan agreements and are meant to protect the lenders' interests. Some examples of debt covenants are restrictions on certain types of business activities or investments, limits on how much more debt the borrower can take on, and requirements to keep certain financial ratios and levels of liquidity. In addition, debt covenants can place limitations on the amount of additional debt that the borrower is allowed to take on.

Mentor(s):

Mr. Burns Character Heads

Author(s):

Samara Kurdelak, *College of Engineering*

Nell Fahey, *College of Engineering*

Abstract:

These oversized Cat and Mouse heads were created to be worn by the 'Itchy and Scratchy' characters in Purdue Theatre's recent production of Mr. Burns, A Post Electric Play. Requirements included that the heads be light and sturdy enough to be worn safely throughout action and choreography sequences, while also being as large possible. They consist of foam mounted on an internal support structure and harness system.

Mentor(s):

Tony Sirk

Mae Berg

Crafty Corner VR

Author(s):

Mary Neuman, *College of Liberal Arts*

Abstract:

This project was an exploration of the possibilities offered by the metaverse. The objectives were to gain skills in experience design, environmental graphic design, and the use of time-based media. I chose to focus on the theme of "Crochet" and customized one of the gallery spaces offered by Spatial to create a virtual reality experience. The graphics that I designed let users know the importance of the space and gave the experience a purpose. I wanted to share my passion for crochet with others and included informational, inspirational, and educational elements in this virtual space. I chose a muted, earthy color palette to give a sense of comfort and ease to those in the space, and designed my walls in such a way that they appear as a kind of crafty collage. I also made use of the free 3D models offered by Spatial to add various crocheted creatures into the space and bring it to life.

Mentor(s):

Project Railmaster

Author(s):

Ramon Pardo, *College of Engineering*

Abstract:

Project Railmaster is a custom / Collaborative E.V Project, set on making one of the worlds most exotic Electric Skateboards, and to inspire a new innovative take on E.V projects for inter-city and inter-suburban travel

Mentor(s):

Testing what happens to MuDR when it is being killed in a Mop1 background

Author(s):

Nicholas Roberts, *College of Agriculture*

Abstract:

Transposons are parasitic DNA that can make up a majority of all the DNA in both plant and animal genomes. In order to survive, these stretches of DNA make duplicate copies of themselves, which insert at new positions in the genome. Because these insertions can be into genes, they can be highly mutagenic and have been implicated in a number of human genetic diseases. To control transposons, all forms of life, including both plants and animals, have a special kind of "immune system" whose job is to keep these parasites from replicating by epigenetically silencing them. This results in transposons that cannot express the proteins they need to replicate. In plants, this silencing requires a number of proteins, including MOP1 in maize, a protein that is required for maintenance of a specific chemical modification of cytosines, one of the four DNA bases. My experiment exploited a transposon system in maize that involves an active transposon, a locus called "killer" that can trigger the silencing of that transposon, and a mutation in the Mop1 gene. To see if Mop1 is for the killer to silence the transposon, I used DNA extraction and genotyping to identify members of a single family that segregated for the transposon, the killer, and the mutant. We hypothesize that the killer will not be able to silence the transposon in the mutant genetic background. Sibling classes will be used as controls.

Mentor(s):

Damon Lisch

Sole-Spand: The Aesthetic Shoe for Patients with Severe Lymphedema

Author(s):

Carl Russell III, *College of Engineering*

Anjollie Ramakrishna, *College of Engineering*

Adaugo Ufomba, *College of Engineering*

Christopher Johns III, *College of Engineering*

Alana van Wijnen, *College of Engineering*

Abstract:

EPICS (Engineering Projects in Community Service) is a service-learning design program run by Purdue University. It strives to teach students design skills by providing solutions for individuals, communities, and organizations in the surrounding area while mirroring engineering industry standards. BME (Bio-medical Engineering) is a team within EPICS that strives to serve community partners through biomedical applications. HR is a patient that suffers from severe lymphedema. This condition results in her foot swelling three times its original size and requires her to prescribe to weekly leg compression therapy. Current shoes that are prescribed are only slightly adequate. However, they eventually lead to sores and pain due to fitting improperly and the expansion of her legs before her next round of treatment. She reached out to the Weldon School of Biomedical Engineering to seek a solution to her periodic pains. The project is to design and fabricate a prototype shoe that addresses the patient's need to walk around with shoes while effectively accommodating her symptoms. The primary user needs to address are condition accommodation, aesthetics, comfort, ease of use, cost, utility, and standardized documentation language. The design uses a novel break-sole passive expansion system that exceeds the normal passive expandable properties of other expandable shoes in addition to several expandable points to aid in functionality and comfort. The hope is that with this product, HR has the chance to get back to the things that she loves like photography and hiking in nature.

Mentor(s):

Asem Aboelzahab

Home-based leg heat therapy to improve walking performance in elderly individuals

Author(s):

Michael Sullivan, *College of Engineering*

Abstract:

Abstract Redacted.

Mentor(s):

Bruno Roseguini

Bohyun Ro