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TUDENT CENTER

WICHITA

NATURAL SCIENCES AND ENGINEERING ORAL PRESENTATIONS

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EXHIBITION/PERFORMANCE PRESENTATIONS

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POSTER PRESENTATIONS

Anna Brake
Faculty Mentor(s): Dr. Nikki Keene Woods
Fairmount College of Liberal Arts & Sciences
Poster Presentation: Applied Sciences

SURVEY ON THE ACCEPTABILITY OF A FETAL MONITORING DEVICE

Pregnant mothers living in rural areas are faced with reduced access to adequate maternal and fetal healthcare, leading to disparities in delivered care and contributing to increased adverse birth outcomes for mothers and babies. Using remote monitoring may help mitigate these issues. This project focuses on piloting a survey that will allow

through the nation at an exceptional rate, so it must be good right? Yet we ask ourselves, is this grading system [j a aͣc\ˊᵗh˚ej gedhZˊidˊZf j VaͤoͦZˊZYj XVi ˊdcˊVXgdhhˊï] ZˊXdj cignˊl] ᶺzˊhiˊaͤihj   XˊZcianˊegͦZeVgͨc\ˊhij YZcihˊ[dgˊ] ^] Zgˊ education and/or life? In this study, we surveyed Kansas educators regarding their experience with traditional and SRG grading systems, asking not for the data behind graduation rates, pass/fail rates, or student performance. But the data behind the real classroom experience. What's working, what's not, how can we improve, and are SRGs the future for all levels of education?

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Jada Nichols
Faculty Mentor(s): Dr. Daniel Bergman
College of Applied Studies
Poster Presentation: Applied Sciences

INCORPORATING TECHNOLOGY IN THE CLASSROOM: A HELP OR HINDRANCE

Throughout my time studying education, I have heard a variety of opinions regarding applying the use of technology in i] ZˊXaͣV/hhgoddb #>] VkZˊVahdˊZcXdj ciZgͦZYˊb Vcnˊd[ˊï] ZˊegdhˊVcYˊXdchˊ ghiˊ"] VcYˊYj gͨc\ˊb nˊhij YZciˊïZVX] ˊc\ˊZmͤeZgͦZcXZh# To better understand if technology enhances student engagement, or if it leads to further distraction, I will observe my students as they complete both paper worksheets and assignments that incorporate technology and compare how frequently they are spotted off task.

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Jessica Orchard, Nancy Martinez, Yareli Mendoza
Faculty Mentor(s): Ms. Martin
College of Health Professions
Poster Presentation: Applied Sciences

ORAL HYGIENE CARE FOR THE DISABLED ADULT

Purpose: Oral Hygiene Care for Adults with Disabilities is a dental hygiene program created to provide education for i] ZˊYᵗhVWᵉZYˊVYj aͤˊedej aͤVi ˊdc#l] ᵗhˊegd\gͦVb ˊVͤb hˊidˊ\ˊkZˊXVgͦZ\ˊkZghˊVcYˊVYj aͤˊihˊZ   XˊZci ˊdgͦVaͤ] ZVaͤ] ˚chij Xi ˊdchˊVcYˊ b dYˊ^ XVi ˊdchˊid˚b VͨciVˊc˚VˊhiˊVWᵉZˊf j Vaͤnˊd[˚aͤ[Z#
Methods: Scholarly articles from National Library of Medicine, PubMed, The Journal of the American Dental, and the CVi ˊdcVaͤ8dj cXˊaͤdc˚9ᵗhVWᵉaͤnˊl ˊZgͦˊï] Zˊb VˊcˊgͦZhdj gͦXZhˊid˚ cYˊcˊc[dgͦ Vi ˊdcˊVWᵉdj i ˊï] ZˊdgͦVaͤ] ZVaͤ˚d[ˊVYj aͤihˊl ˊᵗ] ˊᵉe] nhˊXVaͤ disabilities. The delivery was through a PowerPoint with a demonstration to measure the audience's comprehension.
Results: The residents at The Timbers had an increased understanding of why oral hygiene is important for overall health. These adults with disabilities received instruction on how to modify their oral health aids according to their individual needs.
Implications: The presentation of this research would decrease the amount of caries and tooth loss for disabled eVi ˊZcih#l] ᵗhˊl dj aͤˊb egdkZˊï] ZˊdgͦVaͤ] ZVaͤ˚d[ˊi] ZˊYᵗhVWᵉZYˊedej aͤVi ˊdcˊˊc˚ï] ZˊXdb b j cᵗn#l] Zˊh^\c^ XVci ˊVhhdXˊᶺVi ˊdcˊ between oral health and systemic conditions was also discussed with the residents so that they would have the necessary education to take care of their oral hygiene. This contributes toward the Healthy People 2030 oral condition objectives by promoting oral care, which can potentially reduce cavities, gum disease, and encourage oral health. GZXdb b ZcYVi ˊdch$8dcXaͣj h˚dc/ᶜˊï] Zˊ[j ij gͦZ!ˊᵗᵗl ˊdj aͤˊWZˊWcZ   XˊVaͤiˊdˊgͦZkͤhᵗï] Zˊgͦh YZcihˊd[ˊl] Zˊ ˊb WͦZgͦhˊid˚dWͤV/ᵗc˚ ᶜ[dgͦ Vi ˊdcˊVWᵉdj i ˊˊ] ViˊdgͦVaͤˊn\ͦZcZˊVˊY˚b dYˊ^ XVi ˊdcˊï] Zn˚b eaͣb ZciͦZYˊ˚ᶜcid ˊï] ZˊgͦdgͦVaͤˊn\ͦZcZˊgͤdj i ͦcͦZˊVcYˊ˚dl ˊ hj XXͤhh[j aͤˊi] dhZˊb dYˊ^ XVi ˊdcˊ Zgͦ#l] ᵗᶜ[dgͦ Vi ˊdcˊ dj aͤˊZᶻᵈdi] ZgͦYZciVaͤ] n\ͦZˊᵗhihˊ˚cdl ˊˊ] Viˊb dYˊ^ XVi ˊdcˊid˚ suggest to adults with disabilities. With a better understanding of what teaching methods are most helpful and what dgͦVaͤ] n\ͦZcZˊˊb dYˊ^ XVi ˊVgͤˊb dhiˊWͤcZ ˊXʌVaͤˊï] ZˊïZVb ˊXdj aͤˊb egdkZˊdcˊï] Zˊˊgͤdj i ͦcͦZˊˊegͦZhZciVi ˊdcˊid ˊï] ᵗhˊ demographic in the future.

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Cassidy Parks
Faculty Mentor(s): Donna Robinson
College of Health Professions
Poster Presentation: Applied Sciences

THE KEY TO CLEAN SMILES: WATERPIK VS STRING FLOSS

Art is a medium that allows people to connect with diverse cultures and historical periods. Unfortunately, not everyone has access to these artifacts as most are located in faraway international museums that can be expensive to visit. I] Z˘\adWWǎig̋ZcY˚d[˚b j hZj b h˘Y^↑˚ȯ˚c\˘VcY˘j eᴀdVY˚c\˘Hl A˚ ᴀZh˚d[˚ï] Z˚g̋Xdᴀ ZXi˚dch˚eg̣dk˘YZh˘Vc˚deedg̣j c↑n˚ïd˚g̣ZeᴀXViZ˚ these pieces using additive manufacturing. Our solution to this accessibility issue was to use clay and a 3D printer to recreate any desired artwork. We explored the feasibility of the Delta Wasp 2040 and various clays, ultimately settling on a mixture of Nepheline Syenite, Silica, Grolleg Kaolin, OM4 Ball Clay, and plasticizer, for optimal print quality. B j ᴀ˚eᴀZ˘Hl A˚ ᴀZh˚l Zg̣Z˚eg̣˚ciZY˚ïd˚ïZhi˚di] Zg̣eg̣ci˚c\˚eVg̣/b ZiZg̣h˚ᴀ˚ Z˚ᴀVnZg̣] Z^\] i!˚cdoỏZ˚h˚ȯZ!˚eg̣Zhhj g̣Z!˘VcY˚eg̣ci˚heZZY# ; ˚cVᴀnl˚l Z˚Xj g̣/ViZY˘VcY˚eg̣ciZY˘Hl A˚ ᴀZh˚[g̣db ˘Y↑[Zg̣Z˚ci˚b j hZj b h˘VcY˚di] Zg̣dcᴀ˚cZ˚hdj g̣XZh˘VcY˚l Zg̣Z˚WᴀᴀZ˚ïd˚g̣ZeᴀXViZ˚ them. Our work shows that it is possible to recreate art pieces in a cost-effective and easily replicable way, making them accessible to everyone, and reviving history, culture, and eras.

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Lauren Coffman
Faculty Mentor(s): Dr. Yongkuk Lee
College of Engineering
Poster Presentation: Natural Sciences & Engineering

PORTRAYING SKIN-LIKE ELECTRODES USING A BIOMIMETIC SKIN PHANTOM

Lightweight wearable electrodes advance modern medical technology and the lives of patients. To produce these medical devices, human subjects must be available for testing. Obtaining a diverse group of human subjects is challenging; therefore, our solution is to fabricate a skin phantom for companies that is low-cost and easy to produce. The skin phantom consists of the lower deep tissue layer and the upper stratum corneum. The upper layer consists of hundreds of holes in 0.2 mm diameter cut by a laser cutter to achieve a porosity of 1.4%. The deep tissue layer consists of 0.9% saline solution in polyvinyl alcohol (PVA) to create cryogels using a freeze-thaw technique. Our objectives include 1) completing fabricated skin phantom, 2) analyzing performance data with impedance b ZVhj g̣Z˚b Zcih˘VcY˚hi˚b j ᴀ/ViZY˚: 8<˚h^\cVᴀh!˘VcY˚(ꟸ˚ cVᴀn˚Xdb eVg̣˚c\˚ï] Z˚b eZYVcXZ˚d[˚dj g̣h` ˚c"ᴀ^ Z˚ZᴀZXig̣dYZh˚ ꟸ ↑] ˚dcZ˚d[˚b ZY˚XVᴀ\g̣/YZ˚ZᴀZXig̣dYZh˚dc˚ï] Z˚e] Vcidb #l d˚Xdc g̣b ˚ï] Z˘h` ˚c˚e] Vcidb ˚] Vh˘V˚h` ˚b eZYVcXZ˚ g̣/c\Z!˚ kZ˚] j b Vc˚hj WZ˚Xih˚j cYZg̣\d˚ïZhi˚c\˚ïd˚dWW˚c˚l˘l hZᴀcZ˚cZ˚[dg̣ZᴀZXig̣dXVᴀ˚eZg̣[dg̣p VcXZ#8j g̣/Zci˚ïZhi˚c\˚˚cXᴀj YZh˚ XdᴀᴀZXi˚c\˚h` ˚c˚˚b eZYVcXZ˚YViV˚[g̣db ˚ kZ˚ïZhi˚hj b eZYVcXZ˚l Z˚Xih˘VcY˚ï] Z˚VXi↑kZ˚h` ˚c˚c˚e] Vcidb ˚l ↑] ˚'V˚h˚b j ᴀ/ViZY˚: 8<˚h^\cVᴀ#Dj g̣ g̣ results so far show that the skin phantom is easy to produce, low in cost, and eliminates the need for human test subjects when conducting experiments for wearable electrodes.

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Whitney Crawford
Faculty Mentor(s): Martin Ratcliffe
College of Engineering

Pedro Cupertino
Faculty Mentor(s): Dr. Adam Lynch
College of Engineering

Poster Presentation: Natural Sciences & Engineering

INTEGRATED PROJECTS: ANALYSIS OF POWER TRANSMISSIONS SCALED TO TURBOMACHINERY

Edl Zg̃ig̃/chb ʌi ʌ∿\ ̈ij g̃/db VX] ʌcZh ̄Vg̃Ζ ƒig̃/chb ʌi ʌ∿\ ̈edl Zg̃[gdb ̆ʌcej i ̈h] V[i ̈id ̄Vc ̈dj iej i ̈h] V[i#ΝZi ̈hXVᾱY ̆egdYj Xih ̆ with similar feature has been shown to drive greater student engagement. Therefore, we evaluated the effect of integrating undergraduate and graduate engineering classes using a unifying a power transmission device. Each class I dg̃ ZY ̈dc ̄V ̄Y∫[ZgᾹci ̈iZX] c ̋XVᾱXdb edcZci ̈d[̈i] Z ̆egdYj Xi ̈j h ʌc\ ̈i] Z ̂g̃Xdj g̃hZ ̂heZX^ X ̄V\dYn ̊d[̈̆ cdl aᾱY\Z#6 ̈j c ̋[dg̃o ZY ̆ Six Sigma DMAIC project methodology was employed as well as consistent Entrepreneurial Mindset team building in class.

PURPOSE / HYPOTHESIS: o identify the impact on students' knowledge assimilation and industry preparation based on an integrated project in complementary engineering classes covering different levels of the same product development, namely a battery operated, power hand tool who's central drive transmissions can be scaled to many other industrial motor as well as transportation applications, such as turbomachinery.

Jenna Ercolani
Faculty Mentor(s): Dr. Laila Cure
College of Engineering
Poster Presentation: Natural Sciences & Engineering

IDENTIFYING AND VALIDATING PERCEIVED WORKLOAD METRICS FOR EMERGENCY MEDICAL SERVICES

: b Zg\ ZcXn˘B ZY˘XV̌aHZgk˘XZh˘Ŀ: B Hŀ˘j hZ˘l˘ dg˘ adVY˘hj ggd\ViZh˘id˘˚c[dg̊b ˘YZX˘h˘dch˘hj X] ˘Vh˘hiV ˘ c\˘VcY˘Y˘heViX] ˘c\# The most common workload surrogates are overall call volume and Unit Hour Utilization (UHU). However, these surrogates have not been validated as workload metrics in EMS context and their validity has been challenged given that they do not account for indirect work or for the variability in effort associated with different calls. This study investigates the relationship of commonly used EMS operational metrics with perceived workload to evaluate their Veegd̊egˇViZcZhh˘Vh˘hj ggd\ViZh#L ˘Z˘Veeǎ̊ZY˘V˘b dY^˘ZY˘kZgh˘dc˘d[˘ï] Z˘C̊6H6˘l˘Vh` ˘AdVY˘˚꜀YZm̊hj gkZn˘id˘Vb Vj̊åcXZ˘ crewmembers at various points in time during several shifts to assess the corresponding perceived workload and paired the responses with operational measures based on dispatch data. The operational metrics studied included: dkZg̊V̌aïXV̌ǎkdaj̊b Z!˚J = J !˚eg̊dg̊ń˘hig̊V̌i^ ZY˘XV̌ǎikdaj̊b Z!˚꜀ꜝ˘V̌aVXj ꜝ˘ń˘hig̊V̌i^ ZY˘XV̌ǎikdaj̊b Z!˚XV̌åǦ̌̊ZhedchZ˘j i ꜝ˚åoVi˘dc!˚ b ZVc˘ꜝ˘b Z˘Vu̇il ZZc˘XV̌aŀh!˚VcY˘XdZ ˘ X̊Zci ˘d[˚kVg̊Vi˘dc˘d[˘ꜝ˘b Z˘Vu̇il ZZc˘XV̌aŀh#A˚꜀ZVg̊g̈Z\ g̊Zhh˘dc˘b dYŽah˘l ˘Zg̊Z˘j hZY˘id˘ ZkVaj̊ViZ˘l] Z˘˚꜀ j ZcXZ˘d[˚ZVX] ˘b Zig̊X˘dc˘eZg̊XŽ̊kZY˘l˘dg˘adVY˘#Ad\˘h̊i˘X˘g̊Z\ g̊Zhh˘dc˘b dYŽah˘l ˘Zg̊Z˘j hZY˘˚YZci˘[̌n˚ꜝ˚ꜝ˘ï] ZgZ˚ l ZgŽl ˘Zå YZ ˘cZY˘˚kVj̊ Zh˘d[˘ï] Z˘XVcY˘Y̌ViZ˘b ZigXh˘˚꜀Y˘XVi˘꜀\ ] Vk˚꜀˘꜀Xj ggZY˘V̊˘[V̌g̊gYVnh˘l˘ dg˘#L Z˚[dj cY˘ï] Vi˘dkZg̊V̌å XV̌ǎikdaj̊b Z˚Ŀe"˘kVaj̊ Z2%#%%% !˚GS˘ 2%#(ꜝ˘l˘VcY˘˚J = J ˘Ŀe"˘kVaj̊ Z˚2˚%#%%) !˚GS˘ 2%# (ꜝ˘Zmeả/˚꜀˚åZhh˘ꜝ] Vc˘] Vaj̊˘d[˘ï] Z˘kVg̊VW̊aîn˘˚꜀˘ eZg̊XŽ̊kZY˘l˘dg˘adVY˘#Eg̊dg̊ń˘hig̊V̌i^ ZY˘XV̌ǎikdaj̊b Z˘Ŀe"˘kVaj̊ Z˚2#%%% !˚GS˘ 2%#-*ꜝ˘Zmeả/˚꜀ZY˘b dg̊Z˘d[˘ï] ꜝ˘ń˘kVg̊VW̊aîn˘l˘]˘ ꜝ˘eg̊dg̊ń˘hig̊V̌i^ ZY˘XV̌ǎikdaj̊b Z˘l˘ Vh˘V̌ahd˘hi˘ńVi˘ń˘XVan̊h˘꜁˘c^ XVci˘˚꜀˘YZci˘[̌n̊꜀˘꜀Xj gg꜀˘V̊˘[V̊\ ꜝ̊ dg˘adVY˘#L Z˘XdcXaj̊ YZ˘ï] Vi˘ XV̌ǎikdaj̊b Z˘ǹ˚chj ˚ ˚ X̊Zci˘id̊Ǧ̌̊eg̊ZhZci˘eZg̊XŽ̊kZY˘l˘dg˘adVY#

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RJ Kunde, Henry Hartjes
Faculty Mentor(s): Brandon Buerge
College of Engineering
Poster Presentation: Natural Sciences & Engineering

FLIGHT SIMULATION OF AN AIRSHIP USING A SIX DEGREE OF FREEDOM MODEL
The objective of this research was to develop a highly precise aerodynamic model of an airship through the utilization

Stewart McClelland
Faculty Mentor(s): Dr. Ikramuddin Ahmed
College of Engineering
Poster Presentation: Natural Sciences & Engineering

CARBON FOOTPRINT ANALYSIS OF WICHITA STATE UNIVERSITY'S ELECTRICITY USAGE

This research's main intent is to update the carbon footprint in respect to scope 2 emissions of Wichita State University from a previous study in 2019. All data was collected by the team as a part of the First Year Research Experience program. The data that will be collected and used in this study will be gathered from the Wichita State's electricity bills, natural gas bills, and a survey of student, faculty, and staff commuting and parking. This data will then be converted into kg CO_2. This data was then categorized and ordered into the largest emission sources to the least. Analysis of the collected data will provide us an opportunity to suggest changes that Wichita State could make to approach a carbon neutral footprint more quickly. Additionally, this study should be used for future revisions of Wichita State's carbon footprint as was the intention of the previous study as well.

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Treavor McLeland
Faculty Mentor(s): Yongkuk Lee
College of Engineering
Poster Presentation: Natural Sciences & Engineering

USING A VIRTUAL REALITY HEADSET AND FLEXABLE ELECTRONICS TO TRACK EYE MOVEMENT BY USING EOG FOR EYE THERAPY

Some people are born with abnormal visual development that leads to visual impairment in those individuals. To help correct this people with these impairments will need to seek treatment from a professional to correct it. This will take time out of someone's day as they will need to drive the individual to the professional so that they can have proper care in treating their visual impairment. The objective of this study is to see if virtual reality can be used for eye therapy by recording the EOG data to see if the therapy is working. This study will be using dots on a wall going horizontally and vertically and the patient sitting some distance away from the wall with their eye level being on the XZciZg

Nhu Nguyen
Faculty Mentor(s): Dr. Wei Wei
College of Engineering
Poster Presentation: Natural Sciences & Engineering

EXPLORATION OF PEROVSKITE SOLAR CELL, A FUTURE ENERGY DEVICE

The energy and environmental issues promote the research about renewable energy sources that are pollution-free and contribute towards reducing the greenhouse effects. Out of many renewable energy sources, Solar Photovoltaic (PV) systems are most popular which convert solar energy into electricity. Commonly used PV systems are silicon based. However, Perovskite Solar Cells (PSCs) based on metal halides are gaining popularity as the most promising VcY˘Xdb eZi˘c\˘ĔK˘iZX] cdᴂd\n˘WZXVj hZ˘d[˘ʾ↑h˘] ∧] ˚edl ˚ZgˉZ ˉ X˘ZcX˘Zh˘Xdj eᴂZY˘ǐ ↑] ˚adl ˚egᴂdYj Xi˘dc˘Xdhi˘VcY˘ZVhZ˘d[˘ fabrication. Organometal halide perovskite solar cell follows a general perovskite crystal structure of ABX3, where A is a larger cation such as methylammonium (MA+), formamidinium (FA+) and B is a smaller cation such as lead (Pb+2) or tin (Sn+2) and X is an anion consisting of halide such as Iodine (I-), chlorine (Cl-) or bromine (Br-). PSCs include ˙ kZ˚ᴂ/nZgh/˘ j dg˚cZ”YdeZY˘ï˚c˘dmᴂYZ˘Ł; I Dł˘\ᴂ/hh!˘ZᴂZXigᴂdc˘ig/chedg ˚ᴂ/nZgᴈ I Ał!˘ĔZgᴂdkh` ↑Z˚ᴂ/nZgᴈ] dᴂZ˘ïg/chedg˘Vi˘dc˚ material (HTM), and counter electrode (Ag, Au, Pt, carbon etc). This project researches the performance of PbI2 with Methylammonium Iodide (MAI) as a perovskite layer, poly(3-hexylthiophene-2,5-diyl) (P3HT) as a hole transportation b ViZgᴂVᴂˉVcY˘b Zhdedgᴂdj h˘XVg/ᴂdc˘Vh˘Xdj ciZgᴂZᴂXigᴂdgᴂYZ!˘ᴉ] ˘X] ˚ᴂZY˘ïd˚V˘] ∧] ˘Z˙ X˘ZcXn˘d[˘j e˙id˚&' #&, ⁄ #

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Thu Nguyen
Faculty Mentor(s): Yongkuk Lee
College of Engineering
Poster Presentation: Natural Sciences & Engineering

FABRICATING A SOLID-STATE REFERENCE ELECTRODE WITH LONG-TERM STABILITY FOR SWEAT MONITORING SYSTEM

Valuable biomarkers such as glucose or enzymes are found in human sweat, making it a great resource in diagnosing and measuring biomarker concentrations. However, many commercial sweat monitoring systems are bulky and ZmᴂeZch˘kZ#ᴉ] ZgᴂZ[dgᴈ!˘dj g˘\dVᴂˊh˘id˘YZkZᴂde˘V˘ᴉ ˚gᴂZhh˘hnhiZb ˘ï] Vi˘ʾh˚ ZmᴂWZ!˚gᴂZᴂVWᴂZ!˘VcY˚cdc"˚ckVh˘kZ#ᴉ] Z˚ ᴄhi˘hiZe˚ of this project is to fabricate a solid-state reference electrode with long-term stability and Ag/AgCl electrode is chosen Yj Z˚id˚↑h˚ZVhZ˘d[˘[VWᴄᴂgᴂXVi˘dc#; gdb ˘ï] Z˚egᴂZk˘dj h˘ᴉ dg˘h!˘h˚ᴂkZgᴂŁ6\ł˘ᴉ ˚gᴂh˘Vgᴂˊ ˘ghi˚ᴈ b ZghᴂZY˚ᴄid˚&B ˚; Z8ᴂ ˚hdᴂj i˘dc˚ to form a thin layer of AgCl and then coated by 1 mM MCH to reduce the dissolution rate of AgCl. The current study focuses on investigating various salt-containing membranes as the third layer to minimize potential drifts on the reference electrode. The two mixtures of PVB + NaCl + methanol, and PVA + KCl + DI water have been explored and drop casted on the fabricated reference electrodes. The potential differences between the electrodes and commercial reference electrode in different pH solutions are measured by using a digital multimeter to test the stability. Energy dispersive X-ray spectroscopy (EDS) is used to determine the concentration of each element in the solution to discover how each solution contributes to the performance, and to detect the drawbacks. Results show that the mixture of PVA + KCl + DI water takes a much longer time to dry out compared to the mixture of PVB + NaCl + methanol. The EDS results indicate that the solution of PVB + NaCl + methanol is not effective since sodium and chloride molecules are not detected. This result can be improved by modifying the concentration or changing the compound. The outcome of this research may provide additional information for future research regarding the fabrication of Ag/AgCl reference electrode.

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GOLD CYANIDE EXTRACTION BY COLLOIDAL SYSTEMS

cyanide and cyanide are negatively charged, both should associate with positively charged vesicles in a colloidal state. By mixing a metal slurry with a solution positively charged vesicles, the gold cyanide complex associates with

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DESIGNING BIOWEARABLE SKIN SENSORS FOR WIRELESS PPG SIGNAL MONITORING

Wearable sensors that can accurately read signals given from the body is an avenue of biomedical research uncomfortable to the user, often needing cuff-based devices and other invasive techniques to accurately collect data. This presentation will describe the process and steps taken in the fabrication and testing of a user comfortable,

i] Vi˚g̱‾Ẕ‾ZXi˚A< 7I F ž˚YZci↑˚Zh˚b Vnïg̱Vcha̱ViZ˚¢id˚YZ VcXZ˚VcY˚ZkZcij VãhZạ̈VXXZeiVcXZ!˚g̱hj á˚c\˚°c˚V˚hZchZ˚d[˚g̱a̱Ẕ[˚
once the individual leaves the community setting.

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NA'ABUKO: A CONSTRUCTED LANGUAGE INSPIRED BY AFROFUTURISM

An alien race has come to earth. Their announcement is that all members of what is now known as the Black diaspora were deposited by them onto Earth millions of years ago. This foreign alien race has now come back to return their people to their planet of origin. The language that results from years of assimilation and co-mingling after relocation on this new planet is Na'abuko.

This project investigates two primary research questions: How would members of the Black diaspora's language change as they learn the language of their ancestors and how would ion

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DEFINING THE INTERFACE BETWEEN PALLADIN AND ACTIN USING CROSSLINKING MASS SPECTROMETRY

EVaaVY ̌c ̌1 Vh ̌Y ̌hXdkZg ̌ZY ̌°c ̌" %%%VcY ̌] Vh ̌WZZc ̌h]dl c ̌id ̌ea/n ̌V ̌h ̂c^ XVci ̌gd ̌aZ ̌°c ̌VXi ̌c ̌\gdl i] ! ̌Vand ̌~ cdl c ̌Vh ̌ polymerization, which is a key mechanism in cancer metastasis. A single immunoglobulin domain (Ig3) of palladin] Vh ̌WZZc ̌°YZci ^ ZY ̌Vh ̌i] Z ̌edg ̌dc ̌1] /X] ̌WcYh ̌Y ̌g ̌ZXian ̌id ̌VXi ̌c ̌VcY ̌i] ZgZ ̌Vg ̌Z ̌hZkZg ̌Vaanh ̌cZ ̌Vb ̌cd ̌VX ̌Yh ̌1] /X] ̌"] VkZ ̌ been shown to be responsible for this interaction with actin. Ig domains have not been previously associated with actin binding and it is not yet known which amino acids on the surface of actin participate in its interactions with palladin. Currently we are conducting chemical crosslinking mass spectrometry (XL-MS) experiments to gain a better understanding of which residues are found at the interface between actin and palladin. For crosslinking experiments,
VXi ̌c ̌"h ̌edanb Zg ̌oZY ̌WZ[dg ̌Z ̌VYY ↑ ̌dc ̌d[̌Xgdhha ̌c` ̌c\ ̌g ̌ZV\Zci ̌h ̌i] Vi ̌1 ̌ ̂ai[dg ̌b ̌XdkVZci ̌WdcYh ̌WZi ̌l ZZc ̌heZX^ X ̌X] Zb ̌XVa ̌\gdj eh ̌dc ̌i] Z ̌hj g ̌d[̌VXZ ̌d[̌eVaaVY ̌Y ̌c ̌c ̌VcY ̌VXi ̌c ̌#; j ij g ̌Z ̌ZmeZg ̌b Zcih ̌id ̌Xdc gb ̌i] Z ̌MA"B H ̌g ̌Zhj aih ̌1 ̌ ̂aaiZciV ̂ai] Z ̌Zmeg ̌Zhh ̌dc ̌d[̌WZiV ̌VcY ̌\Vb b V ̌VXi ̌c ̌°c ̌E ̌/X] ̌V ̌eVhidg ̌h#L Z ̌1 ̌ ̂aaj hZ ̌h ↑ ̌Z ̌Y ̌g ̌ZXiZY ̌b j iV\ZcZh ̌h ̌id[̌VXi ̌c ̌g ̌Zh ̌Yj Zh ̌°YZci ^ ZY ̌°c ̌
XL-MS to determine exactly which residue on actin is responsible for its interactions with palladin. This approach, if
hj XXZhh ̌[j a ̌1 ̌ ̂aaWZ ̌V ̌edl Zg[j aiddä ̌[dg ̌YZci ^ [n ̌c\ ̌heZX^ X ̌g ̌Zh ̌Yj Zh ̌°i] Vi ̌Vg ̌Z ̌ckdakZY ̌°c ̌i] Z ̌eVaaVY ̌c ̌°c ̌ciZg ̌VXi ̌dc ̌1 ↑] ̌°
F-actin, which would consequently allow us to examine the biological role of this interaction, both in vitro and in
k ↑ kd! ̌j h ̌c\ ̌VXi ̌c ̌WcY ̌c ̌"YZ X ̌Zci ̌°dg ̌XVcXZg ̌Vhhd dX ̌ViZY ̌eVaaVY ̌c ̌°b j iVcih ̌VcY ̌] Vh ̌Veea ̌XVi ̌°dc ̌°c ̌i] Z ̌YZkZ ̌Zdeb Zci ̌°d[̌
therapies to drastically slow pancreatic cancer metastasis.

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MODELING CONDUCTOR ELONGATION IN OVERHEAD TRANSMISSION LINES

The U.S. transmission grid is rapidly aging with 70% of transmission lines older than 25 years. Maintenance of transmission lines has traditionally involved visual inspection of line degradation, which is costly and time consuming given the large size of the grid. The objective of this study is to model the sag degradation of transmission lines over time by calculating and predicting the inelastic elongation in conductors. Using inelastic elongation as a health index, we analyze the sag degradation of transmission lines under various environmental and operational scenarios
g ̌Zeg ̌Zh ̌Zci ̌c ̌°i] Z ̌ ̂b eVXi ̌d[̌Xa ̌b ̌ViZ ̌"X] Vc\Z ̌Vc\ ̌Z ̌"hXVa ̌Z ̌ZXig ̌Xig ̌g ̌ Xig ̌Xig ̌i# L Z ̌Zb eadn ̌ ̂hidgXVä ̌Vib dhe] Zg ̌X ̌d[̌ZceZg ̌ VcYeh ̌dc ̌i] ̌X] ̌VXYj ̌c ̌°c ̌YVY ̌c ̌°idi ̌Vi ̌Z ̌e ̌idfo` ̌VZ ̌Y ̌Y ̌XYc ̌Z ̌V ̌hc ̌Y ̌YV ̌g ̌fd ̌g ̌physics-based
b dYZah ̌c ̌°id ̌XVäkj a ̌a ̌ViZ ̌°c ̌Zä/hi ̌X ̌°Zadc ̌\Vi ̌dc ̌VXXj b j a ̌ViZY ̌°c ̌V ̌XdcYj Xidg ̌\ ↑ kZc ̌i] Z ̌adc ̌\" ̌iZgb ̌ ̂h ̌iZg ̌Zhh ̌egd ̌a ̌Z#HZch ↑ ̌k ↑ n ̌
VcVanh ̌h ̌h ̌n ̌n ̌eZg ̌[dgb ̌ZY ̌[dg ̌ZY ̌c ̌°i] Z ̌hZkZg ̌ ̂n ̌VcY ̌°[g ̌j ZcXn ̌°d[̌Zmi ̌g ̌Zm ̌Z ̌1 ̌ZVi] ̌ZgdZg ̌Zcih ̌Vh ̌1 ̌ZaaVh ̌i] ̌Z ̌b V\c ̌j j YZ ̌d[̌edl Zg ̌dl ̌°
dc ̌°i ̌g ̌V/chb ↑ hh ̌dc ̌°äc ̌Zh# ̌] dl ̌c ̌°i] Z ̌dVc ̌ah ̌] dl ̌dl ̌ Y ̌dWV\V ̌ZZY ̌g ̌Zhj aih ̌Vd ̌ ̂c ̌dg ̌b ̌c ̌heZ ̌Xi ̌dc ̌VcY ̌b V ̌ciZVcXZ ̌°YZXh ̌dch#
health index to inform inspection and maintenance decisions. Sensitivity analysis results show that an additional
 ̌cXg ̌Z ̌VhZ ̌°c ̌°c ̌edl Zg ̌dl ̌ ̌°ZVYh ̌°id ̌°i] Z ̌b Vm ̌b j b ̌°g ̌ViZ ̌d[̌°c ̌cXg ̌Z ̌VhZ ̌°c ̌°c ̌Zä/hi ̌X ̌°Zadc ̌\Vi ̌dc ̌VcY ̌°dc ̌dc ̌dc ̌! ̌°1] /X] ̌°n ̌ ̌°h ̌°[j g ̌g ̌g ̌g ̌°ZgZ ̌°ZYj ̌XYY ̌°Wn ̌
inelastic elongation due to severe weather events.

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COSMOSHOX: A VIRTUAL REALITY GAME BASED ON THE H.A.R.V.I.E AUGMENTED REALITY USER INTERFACE FOR LUNAR EXPLORATION

CosmoShox is an upcoming Virtual Reality game named Cosmos-Game, based on the H.A.R.V.I.E Augmented Reality user interface (UI) program created by participants of the 2022 NASA SUITS program from Wichita State University. This game is designed to focus on the Artemis mission, which aims to establish long-term presence on the Moon. The main goal of the Cosmos-Game is to provide an immersive and engaging experience for players through an innovative spacesuit UI, which includes features from H.A.R.V.I.E, along with additional features such as lunar search and rescue, analyzing exotic particles, handling, and controlling network-connected devices, and navigation to the target destination.

The Cosmos-Game features various categories that have undergone extensive research and ongoing development, aiming to provide users with a realistic and challenging lunar experience. The game will require players to complete various tasks by following instructions given within the game. The UI will allow for easy access to status monitoring, geological scanning, mapping, and navigation, as well as ROVER control on the lunar surface. Additionally, the game includes features such as searching and rescuing stranded team members, analyzing exotic particles of the planet, and controlling network-connected devices, such as cameras, rovers, and robots.

By incorporating Virtual Reality technology, CosmoShox aims to provide a highly immersive and interactive experience for players. The game is designed to be both entertaining and educational, as it offers a realistic simulation of lunar exploration, including the various challenges and risks that come with it. The ultimate goal of CosmoShox is to inspire and educate a new generation of space enthusiasts while advancing the development of human space exploration.

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SECURE MACHINE LEARNING FOR REAL-TIME EDGE

Machine learning applications are becoming increasingly popular on various computing platforms such as edge computing devices, cloud servers, IoT devices etc. This is because they enable designers to create control systems that are more intelligent, autonomous, and privacy-aware. However, these applications usually come with heavy workloads, which is why edge applications require "real-time" guarantees. This means that application tasks must WZˇXdb eaZiZYˇl ↑] ℃ˇVˇegZYZ cZYˇiˇb ℃\ˇVdj cY!ˇd[iZcˇgZ[ZggZYˇidˇVhˇ YZVYa℃Zh#J c[dgj cViZaₗˣXj ggZciˇd[[ˈi] Zˈh] Zₐˇ ML frameworks like Caffe, Darknet, and cONNXr do not consider the strict delay requirements imposed by real-time VeeaXViˇdch#B dgZdkZgˈi] ZnˇVgZˇd[iZcˇcdiˇ hZXj g↑n"Vl Vgℤ! ˈl] ⅩX] ˇXVcˇXdb egdb ↑hZˇi] ZˇXdc YZciˇVa↑nˇd[ˇ℃[dgↄ Viˇdc!ˇ the processing of data, and the integrity of the application tasks. To address these issues, ML applications may require isolated execution in a trusted environment that is protected from other applications. For instance, when critical applications like biometrics use machine learning, they must execute in a trusted environment to prevent them from being compromised by other applications. One way to provide security for ML tasks is to execute some (or all) of the b VX] ℃Z°aZVgc℃\ˈa\nZgh°l ↑] ℃ˇVˇ Xdc cZY°Zck°gdcb Zci ˇ˙cdl ˇcˇVh°ig hiZY°ZnℤXj i°dc°Zck°gdcb Zcih°l : : h⊢#l : : h°d[[Zg° tamper-resistant execution and are available in recent trusted execution technologies such as SGX, Arm TrustZone, and RISC-V. In this research project, we focus on the Arm TrustZone TEE and investigate its integration with existing B Aˈ[gVb ZI dgˈhˈl ↑] ℃ˇgℤVdiˈb Z°hX] ZYj aZghˇVcYˇVˇXdc cZY°Zck°gdcb Zci ⅃DEˈl : : ⊢ˈl ↑] ˇa⊢b ↑ZYˇgℤhdj gXZh#Dj g\dVdↄnˇ to explore the feasibility of adopting secure, TEE-enabled ML frameworks for real-time applications and to evaluate the implementation of isolated execution of ML workloads. We will also measure the performance overhead (timing,

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