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CITY TECH

Book of Abstracts

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Advancement of the Measurement of the Indoor Environment in Building Entrance
Ferasuddin Siddiqui and Abdellah Gessra
Prof. Daeho Kang

Natural airflows through large openings in buildings such as doors and windows have a large impact in building energy consumption. It also significantly affects the indoor environmental quality (IEQ). Many studies investigated how to estimate infiltration by field measurements, analytical analysis and computational analysis. Most studies focused on a few factors as the quantification of infiltration is very complicated. The impact of infiltration on building energy consumption and the IEQ needs to be better understood. This study is to advance the method of field measurement on infiltration. Literature review will be done to find the most practical method. Once main factors are identified, a field measurement plan will be developed. A pilot measurement will be done to establish a detailed plan.

Does Abnormal Biometal Distribution Cause Protein Misfolding Affecting Neuronal Communication and Neurodegeneration: Modeling & Experimental Correlation
Jakiya Akter, Guadalupe Gonzalez, Ishaak Olougbodi, Achlyn Genao, Anjalee Rabbani
Professor Subhendra Sarkar

Heavy metals have been implicated to impede protein folding and promote protein aggregation leading to perhaps protein misfolding disorders including Alzheimer's. High metal absorption in the neurological system is particularly harmful due to it causing oxidative stress, harm mitochondrial function, and interfere with the operation of various enzymes. Environmental toxins may expedite this by chelating essential Biominerals and thus breaking down the functional secondary and tertiary structure of proteins making them non-functional aggregates. The goal of this research is to see how such toxins expedite water of hydration to redistribute and break down the macromolecular structures. This is being tested by x-ray machine since harder tissue generates greater x-ray absorption and scatter as opposed to fresh fruit models. Currently in our research we're working on separating heavy metals such as iron and copper from light metals like potassium and calcium. For instance in our fruit models and in the brain all of these 4 metals are very important and their relative abundance is usually K>Ca>Fe>Cu. From our fruit models such as apples and sweet potatoes it was noted that they lose about 50 percent water over one month. We are learning the X-ray appearance for these 4 metals and the changes in distribution over time, primarily due to aging and heat stress. By doing chemical modeling it will help understand the aggregation of macromolecules in Alzheimer's (proteins in particular). We plan to introduce toxic agents like Gadolinium and Iodine that may act as chelators and

selectively chelate some of these metals. As we continue this research we will fulfill the main goal as stated at the beginning of the abstract over the course of 2-3 semesters.

Revolutionizing the Stage: The Impact of the Revolving Stage in 'Hamilton'
Amanda Padilla
Prof. John McCullough

This research delves into the captivating features of the revolving stage in the Broadway musical "Hamilton," meticulously examining both its historical significance and technical intricacies. The rotating stage serves as a compelling visual metaphor for the American Revolution, dynamically mirroring the ever-evolving political landscapes of the time. Focusing on design and engineering, the study sheds light on the motor-driven control of the central pivot point, enabling a unique 360-degree view that significantly heightens audience immersion. The research underscores the stage's role in enhancing visual clarity, unraveling complex scenes, and enriching the comprehension of choreography and narratives. Beyond its narrative function, the revolving stage plays a pivotal role in shaping the visual aesthetics of "Hamilton," seamlessly transitioning between historical settings. The study meticulously details the immersive journey it facilitates, transporting the audience from Revolutionary War battlefields to the opulence of the Schuyler Mansion. This dynamic portrayal not only adds depth and authenticity to historical representation but also fosters a personal connection, thereby elevating the overall theatrical experience. This data offers a personalized exploration of the multifaceted role of the revolving stage in "Hamilton," encompassing its historical and technical dimensions and examining its profound impact on audience engagement and visual aesthetics.

Polyethylene Glycol Diacrylate Degradation Rate Studies
Andy Moposita, Arda Battaloglu, Destiny Erhunmwunse, and Jeremy Duru
Prof. Ozlem Yasar

Polyethylene glycol diacrylate (PEGDA) stands as a promising material in biomedical engineering, particularly in the development of hydrogels for drug delivery and tissue engineering due to its biocompatibility and tunable properties. Understanding the degradation kinetics of PEGDA is pivotal in optimizing its performance for various applications. In this study, we systematically investigated the degradation rate of PEGDA under different environmental conditions and molecular weight variations. PEGDA hydrogels with varying concentrations were synthesized and subjected to controlled environments mimicking physiological conditions. Our study employed spectroscopic and chromatographic techniques to monitor the degradation process

over time. We evaluated the impact of parameters such as temperature, and light exposure on the degradation rate of PEGDA. Our findings revealed a significant correlation between temperature and degradation rates. Furthermore, environmental factors exerted notable influences on the degradation process, indicating the sensitivity of PEGDA to specific conditions. This research sheds light on the intricate degradation behavior of PEGDA, providing essential insights into its stability and potential applications in biomedical fields. Understanding the degradation kinetics allows for the fine-tuning of PEGDA-based materials for controlled drug release and scaffold degradation in tissue engineering, ultimately contributing to advancements in biocompatible biomaterials.

Optimizing IoT Data Management: A Comprehensive Study on Processing, Storage, and Retrieval Algorithms in Cloud-Based Distributed Systems
Arian Berisha
Prof. Aparacio Carranza

Data storage algorithms for Internet of Things (IoT) applications are of prime importance as it leverages cloud computing within a distributed system. Understanding in what ways we can learn about how cloud data is accessed and its functions can help push efficiency forward with such information. One of the main reasons for formulating more efficiency for this particular category of cloud computing is that it may help the user make managing and storing gigabytes of data faster, reliable and easy to administer, even if there had to be huge amounts of data involved. IT devices generate vast amounts of data, making efficient storage and retrieval crucial. We have investigated and explained the three main components: Data Processing, Data Storage, and Data Retrieval. The Data Processing module preprocesses IT device data for efficiency. The Data Storage module employs cloud servers and distributed databases for storage, while the Data Retrieval module enhances query efficiency.

How Can Technology Reverse Deafness
Ashanti Belone
Prof. Farrukh Zia

Advancements in hearing technology for the past 30 years have been proven to offer the deaf and hard-of-hearing community adequate auditory facilitation to aid in acquiring spoken language, especially for those in the community who had not developed speech at all. This has been shown to be effective when administered early in diagnosis. As time progresses there are still language and communication gaps that

persist despite the use of cochlear implants and modernized hearing aids. How can we use research to acknowledge and advance these technological devices to close the gaps that are still left unfilled? Though hearing aids may not be able to reverse deafness, regenerative therapy may be able to restore hearing loss but to what extent? Regenerative therapy for deafness includes a combination of nanomaterials and stem cells. This is a new therapeutic approach against hearing loss that combines the proliferation capacity of stem cells with the tissue-targeting ability of nanocarriers. At the end of this research project, my initial goal and result that I hope to acquire is to know the extent to which computers and technological devices can aid in better hearing or even reversing bilateral deafness. To determine if this will work, a simulation of device usage regarding regenerative therapy will be created in a timelapse perspective to test this theory over time.

The Impact of Artificial Intelligence on Healthcare

Farian Shahzad
Prof. Muyes Topcuoglu

In the changing world of healthcare, using Artificial Intelligence (AI) is making a big difference. This project looks into how AI is affecting healthcare, studying its uses, challenges, and how it fits into the whole healthcare system. We use different methods like looking at existing research, doing surveys, and studying real-life examples to figure out how well AI works in diagnosing and caring for patients. Our results show that AI is really good at improving the accuracy of diagnoses, finding diseases early, and making treatments better. But there are also issues like ethical concerns, privacy worries, and the need for AI to be fair. In the end, we say that AI and healthcare professionals can work together, creating a partnership that changes how patients are taken care of. This research adds important information to the ongoing talk about AI in healthcare, suggesting a future where healthcare is better, easier to get, and more effective for patients.

Stresses and Challenges Faced by Radiologic Technology Students in theFirst Semester of the New York City College of Technology AAS RadiologicTechnology Medical Imaging Program

Makadeer Kassim & Fatima Kassim
Prof. Jennett M. Ingrassia

Our research is an extension of our earlier study “The Motivating Factor Towards a Career in Radiologic Technology and Medical Imaging at New York City College of Technology.” We delved into what motivates students and their concerns regarding admission into the program. Some current students in the program have indicated that they did not realize the high expectations of the program. Our results demonstrated the Introduction to Radiologic Technology RAD 1124 course at City Tech serves as the initial step to keep students excitedabout pursuing this field further. Now, we are taking our research a step further. The focus isnow on students who have been accepted into the program to understand the "Stresses and Challenges Faced by Radiologic Technology Students in the First Semester of the Program." We're doing this because there's a shortage of research out there for Radiologic Technology students. The aim of this research is two-fold. First, it is the hope that this research will identifystress factors and challenges faced byfirst-semester Radiologic Technology Students during the first semester in the program. Second, this research may provide insight for success, to those with an interest in pursuing admission into the New York City College of Technology Radiologic Technology and Medical Imaging program. We feel that individuals seeking admission into the program need to be aware of the rigor of the program prior to entry and be alerted to situations that may cause stress, as well as the challenges they may face. Recognizing these aspects isessential to designing solutions to better prepare students to be successful in the program. We've gathered research articles from various healthcare education programs that might have gone through similar struggles. We plan to ask students to complete a survey after their finals, to provide us with data from the very beginning of the semester to the end. This approach is crucial because it will provide current and potential students of the sometimes challenging and time-consuming expectations of the program, thus helping them to become more prepared to be successful. Finally, in summation, our study aims to give incoming students the knowledge they need to stay motivated and succeed in this challenging program.

Hydration and Alkali Halides in Biology-Structure of Water in Proteins Studied by X-ray

Jasper Cheung, Somdat Kissoon, and Michael Li
Profs. Subhendra Sarkar, Eric Lobel and Zoya Vinokur

The degree of hydration in biological samples are studied by our group using soft x-rays with and without the presence of alkali halide salt impurities. Sodium and Potassium ions organize biological water differently and influence cell hydration of tissues. The goal is to see how alkali halide salts influence bulk water in porous fruits to redistribute. Harder fruit matrix mimics dense or dehydrated human tissue (due to cellularity, biominerals) and absorb more x-rays. Regions that draw more water would have less x-ray scatter while concentrated alkali metals (from fruit or from external infusion) would alter the water distribution and increase scatter photon generation. In our fruit models that mimic brain tissue the metals have relative abundance of K>Ca>Fe>Cu. The main goal in this project is to develop filters and protocols to distinguish among all of these minerals based on photoelectric and Compton effects.

Developing a Facial Expression Recognition Application

Jean Tela
Prof. Marcos Pinto

Facial Expression Recognition (FER) is one of the applications of computer vision to classify a facial expression (emotion) as one the possible categories such as anger, disgust, fear, happiness, neutral, sadness, and surprise. FER can be used in mental diseases diagnosis and human social/physiological interaction detection. FER systems face real-world problems with illumination variation, head pose, and occlusions caused by any person/material/climate that blocks the view of the subject in study. The chosen dataset is FER2013 is a well-studied dataset that has been used in ICML competitions and several research papers. The project is implemented with the Python programming language and its libraries. OpenCV and a Convoluted Neural Network are also used in the project.

Moderating Eects of Consumer Traits and Situational Factors of Collaborative Consumption

Juan Del Pozo Severino
Prof. Alyssa Dana Adomaitis

Collaborative consumption (CC) is referred to as “sharing economy, peer economy, collaborative economy, crowdsourcing, and the maker-movement.” It is built on the notion of “what mine is yours” and consumption behavior include sharing, borrowing, lending, and exchanging skills for goods. Students of the new millennium are young enough to recall their childhood days of negotiating toy play, borrowing games, and trading with friends. There is a behavioral shift in millennium consumer consumption whereas owners of certain personal assets are sharing for a profit in the digital marketplace. ‘Some see sharing, with it as a mantra where “access trumps ownership,” as a post-crisis antidote to materialism and over consumption. The purpose of this research is to examine the concept of CC as a critical concept to update theory related to fashion consumption. Fashion marketer experimenting with retail apps that support CC may find that some consumers are not interested. Therefore, the question of which personality characteristics determine consumer interest in CC apps are becoming increasingly relevant for fashion marketers as they consider: (1) whether to use CC retail apps; (2) how to design them to appeal to different consumers; (3) to which type of consumer to promote such service options; and (4) how to do so.

The Role of Linguistics in Education

Laiba Zia
Prof. Lubie Alatriste

This research aims to uncover the critical nuances that shape global learning experiences by delving into multifaceted dynamics of linguistics in education. This investigation includes the analysis of language barriers, preservation efforts, policy challenges and organizational obstacles, illuminating the complex relationship between language and education. A fundamental question guiding this inquiry is how linguistics fundamentally shapes educational landscapes, focusing on understanding the diverse ways language impacts different aspects of education. Using a thorough approach with examining the body or academic researh, this first phase of my work involves gathering insights from different sources. It delves into the perspectives on language bias of final-year medical students, recognizes the role of public libraries as custodians of language, analyzes language education policies, and investigates organizational barriers faced by international students. Exploring the role of linguistics in education reveals valuable information about the difficulties faced by students in countries where

English is not the first language, emphasizing the importance of recognizing linguistic diversity. The study highlights the challenges involved in implementing effective language education policies, the barriers faced by international students, and the significant contribution of public libraries in safeguarding our linguistic heritage against the threat of language extinction. Based on these findings, it becomes clear that policymakers must navigate language policies with sensitivity to economic, cultural, and religious factors, while also highlighting the significance of acknowledging linguistic diversity and providing support to public libraries in the preservation of linguistic heritage. Additionally, educational institutions must reassess their language policies to ensure the inclusion of international students. In essence, this study explores how language complexity influences various learning settings, revealing intricate layers of insight that resonate across diverse educational environments.

The Effects of Age and Type of Pathology on Cognitive Functioning

Lauren Lopez
Prof. Daniel Capruso

The first phase of the experiment sought to determine the differential and interactive effects of age, psychiatric, disease and neurologic disease on cognitive functioning. Phase 1 or the study concerned the effects of these factors on verbal learning ability. Patients with psychiatric (PSYCH group, n = 68) and neurologic disease (NEURO group, n = 66) who had been tested in the clinical neuropsychology laboratory of a general hospital in Western New York. Primary diagnoses of the PSYCH group included depression, anxiety, and somatic symptom disorders. Diagnoses of the NEURO group included cerebrovascular disease, Alzheimer's disease, and multiple sclerosis. The test of verbal learning ability was done through the Long Storage Storage (LTS) variable of the Selective Reminding Test, which measures a patient's cumulative capacity to learn a 12 word list over six trials. A multifactorial ANOVA yielded significant main effects for age, $F(4, 134) = 9.81$, $p < .001$, and type of PSYCH vs. NEURO pathology, $F(1, 134) = 18.33$ <.001. There was no interaction of age and pathology. Post hoc tests indicated that patients ages 30 to 59 did not differ from each other, but were significantly different from patients 60 to 79. The results indicate that in patients with mild and moderate forms of psychiatric illness such as depression, anxiety, and somatic symptom disorders, verbal learning deficits increase with age. However, in a lesser severity than is seen in neurologic disease across all age groups. The effects of age on verbal learning performance are not rectilinear. Verbal deficits increased dramatically once patients reached 60 to 70 years of age.

Black Representation in Hospitality: Past, Present, and Future
Lishelle Moore
Prof. Fatima Kuras

This project explores the historical evolution of black representation in the hospitality industry, examining past challenges and achievements. It analyzes the current state of diversity in the sector, highlighting initiatives promoting inclusivity. Additionally, the abstract delves into future prospects, discussing potential strategies for further enhancing black representation and fostering a more equitable and diverse hospitality landscape. This comprehensive exploration of black representation in the hospitality industry traces its roots through historical shifts, shedding light on the challenges faced by the black community in gaining equal opportunities. The analysis extends to the present, evaluating the industry's current landscape and the impact of diversity and inclusion initiatives. Noteworthy achievements and success stories are spotlighted, showcasing instances where progress has been made. Concurrently, the abstract investigates persistent disparities, acknowledging that despite strides, barriers to entry and advancement still exist. Looking ahead, the discussion delves into potential future strategies, considering how the industry can proactively address systemic issues, amplify representation, and create a more inclusive environment.

The Application and Absence of Aesthetics and Functionality: A Deep Dive into the Utilization of Visuals and Practical Construction of Product Design and the Effects on Consumer Preferability
Michael Lester and Ze Huang
Prof. Maria Giuliani

Every product, every object, physical or non physical, was designed by someone. A spray bottle, door handle, or a kitchen spatula, was designed with a form and purpose. With each new iteration being designed, a challenge is proposed; will this new form serve its intended purpose or will it explore a new form in hopes to catch the consumer’s attention by straying away from the already established design. Both the way a product looks and the way it functions are two points of interest that must be balanced. The focus of the research being conducted is the manner in which visuals and practical construction are used in the development of product design. In addition to that, the researcher will also be focusing on whether the outcome of that design ends up attracting or diverting the consumer’s favorability of said product. To understand whether a product is more favorable to the consumer, a survey will be conducted where the participant of the survey will be asked to choose between straws that are clear and straws that are colored. The choice that the participant chooses will give an insight as to what the consumer will choose; a product that was designed for its intended purpose

or a product that was designed with visuals in mind. The data and information that will be gained from the survey will serve to broaden the knowledge of the researchers regarding the philosophy behind looks and functions of product design. Moreover, it will show us how consumers react to strictly functional products versus products with heightened aesthetic properties that disrupt functionality. Having this knowledge will lead into the more in depth aspects of the research topic. After understanding how the consumer reacts to product designed, hopefully this research project will help future designers understand the purpose of aesthetics and functionality within a product and how to balance both in their projects.

Landmark Proposal: Tracey Towers
Mohammed Jalloh
Prof. Michael Duddy

The evaluation is specific to the project location (Tracey Towers). I'm working on determining the process of filing a Landmark and its importance to society. In particular I am doing research on Tracey towers and focusing my attention to have this building landmarked! Start to look up the architect and history of the building and use of Tracey towers to determine the process of filing a landmark.

Enrollment Trends in New York State Public Higher Education, 2000-2023
Mohammed Nabid
Prof. Ezra Halleck

We look at enrollment trends within the City University of New York (CUNY) and the State University of New York (SUNY) beginning with the year 2000 with a goal to understanding their causes. Demographic trends and the 2008 recession led to a rapid rise in enrollment in the community colleges of CUNY for a few years afterwards and then fell at an accelerating pace. With the COVID-19 pandemic, there was further acceleration of the enrollment decline at the CUNY community colleges, which has stabilized only in the last year. For CUNY non-community colleges, there has been a small but consistent upward trend in enrollment until 2021, when the pandemic affected enrollment numbers, especially in the comprehensive colleges (City Tech, Medgar Evers, CSI). Like CUNY, after growing significantly in the recession years, SUNY community colleges also exhibited a declining enrollment trend during the post recession years, albeit at a smaller rate than in CUNY. With Covid-19, the drop in enrollment at the SUNY community colleges accelerated and the SUNY non-community colleges also saw

a drop in enrollment. We would like to determine the correlation of enrollment trends with such factors as unemployment rates among the college-age population, demographics, wage-growth, inflation, the reluctance to take on debt, socio-economic conditions for the families of the student-age population (most students in the entire CUNY system and in the SUNY Community Colleges live at home). Prospective students may be making cost-benefit analysis and concluding that non-community colleges are more attractive compared to community colleges (although community colleges advertise their lower cost and the guaranteed transfer to one of the other colleges). We speculate that as baby boomers retire, certain non-college, but relatively high-paying trades are becoming more available, such as mechanic, electrician, and plumber, leading to a stronger pull for immediate entry into the workforce after high school in place of higher education. We can also speculate on how new trends, such as the growth of AI, will further affect demand for higher education. Computer programming and white-collar work in general is going to undergo sea changes in terms of numbers needed and recommended education achievement.

Fraudulent Transaction Detection
Muhammad Jaffery
Prof. Patrick Slattery

The prevalence of fraudulent activities within financial systems necessitates robust mechanisms for detection and prevention. This study delves into the realm of Machine Learning (ML) algorithms to address the imperative need for accurate identification of fraudulent transactions within financial datasets. The primary objective is to augment accuracy and efficacy in detecting suspicious transactions, thereby mitigating financial losses and reinforcing trust in the system's integrity. The research draws upon a comprehensive dataset sourced from a financial institution, comprising transactional records annotated as either fraudulent or legitimate. Due to confidentiality constraints, specific details regarding the dataset cannot be disclosed. A diverse array of ML models, including Logistic Regression, Random Forest, Gradient Boosting, and Neural Networks, are employed for training and evaluating their proficiency in classifying fraudulent transactions. Advanced feature engineering techniques are employed to extract pertinent patterns and attributes from the dataset, amplifying the models' discernment of fraudulent behavior. Furthermore, the study investigates the assimilation of anomaly detection methodologies such as Isolation Forest and One-Class Support Vector Machines (SVM) to identify outliers and previously unobserved fraudulent patterns. Comparative analyses are conducted to gauge the effectiveness and efficiency of the various models in addressing the inherent imbalances within fraudulent transaction datasets. The results underscore promising

performance in accurately detecting fraudulent transactions, with select models exhibiting superior precision, recall, and F1-score metrics. The insights derived from this research offer valuable practical implications for the implementation of ML techniques in Fraudulent Transaction Detection, assisting financial institutions in deploying more robust fraud detection systems. These systems serve as critical safeguards against monetary losses, fostering sustained trust among stakeholders in the financial ecosystem.

Detecting a Parking Lot Availability
Ousmane Diallo
Prof. Marcos Pinto

Artificial Intelligence and Machine Learning have the potential to revolutionize the way we park and manage our cars. In addition, by detecting parking lot availability using AI/ML will help us improve traffic flow and make parking more efficient.
This research paper will introduce the state of AI/ML parkinglot detection and will discuss some of the key challenges that AI/ML detection is currently facing. This paper will also present the case study of a specific Artificial Intelligence and Machine Learning parking lot detection project. One of the key challenges that we face in the AI/ML parking lot detection is to develop the robustness of detection that the model will accurately work in a variety of environments such as a parking lot in a different weather condition and lighting conditions. Also, the model should be to perform in a real time system efficiently. Despite all of these challenges that AI/ML parking lot detection faced, there are always some improvements that can be made to make the model very efficient. This research paper will provide all-inclusive the state of the art of AI/ML parking lot detection. The paper will also discuss the solutions of the AI/ML parking lot detection.

The Importance of Vital Signs in Dentistry
Rebeca Philias
Profs. Susan Davide and Anty Lam

Vital signs are essential to assess a patient's general state of health. The purpose of this research is to explain the significance of taking patient vital signs and to elucidate the rationale for evaluation. Vital signs are measurements that provide a change in the patient's homeostasis. In the dental setting, a patient is often apprehensive and stressed in anticipation of a dental procedure possibly causing discomfort or sensitivity.

It is recommended to assess a patient's blood pressure, temperature, pulse, and respiration before the start of any dental treatment. The measurement of vital signs in the dental office is not widely practiced. This study will review vital signs and why they are recommended in determining and monitoring patients in the dental setting. We will explore the various vitals sign types and provide comprehensive knowledge in the context of dental care.

Should Acetazolamide be Added to Loop Diuretic Therapy in Patients with Decompensated Heart Failure?
Simran Puri
Prof. Vishwas Joshi

When used with diuretics, acetazolamide reduces the proximal tubular reabsorption of sodium and may increase the effectiveness of the diuretic, perhaps aiding in decongestion. Nevertheless, there aren't many human trials that examine how well acetazolamide works to treat fluid overload in heart failure patients. This meta-analysis was out to evaluate acetazolamide's efficacy in treating individuals with heart failure as an adjunctive diuretic. Acetazolamide in Acute Decompensated Heart Failure with Volume Overload, or ADVOR trial, was a randomized trial carried out in Belgium which was conducted at more than one medical center and used a placebo. In addition to normal intravenous loop diuretics, 519 individuals with Acute Decompensated Heart Failure were enrolled in the study and were randomly assigned to receive either intravenous ACTZ (500 mg once daily) or placebo. Successful decongestion within three days of randomization without a need for decongestive therapy escalation was the study's main goal. When comparing the patients assigned to the control group, the number of patients who obtained decongestion was considerably higher among those taking acetazolamide. In summary, acetazolamide added to loop diuretic therapy increased the incidence of effective early decongestion among patients with acute decompensated heart failure in the ADVOR trial.

Unraveling Language Bias in Algorithms and AI Systems
Sumiya Jahan
Prof. Lubie Alatriste

This research illuminates the intricate realm of language bias, dissecting its manifestations in algorithms, artificial intelligence (AI) systems, and technology designed to counteract bias for fairness. In the era of pervasive AI systems, addressing language bias is paramount for responsible and equitable technological deployment. This study employs a comprehensive approach, examining language bias's impact on nuanced forms such as gender, disability, and cultural biases. Global survey findings on

language bias in customer service are scrutinized, emphasizing the pivotal role of language inclusivity in fostering customer trust. Insights from articles on AI bias, challenges, and solutions contribute depth and breadth to the research. The exploration of language bias in customer service reveals consumers' discernment when brands overlook multilingual customer experiences, underscoring language inclusivity's role in trust-building. The article highlights the deleterious effects of subpar translations on customer support. Acknowledging the paramount importance of addressing AI bias, the study advocates for a profound understanding of bias types and their real-world implications. Organizations are impelled to implement strategic mitigation measures for responsible AI deployment. The accompanying article on AI bias delves into challenges and solutions, emphasizing AI's dual nature—capable of diminishing human biases yet susceptible to embedding biases. Proposed actionable strategies include raising awareness of AI's potential in bias correction, rigorous testing, fact-based conversations, exploring collaborative human-machine approaches, investing in bias research, and promoting diversity in the AI field. The author fervently advocates for a critical evaluation of language technology applications, averting the perpetuation of biases and essentialist discourses. Emphasizing nuanced understanding in broader social and political contexts, the article posits that technology development should actively promote linguistic diversity, acknowledge multilingual backgrounds, and refrain from imposing a singular standard for language acquisition.

Secondary Electrons and Compton X-ray Generation in Solid and Heated Biological Sample in the Presence of Radiologic Contrast Media

Vanessa Robinson, Fatima Ahmed, and Daler Djuraev
Profs. Subhendra Sarkar and Evans Lespinasse

Our goal is identification of secondary electrons and Compton photons when externally infused radiological contrast from iodine and gadolinium interferes with calcium and iron in tissues. This could help develop next generation of x-ray methods as well as mechanistic understanding of toxic effects of radiology contrast materials on living tissue and agriculture. Changes in tissue minerals over time, aging and heat stress are manipulated in our experiments by infusing imaging contrast agents that consist of large atoms like Gadolinium and Iodine. These have chelation properties to alter electron distribution of proteins and carbohydrates of biological matrix. Our experiments try to map such changes by secondary x ray detection and related modeling. We compare the distribution of minerals within the core and cortex of 1 month old Gala apple to four-month-old Gala apples. We do this by imaging these apples using rhodium and silver filters and gradually mapping out the potential spread of minerals. It has been found that is a slight spread of minerals. Within the core of the

apples, there has been an approximate 20% change versus within the cortex of the apples, there has been approximately a 24-26% change. Our preliminary data shows high keV x-rays generates more secondary photons in the mineral-rich areas in the apple samples than in tissue regions with a mineralpoor matrix. Although tissue contrast is supposed to be lower at a higher keV, the contrast also depends on existence of heavy metals such as iron. So, the usual lower tissue contrast at a higher keV can actually be manipulated to detect and differentiate between heavy and light minerals in the core and cortex of these Gala apples. One experience shows 36 keV is preferred to map the core of Gala apples have iron and the cortex has potassium while the low energy of 24 keV x-rays cannot differentiate between iron and potassium.

The Effects of Gender and Type of Pathology on Verbal and Spatial Functioning

Willcarre F. Desmornes
Prof. Daniel Capruso

The experiment sought to determine the differential and interactive effects of gender, psychiatric disease, and neurologic disease on several types of cognitive functioning. Subjects were patients with psychiatric (PSYCH group, n = 82) and neurologic disease (NEURO group, n = 119) who had been tested in the clinical neuropsychology laboratory of a general hospital in Western New York. Primary diagnoses of the PSYCH group included depression, anxiety, and somatic symptom disorders. Diagnoses of the NEURO group included cerebrovascular disease, Alzheimer's disease, and multiple sclerosis. The measure of verbal ability was the Visual Naming subtest of the Multilingual Aphasia Examination. The spatial ability was measured using the Judgment of Line Orientation Test. The results indicate that neurologic disease has a more severe effect on confrontation naming ability than does psychiatric disease, but there such disease states affect both genders equally. For spatial ability, females performed substantially worse than males with either psychiatric or neurologic disease. The results suggest that the female brain has a heightened vulnerability to deficits in spatial perception across diverse types of disease.

Cloud Computing in the World of Generative AI
Yassine Chahid
Prof. Patrick Slattery

The purpose of this research is to evaluate the progress of cloud computation and generative artificial intelligence, and how the improvements in these respective technologies could be combined for future uses. Cloud computation and generative AI have rapidly developed in their capabilities. By analyzing the ways in which cloud computing and generative AI have been implemented thus far, a better understanding can be established regarding how they may influence current tech solutions within the information technology sector and beyond. The first portion of research consisted of researching the current capabilities of the two technologies respectively. By reviewing relevant publications and academic articles, a timeline can be established which conveys the advancements necessary for these technologies to become more capable. Understanding the fundamentals of what cloud computation is and its practical applications can provide insight into how the rapid advancement of generative AI can potentially influence aspects of cloud computing. Inversely, cloud computing may offer ways to implement generative AI into new solutions and open up the technology to even more use cases. Based on the research, cloud computing may offer new ways to train and enhance generative AI models, potentially accelerating advancements and expansions of said models. Generative AI can also be applied within the cloud, allowing these AI models to utilize the computational resources needed for such intensive processes. Both of these technologies are powerful tools which can influence aspects of each other. Following the research, future studies can assess the future scalability of these technologies, and how these changes may affect current tech solutions.

Green Roof Media Parametric Study: Enhancing Highway Pavement Strength through Repurposed Fiber Modification of Mechanical and Hydrogeological Soil Properties
Yehya Elfgeeh, Calvin Walters Jr., & Angelis Almanzar
Prof. Ivan L. Guzman

Green roof farms have played a pivotal role in extending the advantages of suburban living to urban environments, offering energy efficiency benefits by reducing the need for excessive heating and cooling in commercial buildings. However, integrating green roof infrastructure, growing media, and vegetation poses a challenge due to the limited load capacity of buildings. To address this, a promising approach involves incorporating repurposed textiles into lightweight engineered soil, ensuring that the additional components maintain a minimal weight. This innovative technique aims to modify the hydraulic properties of the soil without compromising structural integrity. The ongoing

project investigates the impact of adding repurposed textiles (with an aspect ratio of 4:1) to lightweight engineered soil, documenting changes in unit weight, water content, and hydraulic conductivity. This study builds upon prior findings, which demonstrated significant alterations in hydrogeological properties when incorporating textile fabric (3% by weight at an aspect ratio of 1:1). Functioning as reinforcement, these fibers enhance the soil's strength, stability, and structural integrity—especially advantageous in erosion-prone areas, regions susceptible to landslides, or locations requiring heightened load-bearing capacity. The outcomes of this parametric study may offer crucial insights, potentially opening avenues for practical implementation in strengthening highway pavements.

Numerical Calculation of the Fully Differential Semileptonic B-Quark
Yitao Li
Prof. Andrea Ferroglia

In the research we have conducted so far, we consider the Standard Model of particle physics, the comprehensive framework that catalogs the known elementary particles and the fundamental forces through which they interact. The Standard Model describes three of the four fundamental interactions in nature: The electromagnetic force, strong force, and weak force. Gravity can be safely neglected in current particle physics experiments. Subsequently, the semileptonic decay of the B meson is considered. In particular, we focus on the weak decay of the valence bottom quark in an up quark and a virtual W boson, and the gluonic radiative corrections to this process.