Book of Abstracts

The Emerging Scholars Program

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Heat Shocked Porous Media: X-ray Experiments to Reveal Abnormal Nutrient Distribution in Mineral-rich Fruits

Aaliyah Salmon, Aravis McBroom, Joanna Syska
Profs. Subhendra Sarkar, Eric Lobel

Minerals exist within biomolecules in food and are not detectable in their natural form by routine analytical techniques. X-ray imaging depends solely on atomic mass, density, and photoelectric peaks, while MRI images depend on moisture content, sample porosity, magnets, and protocols. Using low energy x-rays and photoelectric absorption the minerals; iron, manganese, and copper which are transition metals, were detected in mineral rich fruits like apples. However, we found that the minerals discovered were inconclusive due to their imposing similarity in K-edges. The use of intrinsic filters like Rhodium and Silver along with the extrinsic filter, Iodine aids in removing K and Mn from apples by using L-Edge of all three filters. The 3 minerals of interest (Fe, Mn, Cu) are hard to differentiate due to their close K-Edge. Comparing with MRI images, we can exclude Cu since our x-ray and MRI images match exactly and MRI selectively shows Fe, Mn rich regions without Cu. Our next goal would be to address porosity with both modalities x-ray and MRI since environmental heat waves will affect porosity of biological tissues. Thus, the goal to image mineral dynamics with heat was partially met. The use of heat shock displays the change in distribution because the minerals change both shape, porosity and brightness. The overall conclusion is that it cannot be definitively claimed that the results prove Fe redistribution with heat shock.

Polyethylene Glycol Diacrylate Degradation Rate Studies

Aaryan Nair, Najwan Kased, Owen Diaz, Raisa Ratri
Prof. Ozlem Yasar

In the field of tissue engineering, scaffold is the foundation structure that provides the desired mechanical support for the tissue being engineered, surface for cells to attach and spread, and access for nutrient transport crucial for cell viability. The scaffolds are 3D building blocks which are designed and fabricated precisely prior to its implantation to the host tissue. When scaffolds with desired shape and size are fabricated, they can be seeded with cells and appropriate growth factors. After cells show healthy growth within the scaffold, they are implanted into the body with the scaffold to allow full-scale tissue regeneration. In this research, photolithography is adapted as a fabrication method to generate PEGDA-based structures. In this method, ultra-violet (UV) light is reflected on PEGDA and as a result of the interaction between UV light and precursor solution, PEGDA turns into solid form. Despite the potential of PEGDA in scaffold applications, the mechanical properties have not been studied in a great extent. Therefore, in this project, the mechanical characterization of PEGDA was conducted for various polymer concentrations. Specimens with 20%, 40%, 60%, 80% and 100% PEGDA to water ratio were prepared for compression tests. Our preliminary experimental data results show that, mechanical properties of PEGDA can be controlled by changing the PEGDA to water ratio. Stronger and stiffer structures can be obtained with high PEGDA concentrations while softer structures can be fabricated with reduced PEGDA concentrations.

Finding Inhibitor of the Phosphodiester Type 5 for the Treatment of Alzheimer's Disease
Adrian Guin Rizzo
Prof. Mai Zahran

In this research paper, we utilized computational molecular methods to find potential small drug inhibitors of the phosphodiesterase type 5 (PDE5). This protein is involved in a variety of cascade pathways that promote the progression of Alzheimer's disease. Finding chemical compounds that could safely bind to PDE5 and inhibit its effects is the aim of this investigation. We have modeled computationally four different compounds called 3A, 4A, 6C, and 7A using a software called Maestro. We performed molecular docking simulations to predict a favorable binding mode between each of those compounds to PDE5. Our results show that compound 6c is the most potent compound, which is correlating with *in vitro* and mouse model results obtained on that compound. In conclusion, our computational results corroborated the experimental results, revealing that those compounds can bind to the phosphodiesterase type 5 which could potentially aid in the progression of drug development for the treatment of Alzheimer's disease.

Building an Automated Robotics System
Agha Akram, Tahsinur Rahman
Prof. Muhammad Ummy

In the previous ESP session, we built and prototyped an automated robotics system that was capable of testing light bulbs. The aim of this ESP session is to consolidate the system, and also to write a comprehensive lab manual for the entire system. The consolidation includes 1) removing redundancies from the system 2) designing and printing a PCB for the purpose of simplifying complex wire connections 3) finalizing all the parts and components. After consolidating the entire system, building it will be a repeatable and relatively simple task. However, a comprehensive lab manual would be needed so that anyone could set up the system. The lab manual will include 1) a parts list 2) a detailed explanation of each sub-system and how it is to be connected 3) details on the computer software to be used 4) writing the computer program needed to operate the system.

Global Radiological Technologist Licensing Requirements
Aigul Sharipova, Katelyn Lopez
Prof. Patrick Slattery

Because of working conditions in the field, exacerbated during the recent pandemic, there is currently an acute shortage of licensed radiological technologists ready to work around the globe. This project will research the licensing requirements for several regions of the world to help understand talent gaps and educational and other remedies to satisfy the global demand for radiological technologists.

Natural Language Processing for Disaster Tweets - A Kaggle Competition
Akinyemi Apampa

Prof. Nan Li

Our goal is to establish an automatic model that identifies which tweets are about natural disasters based on the content of the tweets. Our method is to construct a decision tree based on keyword searching. We will construct the model using 7,613 tweets and test our model on 3,263 tweets.

Radiomics of Neurodegeneration in Alzheimer's: MRI, MRS & PET
Analia Basilicata, Anam Riaz, Anjalee Rabbani, Jennifer Padilla
Prof. Subhendra Sarkar

This work aims to review and assess the current state of Radiology research in Alzheimer's disease to complement and coordinate multi-modal research progress via Radiomics. Alzheimer's Disease Neuroimaging Initiative (ADNI) is a center that utilizes the different standard methods for the use of clinical, magnetic resonance imaging (MRI) and positron emission tomography (PET) and cerebrospinal fluid (CSF) biomarkers for advancing. Early diagnosis and assessing the efficacy of treatment and related biomarkers for Alzheimer's disease. ADNI databases can be assessed to analyze the patterns and changes in imaging and CSF biomarker data with Mild Cognitive Impairment and Alzheimer's Disease patients. The use and observation of biomarkers try to either directly or indirectly measure the pathology of AD as a predictor of dementia or screen for early cognitive decline. These predictors will make it easier to select patients with mild impairment and healthy elderly patients for treatment and even disease prevention trials. Proton magnetic resonance spectroscopy (1H-MRS) is a potential biochemical imaging marker for AD that can recognize patients with the disease prior to the onset of clinical symptoms. Changes in the concentration of a few metabolites in MRS can serve as stand-in markers for pathogenic abnormalities in AD although 31P MRS is gaining ground at high-field MR centers. ADNI-MRI protocols have been adjusted to be compatible with the latest phase called ADNI-3 which started in mid-2017. Regardless of the vendor e.g. GE, Siemens, and Phillips, all protocols from the second phase ADNI-2 are used on the third phase ADNI-3 in 3 Tesla models. The most critical MRI sequences used in screening for Alzheimer's disease are T1 weighted, ASL, MP-RAGE, T2* GRE, 3D- FLAIR, High-Resolution Hippocampus, DWI and EPI-BOLD sequences. The advance in brain diffusion imaging (DWI) and Resting-state functional MRI (RSfMRI) are emerging AD MRI tools. Tau PET, also known as Tau positron emission tomography, is a promising method for predicting cognitive abnormalities that is more accurate than amyloid PET and today's MRI and can support prognosis in the preclinical and prodromal stages of AD. It has demonstrated remarkable diagnostic efficacy for differentiating non-AD neurodegenerative diseases from AD dementia.

The Chemistry of Teeth and Dental Care
Aneeza Hussain

Prof. Alberto Martinez

Teeth are complex bio-composites with well-structured and hierarchically organized material characteristics. They occur in or around the jaws and pharynx of vertebrates. Teeth are composed of four main dental tissues: enamel, dentin, cementum, and pulp. Modern dental care is an important aspect of health care in general. In line with this, toothpaste plays a critical role in maintaining appropriate dental hygiene. The aim of this review project consisted of describing and understanding the chemical structure and composition of teeth as well as basic elements of dental care, such as toothpaste or mouthwash. In addition, the most recent research and findings in the development of modern toothpaste were explored and discussed. In particular, the role of fluoride in our oral health proved to be critical. Fluoride can replace some of the hydroxyl ions in enamel, which gives much greater resistance to acid and aids remineralization, however, if the fluoride concentration is too high during the formation of the tooth, the enamel can soften and take on a mottled appearance. In conclusion, we found that chemistry plays a critical role in dentistry in maintaining an understanding our oral health.

Enrollment Trends at New York City College of Technology for Radiologic Technology and Other Imaging Modalities
Bich Tram Pham
Prof. Lillian Amann

Every year, hundreds of students enroll in the Radiologic Technology and Medical Imaging Program at New York City College of Technology. Among these students, only roughly 65-70 students are selected to join the program. The current cohort of radiography students was surveyed to understand what their interests were before entering the radiography program and what their interests are upon completion of the program. They will be introduced to different radiologic modalities during their clinical rotation. This research is to determine the number of students who are interested in becoming x-ray technologist after graduating from the program versus those using the program as a steppingstone to other radiologic modalities. Data was collected from 97% of this year's radiologic technology students. This survey gathers basic demographic information from the students, including their age, gender, and ethnicity. We also asked the students which modalities interests them most, and their career plans post-graduation. The research showed that after surveying our pool of 64 out of 66 Radiologic Technology and Medical Imagining students that the program would produce approximately 20 radiographers each year while the majority of students will move on to other radiologic modalities.

The Living Breakwaters PDR Efforts: ECOncrete Resource Analysis

Calvin Walters Jr, Diana Minchala, Guianina Ferrari, Shervon Stephen
Prof. Anne Sowder

On October 29, 2012, Superstorm Sandy impacted 443,000 people and caused nearly $19 billion (about $58 per person in the US) in damage within New York City. As part of New York City's infrastructure reparation plan, the Living Breakwaters project in Tottenville addressed coastal resilience, allocating $100M of public funds to a series of artificial breakwaters by the southwest coast of Staten Island. Each breakwater is constructed and designed to mitigate water flow in storm events. ECOncrete, a primary element of the breakwater, is a specialty cast cementitious product that is marine organism-friendly that encourages biocalcification and photosynthesis. Studies conducted in the 2000s suggested that alternative cementitious products produced such adverse effects as low colonization biodiversity and other ecological distortions and created the potential for pollution. According to Israeli biologist and co-founder Shimrit Perkol-Finkel, ECOncrete can be cast in complex, 3-D textured surfaces that simulate natural reefs and stimulate the growth of oysters, corals, algae, and other healthy marine life. ECOncrete prices are up to 2% more than traditional concrete but are 5% stronger and more immune to deterioration from chlorine. The decision to incorporate this material as a key element of the project reflects a balance of costs and benefits and the primary objective of this research is to explore the material properties, costs, and benefits of ECOncrete utilizing project reporting, case study comparison, and analysis of resource timing and geospatial data. Expected outputs include work towards the creation of a resource-loaded schedule and accompanying GIS map of the material's locations.

Country Tech: The Rebirthing of a Windswept Dairy Barn in the Catskill Mountains
Dahrel Cadore, Felix Alvarado, Rokhaya Ndiaye
Prof. Kenneth Conzelmann

This real-world project centers on the birth, life, abandonment, destruction, and rebirth of a ca. 1911 dairy barn in the Catskill Mountains. The barn sits in the north-east corner of a 20-acre parcel of land which was purchased by its current owners in 2020. The owners joyfully took to the barn, with their own hands restoring and securing it for structural stability and future reuse. Then, in the late winter of 2022, a windstorm pulled the barn from its foundation and left the building tilting, teetering in the landscape. This project aims to repurpose the remains of the structure as part of a new environmental study center which will benefit, educate, and inspire the larger community. This site will be revived through the application of advanced agricultural practices, renewable energy solutions, and progressive building technologies. The birth, life and demise of the barn were investigated in order to gather context. Once this was done, we gained a deeper understanding of the life cycle of the barn, its causes of collapse, and the problems we'd need to solve going forward. This fully off-grid environmental center will also preserve and feature the ruins of the fallen barn as an active historical architectural destination. Over the summer while performing research with the CSTEP program, our team's visit to the barn offered us a firsthand experience and interaction with the landscape and its vegetation, while showing us how the sun path and wind forces impact the site. We performed on-site documentation using traditional methods (tape measures, photos, freehand sketching) and then in the studio utilized advanced 3D digital software and printing technologies to generate diagrams and models of several design schemes for our discussion and debate. The changes we implemented on site includes the revived ruins, which features an elevator lift that takes visitors to the top of the structure to overlook the field, or to the earthen tunnel below that allows visitors to experience the underground environment. Wind

turbines, solar panels and cabins were also scattered across the landscape. The Emerging Scholars Program has offered an opportunity for us to continue and develop our initial visions and ideas begun with the CSTEP program in June. Our current updated plan offers a more realistic scale. From understanding the life cycle and history of this compound, we will honor it by reviving it into an environmental center that will serve as a pillar of inspiration and education for the community.

X-ray and MRI Theory for Mineral-Rich Fruits Affected by Heat Waves During Climate Change
Daler Djuraev, Nino Jvarishvili, Robert O'Brien
Profs. Subhendra Sarkar, Zoya Vinokur, Lillian Amann

Conventional Nutrition facts data relays the amounts of different minerals in apples. This information from such analysis may not connect these minerals with their natural biochemical or functional state for health or disease. These minerals may also be part of different particle sizes that affects X-ray transmission, absorption and scatter. The minerals may also redistribute within the tissue over time with or without heat shock. Current Medical Imaging procedures (Xray and MRI) do not localize such minerals. Our work offers a way to increase detection sensitivity of transition metals in various apple varieties non-invasively. This can constitute a step in the detection and localization of these minerals in the natural biological unprocessed tissue. Our experiments also utilize detailed analyses of scatter in X-ray or MR images to correlate literature based porosity to model mineral distribution in apples. These tests were done on a small sample of a few varieties of locally grown apples. Our model of the movement and particle sizes of minerals within tissue needs to be verified in large batches of apples and other fruits before it can be tested on complex biological tissues like the human brain.

Augmented Reality With Membit
Daniel Greene, Katherine Alas
Prof. Jenna Spevack Spevack

Augmented Reality (AR) is an emerging medium that superimposes digital content over a user's view of the real world. In our research we explore the user experience, focusing on how AR interactions can connect people through collaboration and community building. Utilizing the AR application Membit[TM], "a geolocative augmented reality (AR) storytelling platform," developed and co-founded by Jay Van Buren, we are helping to identify interface and usability issues, providing outreach support, and developing a collaborative AR exhibit to showcase the creative work of COMD students and alumni.

Characterizing a Calpain gene, TTHERM_00486970, Belonging to Tetrahymena Thermophila

Derbie Desir
Prof. Ralph Alcendor

Calpains are a family of ubiquitously expressed calcium-dependent, non-lysosomal cysteine proteases. Calpains are involved in apoptosis, cellular proliferation, and cell motility. While mostly calcium-dependent, calpains may also be activated through ERK-mediated phosphorylation. Calpains are found in a few eubacteria and almost all eukaryotes, but not found in Archaebacteria. Tetrahymena thermophila is a ciliate found in fresh water. Remarkably, these cells have two nuclei, one is the germline nucleus and the other is the somatic nucleus. The germline, the micronucleus, is silent during vegetative growth, while the macronucleus is very active during vegetative growth. Conserved eukaryotic mechanisms have been modified in ciliates to selectively deal with the two genomes. T. thermophila has been used as a model to study many cellular processes. However, the role of calpains in these cells is yet to be examined. The purpose of this project is to begin examining the role of TTHERM_00486970 underoxidative stress. Cells were exposed to different amounts of cadmium, an oxidative stress inducer, for 2 and 24 hours. RNA was extracted followed by cDNA synthesis. PCR was performed using primers for TTHERM_00486970. Preliminary results suggest TTHERM_00486970 mRNA decreases when exposed to $10 - 100$ μM of cadmium, but increased when exposed to the same stress for 24 hours. These results suggest TTHERM_00486970 may have a role to play in cadmium-induced oxidative stress. using bioinformatics tools such as MUSCLE (MUltiple Sequence Comparison by Log- Expectation), MAFFT (Multiple Alignment using Fast Fourier Transform), T-Coffee (Tree-based consistency objective function for alignment evaluation), BLASTp (Basic Local Alignment Search Tool), Phylogeny.Fr, SWISS-MODEL and PHYRE2 (Protein Homology/AnalogY Recognition Engine). Calpains are remarkable proteins that have similar genes with Tetrahymena thermophila, which concludes that these are related to human genes using bioinformatic tools. VMD, which stands for Visual Molecular Dynamics, utilizes the proteins for a better visualization. By determining which models: Swiss and Phyre, had the highest QH, RMSD, and ID. Swiss models were compared to each other, continuing with, Phyre models were compared to each other. However, more analysis is needed to confirm which of these two human Calpains is THERM 00486970 more related to and also to begin predicting the function of this particular calpain in T. thermophila.

Mobile Robot for Educational Robotics Competitions

Elizabeth Gonzalez
Prof. Farrukh Zia

The goal of this research project is to develop a cost-effective mobile robot platform using state of the art, open source hardware and software tools. The modular hardware and software design of the robot and it's physical specifications will be compatible with the requirements of educational robotics competitions such as the annual IEEE Micromouse Competition and other college level robotic competitions. The mobile robot platform can also be used to teach computer-controlled, embedded systems design and robotic system design in various courses in the Computer Engineering Technology program.

Do Cosmic Filaments Protect Galaxies From Gas Stripping in SAMI Clusters?

Ena Chia, Lianys Feliciano

Prof. Charlotte Welker

The project is about identifying cool cosmic filaments that branch into galaxy clusters. Clusters contain up to thousands of galaxies and are filled with hot gas. This prevents galaxies to form stars. Using the SAMI survey, which detects emissions lines from thousands of galaxies, and the Horizon- AGN simulation, we will determine how galaxies are distorted inside the clusters and inside filaments and how it compares. Using statistics and programming with Python on a supercomputer, graphs will be created.To learn how to analyze large datasets of astronomical observations and simulate these observations by creating mocks using thousands of galaxies from the Horizon-AGN simulation. Will be learning on how simulations are conducted and determine whether results are similar to real data or whether there are discrepancies. As well as predicting what is the best parameter to detect the protecting effect of filaments in observations. Such as producing figures, graphs and visualization with Python using statistics.Cold gas are most commonly found throughout cosmic voids and connecting branches. Though, it seems that pockets of cold gas still form in the dense clusters they would reform even after a cosmic shock (as seen in simulations). Depending on the resolution of simulations, the results often differ as the size of cold gas and quantity changes. The lower the resolution, the less accurate simulations will be versus higher resolution where cold gas pockets and density of clusters will be identified. With the help of DisPerSe and SAMI surveys, we're able to identify and create simulations own how the cosmic branches and clusters are created. As well as how compact and dense galaxies would be amongst with filaments.

Development of Practical Method to Quantify Infiltration Rate Through Building Entrance
Eric Reed, Ferasuddin Siddiqui, Louidelson Deguerre, Steven Boodram
Prof. Daeho Kang

Infiltration through entrance doors, vestibules, cracks and other areas have a large impact in building energy consumption. It also has a significant impact on indoor air quality because it allows outdoor particles, gaseous containment and moisture inside. There are only a few studies about air infiltration and air tightness. Most research that has been done only focuses on residential buildings and not commercial buildings because it has not been viewed as a major issue. The little information and research done has left the energy standard of warehouse and production buildings lagging behind. The purpose of this study is to develop practical methods to measure air infiltration rate to help reduce energy use and improve indoor air quality. We have read research articles and identify several methods in the literature. The traditional methods, the blower door method which measures air infiltration rate is disruptive to occupants, does not locate where infiltration occurs and takes lots of time to set up and take down. Thermographic images of a building were used to identify crack size and infiltration rate. Infrared thermography used with the blower door method helps locate the cracks inside the building and the size of them which can help calculate inflation more accurately leading to better building energy consumption. Further investigation is required to help more accurately find infraction rate, crack size and location of cracks to help reduce air infiltration, energy costs, maintain comfortable indoor conditions and lower buildings carbon footprint.

ARCscholars

Erickson Diaz, Kaylynn Daoud, Tylee Rivera
Prof. Naomi Langer-Voss

We are a diverse group of scholars ranging in age, gender, and background from all over New York City. We share a common interest in solving our urban challenges through studying and proposing improvements to the built environment. From professors at CUNY CITY TECH to NYCHA Design & Implementation specialists and NYCHA residents, we encompass a group of scholars united by this common purpose. This team of ARCscholars is working collaboratively, sharing lived experiences, creatively thinking & planning and applying our research discoveries to the proposed design interventions. We seek to address and combat critical issues to foster a measurable improvement in community health, understanding, and relationships. Through enhancing the community at large via housing equity and durability and beauty, we hope that the proposed design improvements will have a direct, indirect, and long-lasting positive effects on the NYCHA communities. We have developed an architectural and urban proposal that will enhance the overall quality and design of our case study development: the NYCHA Gowanus in Manhattan. Our research included a comprehensive site investigations, multiple informative discussions with the Resident Leaders at the development, and an understanding of planning issues. We met weekly to analyze, discuss, and investigate architectural and urban concepts, and develop specific planning interventions. We also me in person three times at the City Tech Campus to workshop ideas and establish close personal connections. Personal anecdotes from our NYCHA resident students helped inform the design strategy. Our research informed us that our proposal should address the overall campus in addition to providing specific design interventions. The students were divided into three groups, based on their interests, and focused on three main categories of development: an overall site strategy including added retail, a reimagining of the building entrances and a redesign of the community center. The team identified an opportunity to improve the condition on Baltic Street. This is currently a two-way street that divides the campus and is exclusively used as parking for the residents. Building upon the open street's movement across the city, this team proposed pedestrianizing Baltic Street as a connecter across the two blocks of the development. This space will house both temporary and permanent retail units to introduce mixed-use in this development. The conceptual design of the retail structure compliments the existing urban design fabric of the development. The stores will have essential community assets such as laundromats, medical stores, artist spaces, deli, etc. and support and uplift resident businesses. The parking would be moved to a new underground parking lot beneath Baltic Street that free up the street for retail activity. Moreover, adding an underground parking would help with flooding that is a true concern due to the Gowanus campus's proximity to the Brooklyn Canal. The Scholars observed that the campus lacks recognizable and elegant entrances and a visual focal point. Building entrances were analyzed in terms of the small size of the canopies over the main doors, the narrow and austere ramps leading up to the main doors, and the small solid-walled lobbies. The proposal includes adding large canopies to the building fronts to extend the shelter zones at the main entrances. The lobbies will be enlarged using glass enclosures outside of the current building footprints so as not to disturb the current adjacent apartment layouts and make them safer and more inviting. Landscaping surrounding the buildings would be gradually graded up to the entrances to allow for the removal of stairs and ramps. This team is also adding of a large sculpture near Baltic Avenue, and replacing existing flag poles with a large umbrella canopy to create a distinctive sheltered central meeting space. This design intends to convert the community center into a safe and welcoming environment for both residents and visitors. The new organization of the building will include the creation of an open central lobby with direct access to the children's and senior

areas. The design will focus on creating a feeling of welcoming with the addition of glass walls and overhangs at the entrances. The roof will be transformed into a usable area with both interior and exterior spaces. For the site design surrounding the community center we addressed, pedestrian accessibility, uninviting spaces, and material choices. The improvements include creating an open central area for gathering, playing, or other leisure activities, relocating the waste area and parking away from the public gathering zone, and the addition of a snack bar located in the redesigned adjacent service building. Accessibility is introduced by incorporating ramps on the two main sides of the building. We believe that the community center has the potential to become a space that unites the neighborhood by providing opportunities for recreation and the overall improvement of the wellness of people of all ages, ethnicities, and skill levels. The ideas investigated can make the Gowanus Houses community center a space that residents can identify with, and a focal point in its community.

Using an AI model to Analyze the Rate of Inflation in the United States Within a Statistical and Data Science Context.
Ethan Pruzansky, Jason Lin, Kazi Tasin, Tanvir Rahman
Prof. Patrick Slattery

Artificial intelligence (AI) attempts to replicate human intelligence in robots trained to think and act similarly to humans. The word can also be applied to any computer that demonstrates characteristics linked with the human mind, such as learning and problem-solving—improving critical business processes by accelerating and refining strategic decision-making processes. To determine the inflation rate in the United States, we intend to employ an AI model. By creating an AI model to find the inflation rate, we can predict and determine how high it might become throughout the coming years as the US dollar loses its value yearly. We will explore how data science helps people discover how it can be used in real-world situations, such as determining the inflation rate. We will be compiling the data in an easy-to-read format that is straightforward and coherent for the average user. We also aim to highlight the importance of data science in our project.

Characterizing a Calpain gene, TTHERM_01108610, Belonging to Tetrahymena Thermophila
Eva Tse
Prof. Ralph Alcendor

Tetrahymena Thermophila is a unicellular ciliated Protozoan. It is commonly found in many freshwater habitats globally. *T. thermophila* has two nuclei, a macronucleus and a micronucleus. The macronucleus is the vegetative nucleus involved in gene expression while the micronucleus is the germline nucleus involved in sexual reproduction. These cells serve as model organisms for the discoveries and the broadening of information on many biological processes such as cell division, evolution, histone acetylation and DNA elimination. Calpains are calcium-dependent, non-lysosomal cysteine proteases that are prevalent among eukaryotes and bacteria. In the human genome, there are 15 calpain genes that convert into a calpain-like proteases. Of the 15 calpain genes, there are nine that are classical calpains and there are six that are nonclassical calpain. Classical calpains have a PEF domain, while non-classical calpains do not have this domain. Studies have shown that calpains are involved with programmed cell death, cell motility, and cell

proliferation. Other studies suggest that uncontrolled regulation of calpains may be linked to various diseases such as, Alzheimer's disease, retinal cellular dysfunction, and many others. *T. thermophila* has about 27 calpains, however, very little is known about these calpains in *T. thermophila*. Therefore, the goal of this research project is to begin examining the effects of oxidative stress on TTHERM_01108610, one of *T. thermophila* calpain family members, gene expression. Cells were exposed to different concentrations of cadmium, an oxidative stress inducer, and TTHERM_01108610 gene expression was examined. Total RNA was extracted and mRNAs were converted to cDNA. Preliminary PCR results suggest the expression of TTHERM_01108610 decreases after two hours of $10 - 100 \mu M$ of cadmium but increased after 24 hours. These results suggest TTHERM_01108610 may be involved in cadmium toxicity.

Smart Home Automation System
Fahmeda Khanom, Touheda Khanom
Prof. Farrukh Zia

According to smart home statistics, the number of households using smart home devices in 2022 represents 44.4% of the total number of households. The target audience for our project will be elderly adults, children, and disabled people. Our project will be able to build a home automation system for our target audience with the help of IoT devices along with Arduino Uno to remotely control electrical and electronic devices in the home. With the help of a home automation system, our target audience will get smart homes that will provide automatic lights, fans, garages door, parking, and smoke alerts. Moreover, a Bluetooth module will be used to do Cell phone-based control of home appliances which will let the user control the automated home appliances. Our research project will save time, provide energy-efficient solutions, and will be budget-friendly for all classes of people.

Radiobiology & Radiation Benefits in Alzheimer's From CT: A Physics Assessment
Guito Charles, Lin Mousa
Prof. Subhendra Sarkar

This work is a review and assessment of research literature on Alzheimer's disease (AD) today which is an irreversible neurological disorder, that continuously decreases the individual's memory and thinking skills and, suddenly, the ability to carry out the simplest functions of daily living. Although treatment can only help manage the symptoms of AD, there is no cure for the disease. CT imaging is proven to be somewhat helpful in the detection of AD disease similar to MRI, multiple repeat CT seems to show promise in part-reversing the loss (radiation Hormesis). In-vivo exposure, spatial distribution, and quantitative characterization could be essential markers in diagnosing and assessing AD progression. Phase Contrast X-ray micro-computed tomography (micro CT) is an emerging highly sensitive imaging technique capable of high resolution and impressive soft tissue discrimination. abnormality detection. The main disadvantage of absorption-based phase contrast- X-ray micro CT is it requires thin sections, and thus invasive biopsy or post-mortem scanning. Still, there is a potential to extend it to imaging precise 3D information about the inner structures of the entire brain in the future using clinical CT machines but with phase contrast software without invasive tissue sectioning. We feel clinical scanners with phase contrast modes will not provide the plaque imaging exactly for $50 \mu m$ individual plaques at this time, but plaque tangles and sharper hippocampus structures similar to or better than high-field MRI.

Discovering Kepler's Third Law from Planetary Data
Hamely Jose Taveras
Prof. Satyanand Singh

This is a data driven project. We will illustrate Kepler's third law of planetary motion from NASA Data. We will also discuss practical applications of our work and other studies in planetary motion.

Business Information Security Office (BISO) Responsibilities and Role Development
Hudda Siddique, Kaung Myat Thu
Prof. Patrick Slattery

As technology develops in the 21st century, everything is connected through a network. Enterprises are highly dependent on that network connectivity to develop and succeed.

The Information security role has become critical to protect sensitive information from threats such as cyber-attack, and other information incidents to ensure the success of the business. We cannot rely on technology every time because one mistake could compromise the organization's reputation, financial impact and value. This research project is to study the Business Information Security Officer (BISO) role: its responsibility, strategy, and how BISOs handle threats. We will look at what knowledge a BISO should have and what skills required to be a BISO. BISOs need to have a combination of technical and business knowledge to maintain and improve information security in important aspects of a business. Whether a BISO needs to have an ISC² CISSP (Information Systems Security Professional), ISACA CRISC (Information Technology Risk Management), CISM (Information Security Management) or other certifications will be explored. In addition, an understanding of risk management, and CompTIA Security+ qualifications will be studied. The role of a BISO is new and evolving – this study aims to contribute to the maturity of the role.

Students as Fellows and Mentors: Strategies for Success
Isory Santana
Prof. Lubie Alatriste

This project focuses on the role of student fellows as mentors in the classroom. It uses a questionnaire as a data-gathering tool to find out more about the students that participate in mentoring programs. Mentors, and fellows can offer advice, inspiration, emotional support, and role modeling in addition to information about their own career paths. According to Facilitating Long-Term Mentoring to Effectively Implement Active Learning Instruction (Moore & Naganathan, 2020) and based on my survey results, the benefits of mentorship include improved reasoning, risk-taking, and self-esteem, professional development and enrichment, dedication, and growth. The most likely participants in that research are students who understand how the mentor program will help them develop leadership skills, confidence, and problem-solving skills. The project's phase required City Tech students to respond to an electronic survey to deepen my understanding and identify the kind of students who routinely seek fellowship and mentoring. First-generation students will be included, along with details such as the student's GPA, first year

in college, race/Ethnicity, age, etc. According to the early findings, most of the students enrolled from 2016 to 2020 are not aware of the mentorship program at City Tech or the services it provides to assist them in succeeding as college students. Most students between the ages of 20 and 30 are unaware of the impact of mentor programs on academic performance. At City Tech, first-generation students with GPAs between 3.00 and 4.00 have rarely participated in mentorship or assistance programs. Despite initiatives to promote mentoring to support students in their academic endeavors, the majority of students are unaware of the multiple support programs that City Tech provides. The findings of this poll will help raise public awareness of the Success Strategies services provided to students as fellows and mentors.

Novel Composite Polymer-Ceramic Electrolyte for Li-ion Batteries
Itay Rubin
Prof. Jay Deiner

Solid state lithium ion batteries are an emerging energy storage technology. Their widespread adoption will require discovery of solid electrolytes that have high conductivity and ease of manufacture. This work focuses on synthesizing a new solid electrolyte combining a glassy ceramic, Lithium Aluminum Germanium Phosphate ($Li1.5Al0.5Ge1.5(PO4)3$), and a polymer, polyethylene glycol (PEG). The combination is achieved by high energy milling. Various analytical methods are used to determine the characteristics of the synthesized electrolytes, including Fourier transform infrared spectroscopy, thermogravimetric analysis, and solid state nuclear magnetic resonance spectroscopy. The picture that emerges after combining the data collected from these analyses is that the ceramic and polymer interact through a surface chemical reaction. Future characterization of the conductivity of the LAGP/PEG electrolyte will elucidate how the surface interaction of the LAGP and PEG affects the conductivity of the material.

Medical Illustrations of Neuroplasticity in Response to Developmental Events.
Jhoanna Dimapanat
Prof. Daniel Capruso

The neurologist Hughlings Jackson, MD was the first to localize complex visual perception to the right hemisphere of the human brain. The patient suffered from what Jackson called "imperception," an inability to recognize objects, persons, and places caused by three gliomatous tumors, in close proximity, within the inferior aspect of the posterior right hemisphere. To reconstruct and localize the lesions in Jackson's case of imperception. Based on Jackson's description, the three lesions were localized on Damasio and Damasio's (1989) templates in both horizontal and coronal sections using both "Procreate" raster-based graphics and "Adobe Illustrator" vector-based graphics. Color medical illustrations of the lesion were then reconstructed in the coronal plane in the manner of Frank Netter, MD, using digital painting. The neuroanatomic locus of lesion in was then compared to subsequent cases of visual agnosia as described by Devinsky, Farah, and Barr (2008). The right hemisphere inferior temporal lobe neuropathology in Jackson's case of imperception is consistent with the locus of lesion observed

in subsequent and contemporary descriptions of what is now termed "visual object agnosia." Jackson's case stands as a landmark in understanding the cognitive geography of the human brain.

Girls Who Code Make Chat-Bots
Joan Beatrice Ladaban
Prof. Farrukh Zia

AI based chatbots are widely used in e-commerce, tech, and medical fields. This research project will explore how chatbots work and function the way they do, as well as explain how they help us virtually. The student will conduct research to gather background information; gain required knowledge through tutorials and hands-on learning; analyze information; synthesize, implement and present a solution. Following skills and knowledge learned in the classroom will be employed by the student in conducting the research project: Computer Programming, Web Application Programming, Algorithms, Database.

Culinary Applications of Underutilized Native New York Plants in Hydroponic Media
Joshua Moton
Prof. Tracy Zimmermann

This semester we have explored our research project viability by calibrating the hydroponic system. We have done this by using radish, arugula, salad, mustard green, and amaranth micro greens. The growth progress has been steady and taste profiles have been on par with conventional methods. We are convinced through this process that our research goal of growing native edible wild plants in hydroponic suspension is a viable and possibly cost-effective means of food production. In the spring semester we are planning on moving into the next phase of our research and will plant out these native wild edibles for use in culinary classes furthering our research and exploration. We selected the native edibles we will use in next semester's research: wild strawberry, blue violet, chicory, wild leeks, and plantain.

Machine Learning for Credit Decisions
Julio Rayme Villavicencio
Prof. Boyan Kostadinov

In this project, we use data provided by the company Lending Club on the performance of their loans. Lending Club is a peer-to-peer lender that allows investors to lend money to borrowers without an intermediary being involved by making credit decisions using machine learning. We explore the challenging task of using machine learning ourselves to make our own credit decisions based on the data, and compare our results to those of Lending Club. We develop a logistic regression model for making credit decisions using a training set, and we test our model on a separate test set, where both datasets are generated from the original Lending Club data.

Control of the VEX robots using Raspberry PI
Justin Bartholomew
Prof. Lili Ma

The purpose of this project is to explore the possibility of using Raspberry PI to control the commercial VEX robot, instead of using the micro-controller, Cortex, which comes with the VEX robotic kit. The VEX robotic kits are widely adopted in undergraduate robotic curriculum, allowing students to construct, assembly, and program an autonomous mobile robot. Despite its great features, the current VEX robot does not have an onboard image processing capability. This restricts their usages in achieving more advanced/challenging tasks such as vision-based control. In this project, we replaced the VEX micro-controller (Cortex) by Raspberry PI (plus its camera module). Specifically, we used the Raspberry PI to control the mobile base constructed using the VEX hardware driven by two motors. With the help of several additional electronic components such as power bank and motor board, we are able to bypass the VEX micro-controller completely, resulting in an autonomous Raspberry PI-controlled VEX robot. In the current phase/semester, we have successfully controlled the two motors to run in the same and opposite directions with different speeds, thus achieving basic motion control of the autonomous mobile robot. This work establishes the foundation for two directions of future investigations: a) vision-based control tasks can be implemented utilizing the OpenCV library; b) the Robot Operating System (ROS) can be installed on the PI to explore the functionalities provided by the ROS. We plan to continue with the project in the next semester exploring these directions.

Analysis of Stroboscopic Instruments
Keven Logrono
Prof. Mars Podvorica

Photography has been around since the 1800s. It has been used as a means for regular daily use, commercial use, and storytelling. Different Photography uses different methodologies, in this case, we study the alteration of movement and agility between subjects. Our main focus will be to illustrate what inspiration can be derived from these images by Gjon Mili and translate them into architectural forms, diagrams, and illustrations. To do so, a series of adobe software is used to extract the idea and skeleton of the photograph. Because of the movement within the photos, there is a lot of layering of lines and organic movement. As a result, smooth geometric diagrams are overlaid with the photo. These geometric shapes are then extruded and edited for imaginative spaces. The façade and mass of these 3d spaces are a clear representation of how movement can be analyzed.

What is The Hoopla about Progressive Web Apps?
Kevin Hernandez
Prof. Marcos Pinto

PWA is an application that can be accessed through a website. PWA is installable and is able to function when offline or when there's poor internet connection, this will allow users to be able to access PWA wherever they go. Also, PWA does not consume a substantial amount of storage on a user's device. In addition to this, PWA mitigates the costs that would be incurred if creating a

native app. PWA was created through the use of html, css and javascript. Javascript was used to create a manifest and service worker file. The manifest file was created to describe the app by disclosing information such as the name and files that created the PWA as well as to make the PWA installable. The service worker was created to enable fast loading, push notifications and be able to function when offline. The results from this research is a functional web app that was installable and engaging. Users are able to add and delete contacts and navigate to a different web page.

Importance of Incorporating Computer Ethics in Computer Curriculum
Kimberly Ramgopal
Prof. Elizabeth Milonas

In today's technologically advanced world, many things students interact with are built using programming. Exposing students to computer science (CS) is an excellent way to gain their interest and knowledge. CS curricula are usually incomplete and fall short because they teach how to apply CS topics practically but not necessarily in an ethical way. With a CS curriculum incorporating ethics, students can better appreciate the helpfulness that computer science can bring to the world without causing unjust consequences for themselves or others. Many schools that have CS as a course for students have begun to incorporate ethics in many ways due to increased awareness of its importance. For example, a curriculum from COMP_SCI 396: Computing, Ethics, and Society from Northwestern University has the goal of engaging students in activities that would allow them to use their judgment to create technical solutions, as stated in the syllabus (Northwestern University McCormick School of Engineering). A curriculum like this one and others can change the traditional approach to teaching by applying the topic to real-world examples. By doing so, it teaches students the topic and real ways it can be used. As a result, it teaches students to be more socially responsible and how they can positively impact society. Without incorporating ethics into CS curricula, it creates unintended problems which are hard to fix later.

Converting Polluting Greenhouse Gas Carbon Dioxide to Useful Chemicals
Le Van La
Prof. Vishwas Joshi

Carbon dioxide, CO_2, is known as a major pollutant of the greenhouse effect that led to global warming and climate change. As a result of the development of industrialization and economics, CO_2 has been produced exponentially and abundantly, which speeds up the global warming process. One of the ways to effectively reduce this polluting greenhouse gas is to find multiple ways to convert CO_2 into other helpful chemicals. The conversion process is not easy and requires high energy and time since CO_2 is a stable compound that is normally inert, which means it hardly has a chemical reaction with other chemicals to produce useful products in normal conditions [2]. The project focuses on how to convert CO_2 into useful and friendly to the ecosystem and environment with energy-efficiency processes. Some findings so far include: (i) the breakdown reaction of CO_2 into CO and O_2 by a single catalyst (a research project conducted by Chen, Concepcion, et al, 2012) [1], (ii) the conversion of CO_2 into Porous Metal–Organic Frameworks (a research project conducted by Kadota, Hong, et al, 2021) [2]. In this project, we will carry out a literature search relevant to find out various ways of utilizing the abundant amount of CO_2 in the atmosphere by turning them into other valuable and beneficial chemicals. We will then analyze

the open-source articles and data that are available via the world wide web, summarize the important findings, and put together a presentation for the perusal of the other student scholars.

Ethics in Computer Curriculum
Malachi Bacchus
Prof. Elizabeth Milonas

Computer interconnections can be used to link different network by using electrical artificial flow ways that can travel in light speeds through different connections. These are called data network in which that travels through different sectors of the network similations of the service internet performance using artificial intelligence to enhanced further understanding the, i've alson demonstrated into knowing by using data network to get a better understanding of how ethical computing can be learn through universities and collegiates that can help established a knowledgeable and healthy computer information. The following tools are using data networking, ethical learning computing, computer curriculum and translation towards different computer systems.

Design and Manufacturing of a Prosthetic Leg Aesthetic Cover
Maria Hashmi
Prof. Gaffar Gailani

Prosthetic leg covers are custom made casings that go over a prosthetic leg in order to protect the internal components, giving it a more realistic look. They are usually made with ABS plastic or a silicon/rubberized cover, and because the companies that manufacture them are for profit, they can typically charge anywhere from $500 to $2000. Right now there are only hard and rigid plastic based filaments available to individuals at a low cost. By designing, prototyping, and 3D printing a prosthetic leg cover, we can create an affordable, durable, and natural feeling product.

Use of AI and Machine Learning for Engineering Applications
Max Rios Carballo
Prof. Andy Zhang

In this paper, we examine how artificial intelligence (AI) and computer-based intelligence (CBI) may be used to address design challenges. We examine artificial intelligence (AI) and machine learning (ML) as they relate to developing applications from the inside out, highlighting the most challenging issues as well as intriguing research areas for further consideration.

A Survey Based Study Reviewing the Career Oportunities for Students in Radiological Technology
Mikhail Kun, Peber De Jesus, Tatiana Ryzhakova
Prof. Zoya Vinokur

Medical students' decisions of career specialties are influenced by a variety of circumstances. The purpose of this study is to investigate the radiological technology career prospects and the factors affecting medical students' decision to pursue this field as a career. Questionnaires will be distributed to the students in order to determine how prepared they felt to learn about radiology and how interested they are in the subject. The questions in-depth will target the career options in radiology field; also will include questions that ask for the age and demographics of students forming the part of survey. The survey will be carried out in the spring as well to discover if the same percentages of students are interested in. The study will show students' eagerness to learn about radiology early on in their medical school curriculum and opting radiological technology as a career.

Climate Change and Community Preparedness and Well-being Using a Social Justice Framework
Nilda Orellana
Prof. Smita Ekka Dewan

Extreme weather events due to global climate changes produce heatwaves, drought, wildfires, cyclones, and heavy precipitations that can cause floods and landslides, creating morbidity and fatalities. People's vulnerability to natural disasters is a phenomenon with social, economic, health, and cultural dimensions when communities are not prepared to confront such conditions. Climate change will have numerous impacts on the physical environment and human society, creating vulnerability to these environmental changes, presenting two essential aspects a) the degree to which people are exposed to the hazard and b) the capacity to deal with or recover from a natural disaster. Susceptibility to disasters can decrease depending on the prevention of tragedies and mitigation of emergencies; disaster resilience increases based on emergency preparedness, response, and recovery. The support and response from the various organizations to the crisis generated by extreme weather conditions will mitigate the outcomes from communities. Stakeholders with wide-ranging and multidisciplinary expertise from public health agencies and human services organizations such as Child and Family Services, Office of Human Services, Emergency Preparedness & Response, and FEMA will create the following support; 1) build human resilience to climate-related disasters 2) develop a hazard mitigation plan and 3) engage and educate the community about disaster response. It is essential to create awareness about climate change and prepare communities, especially those most affected, implementing strategies that will secure safety in a natural disaster. Community-based disaster preparedness (CBDP) is; a work strategy in which community members share their expertise and knowledge of local resources, creating a sense of readiness. Climate change will impact the physical environment and human society. It is essential to recognize that the different degrees of knowledge, cultural preference, responsibility, and trust shape individual positions and perceptions based on factors such as gender, age, religious affiliation, or ethnicity as values of social justice. In the advent of adverse effects of a natural disaster crisis, protecting people's rights to property, life, liberty, and personal security must be guaranteed at the core of their human rights.

Machine Learning App: Automated Home Loan Approval
Prashant Sah
Prof. Marcos Pinto

With the increasing population, the demand of housing market is also increasing and as result banks have more and more clients seeking for home loan. Due to high volume of application, it takes days for banks to approve or deny the request for home loan because it's a lengthy process where banker have to look at several factors before making their final decision. To solve this problem, we need a system that can approve or deny the request in matter of seconds. Machine Learning (ML) is a process of self-learning from the experiences and acts without human intervention or re-program and it makes the computing process more efficient, reliable and cost-effective by analyzing even more complex data automatically, quickly and more accurately. Using this technique, we are going to make an automatic home loan approval program. In this program our end result will be whether the home loan is approved or denied based on the given user data like last payment, credit score, etc. using our classification predictive model. Classification refers to a predictive modeling problem where a class label is predicted for a given example of input data, like spam email detection, cancer detection, etc.

A Study of the Environmental, Social, and Governance of Electric Battery Technology
Rex Wong, Qingqing Zhuo
Prof. Patrick Slattery

Electric battery technology is indispensable for a global transition to a carbon-neutral future. As technology evolves, we find new battery technologies or find ways to improve existing technology. Electric battery technology research is important because of the need to increase reusability and reduce negative environmental impact. In addition to being a major part of reliable reusable energy systems, electric batteries also power most everyday electronic items. Ensuring high battery cycle characteristics, and environmentally friendly production and disposal are critical concerns. This research project will present how current electric battery technologies harm us and the environment, what are some of the promising new developments in battery tech., and what are some of the effects of adopting a new battery technology. The primary focus of this project is on effective research and the presentation of findings and recommendations to help advance the relationship between society and electric battery technologies.

Open Educational Resource (OER) Textbook Update Process and Tools
Shaquan Larose
Prof. Patrick Slattery

OER texts are becoming more popular. As their uses increase the need to keep them current becomes more acute. Without a publishing firm, OER texts are dependent on crowd-sourced updates. There is a need for an open-source editing and change management platform.

Sjogren's Syndrome and Dental Caries

Shivani Jagadish Acharya
Prof. Dora Ann Oddo

Sjögren's syndrome is an autoimmune disease affecting salivary glands. Sjögren's syndrome's syndrome affects more women than men and average age of being diagnosed is 50 years old. An oral manifestation of Sjögren's syndrome is xerostomia due to reduced salivary rate, which affects the pH and buffering capacity resulting in dental caries. Dental caries is the most common oral disease experienced by patients with Sjögren's syndrome. The role of oral health professionals is to educate patients on various preventive measures to decrease the risk of caries. One of the preventative measures is recommending fluoride products to reduce the risk of dental caries. Various literature reviews states that there needs to be more research on the effectiveness of fluoride treatments in managing Sjögren's syndrome.

Job Search Skills that Needed for Data Roles
Svetlana Idrovo Shindler
Prof. Patrick Slattery

Data science is described by Harvard business review calls as "the sexiest job of the 21st century". There is a rapidly growing volume of global data that is collected by every company in every industry and there are not enough people skilled in transforming and analyzing the data provide insights that business can understand. In this research I decided to choose the main three jobs: • business intelligent analyst • data analyst • data science. I will compare the salaries and set of skills that is needed for those three jobs, in addition to what kind of skills are required for all three jobs.

Discrimination in New York City's Housing Voucher Program
Tashana Brooks
Prof. Jeannette Espinoza

The Fair Housing Act (FHA), enacted as Title VIII of the Civil Rights Act of 1968, prohibits discrimination from selling or renting a dwelling to any person because of race, color, disability, religion, sex, family status, and national origin. The federal government provides rental subsidies for many low-income renters through government programs. Rental assistance such as Section 8 vouchers administered by Housing and Urban Development is considered a lawful source of income for paying rent; however, many landlords or realtors discriminate against individuals utilizing Section 8 vouchers.According to the New York City Human Rights Law, this is illegal. The Legal Aid Society filed a federal lawsuit against 88 New York City real estate firms and landlords alleging housing discrimination towards prospective tenants attempting to use Section 8 housing vouchers. The lawsuit claims that nearly half of all cases recorded under the investigation were denied housing. It is against the law in New York State for landlords or brokers to deny an applicant who uses housing vouchers, and it is considered a violation of the FHA.

Green Roof Media Parametric Study
Victor Arenzana
Prof. Ivan Guzman

Green roof farms have contributed to deliver the benefits of the suburban environment to the urban setting. If every commercial building has a green roof farm, we can reduce the amount of energy needed to heat/cool the building. However, buildings have a limited capacity to withstand the additional loads imposed by a green roof including green roof infrastructure, growing media, and vegetation. These additions need to be light in weight, so buildings can carry them without adversely affecting the structure. Adding repurposed textile to lightweight engineered soil can modify the hydraulic properties of the soil without compromising its weight. The project focuses on studying the effects of adding textile to green roof soil on the weight and hydraulic conductivity of the soil. In previous research, an aspect ratio of 1 in. to 1in. of textile was used with results being similar and a significant change of 3% of textile in lightweight engineered soil. We are now testing lightweight engineered soil with repurposed textiles of an aspect ratio of 2 in. to ½ in. and recording any changes in weights and hydraulic properties. Therefore, studying the changes in weights and water permeability of the lightweight engineered soil with different percentages of fabric can be delivered in this research. With these results and previous results, we will be able to develop more studies using different materials.

Value of Financial Instruments
Wadud Khan
Prof. Patrick Slattery

The Information Age refers to the concept that access to and the control of information is the defining characteristic of this era in human civilization. With just a few clicks and keystrokes, Data on any topic and its sub-topics are freely available. Much of this data is produced from human behaviors and actions. With the help of specific tools and techniques, insights can be derived from human produced data which is vital for prediction and eventually decision making. Social Media Sentiment Analysis is the process of retrieving and analyzing human produced data that pertains to their perception and opinions of a product,service,or brand is one of these techniques. Social networks such as Twitter and Reddit are platforms where opinions of the public are often shared in text form. This has applications in many fields, particularly financial instrument valuation.