



# **Book of Abstracts**

**The Emerging Scholars Program**

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## **Assessing Participants' Feedback to Dental Hygiene Care Provided by City Tech's Dental Hygiene Students**

Nazrin Akbarova, Dirien Santos and Roseanna Torres  
Prof. Susan Davide

The purpose of this research is to determine if CUNY students, faculty and staff are aware of the Dental Hygiene Program and services located at New York City College of Technology (NYCCT). Dental Hygiene students at NYCCT provide educational, clinical and therapeutic services to the public in accordance with individual state Dental Hygiene practice acts. Prevention and treatment of oral disease are recognized as important factors in a patient's overall health and well-being. Dental hygienists are important members of the dental health care team providing these services. The first phase of the project consisted of a free dental screening event that was held during a Wellness Fair at the CUNY Graduate Center on May 2nd, 2018. The study received CUNY IRB approval and the individuals that participated in this event were contacted to schedule an appointment in order to receive a prophylaxis (comprehensive Dental Hygiene examination and treatment/care) with a Dental Hygiene student. The second phase of the project involved an electronic survey completed by the dental screening participants as well as a hard copy (paper) survey that was given to individuals who complete dental treatment at NYCCT's Dental Hygiene clinic. The findings of this research demonstrated that those individuals who received the dental screening are likely to schedule an appointment to receive a prophylaxis. Additionally, most of the participants who received oral hygiene services at NYCCT greatly benefited from their treatment, oral health education and care. Even though poor oral hygiene is preventable, many individuals from lower-income households and ethnic minorities lack access to dental care services. Although efforts to increase access to services have improved, there is still much to be done at an individual, professional and community level to improve the oral health status of our population. The findings of this study will support raising the level of awareness of the services available in our dental clinic in terms of future dental screenings.

## **Exploration of the Lessons Learned by Students Attending a Peer-led Workshops**

Fahmida Akhter  
Prof. Nadia Kennedy  
Prof. Armando Cosme

The study is conducted with students attending an additional one-hour a week peer-led workshop associated with their Pre-Calculus class. The study focuses on the following research questions: Do peer-led workshops help students become better at problem solving? What are the lessons learned from peer-led workshops that can be useful and applicable in future courses? Data will be collected through administrating surveys to the students in the peer-led workshop. The data will be organized, analyzed and presented at the poster session.

## **The Feasibility of Augmented Reality in Modern Society**

Haddi Al Jazzaf

Prof. Marcos Pinto

Augmented Reality at its core is the experience of having real-world environments augmented through perceptual means with computer-generated information. As the development of Augmented Reality technology progresses we find ourselves questioning its practicality in contemporary society. This review aims to highlight where we are at with Augmented Reality, delving into applications in the workforce as well as in daily life as a consumer product. Based on the current products out in the market, we were able to come up with a fair and adequately concise prognosis of its current state as well as its prospective future.

## **Interaction of Ionophoric Polyphenols with DNA by Fluorescence and UV-Visible Spectroscopies**

Yaa Andoh, Gabriel Ortiz

Prof. Alberto Martinez

Alzheimer's disease is a serious epidemic affecting 44 million people worldwide, and 5.6 million people alone in the United States of America. Every 65 seconds someone in the US develops this most common and fatal form of dementia. Our group is currently working on the design, synthesis and primary testing of ionophoric polyphenols as potential anti-Alzheimer's disease agents. In line with this, studying the interaction of such compounds with DNA helps to determine the potential side effects and activity of a drug candidate. The aim of this work was to gain understanding of the strength of compound-DNA interactions (or binding affinity), and binding mode of two polyphenols, resveratrol (3, 5, 4-trihydroxystilbene) and AM16 ((E)-1-(((2-hydroxyphenyl)imino)methyl)naphthalen-2-ol), with *Calf Thymus* (CT) DNA by means of fluorescence and UV-visible titrations. Assessing the binding mode and strength might give insights into the therapeutic value of these polyphenols known to have potent antioxidant and anti-amyloidogenic properties. Analysis of UV-visible spectroscopic data for resveratrol and AM16 showed binding affinities in the range 103 to 105 M<sup>-1</sup>. Fluorescence spectroscopy experiments confirmed UV-visible results and additionally revealed that both polyphenols form permanent adducts with DNA through one binding site. Overall, our results provide evidence that both polyphenols have the ability to interact with DNA, which could have important implications in the therapeutic potential of this family of compounds.

## **Data Analysis and Visualization of Heart Disease Patient Data**

Afis Animashaun, Dahiana Jimenez

Prof. Boyan Kostadinov

Doctors often study old cases hoping to learn better ways of treating their patients. A new patient who has a health history similar to a previous patient could benefit from undergoing the same

treatment. This project investigates whether doctors might be able to group together patients with heart disease to specific treatments using some unsupervised learning techniques.

### **Light Animations Using Arduino and MATLAB**

Rabia Arif

Prof. Farrukh Zia

MATLAB is a scientific computing software application for PC. Through its extensive set of toolboxes, it supports programming of embedded systems such as Arduino where advanced algorithms running under MATLAB can be used to control hardware devices such as LEDs connected to an Arduino board. Light animations are visually appealing and hence widely used for advertising purposes. The microcontroller has 32kB of ISP flash memory, 2kB RAM and 1kB EEPROM. The board provides serial communication via UART, SPI and I2C. The microcontroller can operate at a clock frequency of 16MHz.

### **The City Performs: A GIS History of NYC Theater**

Diego Atauchi, Freddy Ruiz, Solangie Falla, Mohamed Soofi

Prof. Christopher Swift

Our research goal is to gather historical and architectural information on theaters in New York City from the colonial period to the present. Many of the theaters were demolished years ago, requiring us to sort, evaluate, and collect material in online and library archives. These materials include names of architects, images, design styles, architectural plans, seating capacity, bibliographic information, and production histories, as well as GIS coordinates so that the information can be projected onto a digital, interactive map. We also wrote summaries for each theater in order to provide users a general overview. When the project is completed, an open-source ArcGIS Story Map will contain the histories and images of over 400 theater buildings from the past and present, available for use by colleges, research institutions, and the general public. The interactive map is being published by the University of Minnesota Press.

### **Roboqueen – The Computer Controlled Robotic Mannequin**

Anny Baez Silfa

Prof. Farrukh Zia

Roboqueen is an ongoing research project in the Computer Engineering Technology Department. It is being designed as a full body interactive robotic mannequin in response to the needs of the fashion technology industry. It can be controlled by using voice commands or Bluetooth connected smart phone. The original prototype built in 2016 was based on the original versions of Arduino and Raspberry Pi computer boards. The goal of this research project is to upgrade the computer hardware boards to the latest versions that are computationally more powerful and faster than the original versions. The hardware upgrade will allow the robotic mannequin to be programmed with more sophisticated control programs written in C++ and Python languages. As a result, it will be possible to add more features and capabilities to the mannequin.

## **Cellular and Hormonal Changes on Long Term High-Fat Diet Exposure in Mice**

Ilhom Bakiyev, Bushra Mia, Travis Caraballo, and Viktoriia Olshana  
Prof. Sanjoy Chakraborty

Obesity is defined as a condition in which there is an energy surplus than the energy expenditure which in an excess accumulation in fat. Obesity is one of the major medical problems in America leading to several diseases like cardiovascular disease, type II diabetes, stroke and hypertension etc. Obesity has become an epidemic in America. About 27% of Americans are now considered obese. Generally women are found to have a greater body mass as fat with deposit in the lower appendages and the depositions of fat in men are in the abdominal regions. The role of a High Fat Diet (HFD) and its direct correlation with gender, age, hormone and cellular changes has become an important question that needs to be addressed at this present time. The aim of this study is to determine the effect of long-term exposure to high fat induced obesity in male and female mice model, through the cellular, hormonal, and morphological changes in various tissues.

## **The Psychology of Hurricane Warnings: Why are they Sometimes Ignored?**

Ilhom Bakiyev, Christina Bhawanidin  
Prof. Howard Sisco and Ngana Mundeke

Why do some people heed evacuation orders given before an impending major disaster such as a hurricane while others do not? Failure to comply with departure instructions puts the individual at personal peril as well as the first responders responsible for rescuing them during those dangerous times. . For example, during Hurricane Sandy in New Jersey, 72% of people refused to evacuate whereas with Hurricane Rita 53% disobeyed orders to evacuate. The purpose of this research is to begin the process of investigating the psychological factors that contribute to individual differences in not obeying evacuation orders. A hurricane preparedness questionnaire will be developed using rational methods. When completed, the survey will be administered in person to future hurricane victims at disaster response centers.

## **Comparison of the Indoor Thermal Environment in a Lobby in Two Campus Buildings**

Jelani Barro, Fuxin Bao, Demba Diop, Adam Brzozowski, and Raymond Sandoval  
Prof. Daeho Kang

The waste of energy has become one of the focuses of global attention. It is recognized that effective and long-term control of energy use can significantly reduce the loss of the earth's resources and economy. Energy control is reflected in many aspects, the most common being the efficiency of equipment and architectural design and material selection. Our study is intended to contribute to such efforts.

We monitored the outdoor weather and the indoor thermal environment in the Environmental building and Voorhees building. We analyzed the data collected to calculate heat transfer rate due to unwanted air flow through the entrance doors. We also calculate the heat transfer rate by using

standard weather data measured by a local weather station. This poster presents the results of the measurements and compares the calculated heat transfer rates by the weather data we collected and the standard weather data.

## **Genetic Diversity of Local Canines Assessed by Derived Cleaved Amplified Polymorphic Sequences**

Nicole Benmoshe  
Prof. Jeremy Seto

Breeding of the dog, *Canis lupus familiaris*, over centuries has given rise to the selection of certain traits including size, shape, coat length, color and many behavioral traits. Inbreeding within dog breeds has resulted in the increase of genetic diseases, many of which are similar to human diseases making the dog an exemplary model organism to study. In order to associate a certain gene with a characteristic or phenotype, GWAS (Genome Wide Association Studies) compare many genomes (in this case canine genomes) in order to identify genetic markers called SNPs (Single Nucleotide Polymorphisms). SNPs are single nucleotide substitutions at a specific locus, occurring in at least 1% of the population. Using dCAPS (Derived Cleaved Amplified Polymorphic Sequences) we can identify SNPs in the dog genome using buccal sample collected from eight local dogs of different breeds, both large and small. After performing DNA extractions, PCR (Polymerase Chain Reaction), restriction enzyme digestions and gel electrophoresis on each sample, these genetic markers can be analyzed and differentiated.

## **Motion UI – A Web Development Trend that it is here to Stay**

Adderley Brito, Christopher Guzowski  
Prof. Marcos Pinto

Did you know the average person spends around 20 seconds on a website? Furthermore, the average person reads less than 20% of text presented and averages around 15 seconds reading time. If your page isn't visually appealing or functional, people are more likely to back away as it's human nature that we want as much as possible putting in the least amount of effort. Which brings us to the beauty of Motion UI, an approach to web design that's more prevalent than ever before!

Motion UI is an approach to web design that's taking advantage of the different ways a human eye perceives visuals and the mind processing them, it manipulates what and how we display to cater to the viewers experience. Our eyes analyze information in blocks, and they contain patterns; this allows us to set a tone for how to structure the content. When implementing motion UI, some significant factors to consider are animations, transitions, and orientation providing them with personality, emotive and being responsive. When designing around this approach we must keep in mind the duration, speed and frequency of these animations.

Websites containing motion UI really draws the viewer in and keeps them there wondering what will come their way next. Research shows that pages which implement an engaging/ interactive

Motion UI of some sort retain longer attention spans. Research suggests in a few years to come most of the websites on the internet will have a form of Motion UI that is if they wish to stand out.

## **What is Celiac Disease and How is it Affected by Gluten Free Diet?**

Stephanie Cabrera, Eugenia Pierre  
Prof. Liana Tsenova

Celiac disease (CD) is one of the most common diseases, resulting from both environmental (gluten) and genetic factors. One in 100 people worldwide is affected by CD and 30% of these individuals still have symptoms even being on a Gluten Free Diet (GFD). The current study was accomplished through extensive literature search with the aim to fully understand the effect of GFD. Celiac Disease is an autoimmune condition in which gluten damages the mucous membrane of the small intestine. Gliadins and glutenins are the two main component of the gluten fraction of the wheat seed. An overview on CD is provided describing the pathogenesis, symptoms and treatment of the disease. The study focuses on the effects of GFD on the immune system and the intestinal flora in individuals with CD.

## **Fortifying Lower Manhattan's Shoreline**

Krystel Campuzano, Mathlyn Mckie  
Prof. Elizabeth Parks

Lower Manhattan comprises less than 1% of the entire city's land area, but generates almost 10% of the city's total economic output, as measured by Gross City Product, and is the location of over 10% of all New York City jobs. Workers in Lower Manhattan come from all parts of the city to work in the financial district. The Financial District's growth is supported by excellent access to transit, with 19 out of 25 subway lines and 26 ferry lines passing through the District. Any climate impacts in the entire region will resonate across the city as a whole and beyond. Because Lower Manhattan is a critical economic, cultural, and civic hub for New York City and the region, the impacts of climate change on Lower Manhattan will make a big impact in the area. In other words, a plan for action is needed to ensure that Lower Manhattan's vitality and growth continues in this century and into the next. Lower Manhattan's physical conditions present both vulnerabilities and opportunities. The area on the whole is characterized by a distinctive, densely developed mix of tall, newer towers and a large proportion of old, historic buildings. These older buildings are particularly vulnerable and challenging to adapt due to their age and structure. The area also has particularly low-lying topography in some areas, dipping below the aging bulkhead at the coastal edge. This research will recognize the unique mix of challenges and opportunities in Lower Manhattan and builds on existing efforts towards the long-term climate adaptation and resilience of the area.

## **Modular Lithium Ion Battery Pack from Recycled 18650 Cells**

Mason Chen

Prof. Angran Xiao

The purpose of this experiment is to test the hypothetical environmental and cost effectiveness of utilizing second-hand Samsung INR18560-15M lithium-ion battery cells in the construction of an adaptive and multi-application power module which can be used to power electrical vehicles among other uses. A smaller test scale power module has been built using 8 cells along with a battery management system (BMS). Cost effectiveness and environmental impact of this power module over traditional ones such as lead acid batteries are evaluated by comparing their data sheet values, i.e. energy density and cost in USD/watt hour. The initial results have shown promise and warrant a larger scale model. Further research is needed to analyze whether or not blood-minerals like cobalt can be excluded from lithium-ion chemistry without significantly detracting from energy density and cell stability.

## **3D Printed Smart Mobile Robot**

Bingfang Chen

Prof. Farrukh Zia

The goal of this research project is to design and build a prototype of a smart mobile robot to participate and compete in IEEE Micro-mouse and similar competitions. The robot has to find its way out of a maze as quickly as possible, by exploring and learning the paths in the maze. 3D printing technology will be used to build a lightweight robot frame so that it can move at a fast speed.

## **Enhanced Security System with Image Feature Identification**

Musharrat Chowdhury

Prof. Farrukh Zia

Open source hardware and software will be used to acquire camera images and recognize and identify objects of interest in the image that will be used to implement new and existing personal and professional security system. The mechanism of this system is to rotate the camera either automatically or manually to track a face when a human is within view of the camera. The biometric security recognition system is a real-world application with complex effects of illumination, occlusion, and imaging condition on the live images.

## **The Impact of Technology on the Paralegal and Legal Profession Law & Paralegal Studies Department**

Marisol Correa

Prof. Marissa Moran

The purpose of my research is to explore some of the new developments in legal technology as they apply to the modern law office and law practice. As a Legal Assistant Studies major, I am embarking on this project because I am interested in learning more about the software and technologies that are currently being employed in law offices. I am particularly interested in

eDiscovery software and how it has made the process of discovery less time consuming for attorneys as well as staff. My goal is to apprise other aspiring legal assistants of these current trends and hopefully aid them in better understanding what kinds of technical challenges await them when they enter the workforce.

## **Hiding in the Light: An Investigation of Galactic Halos**

Ana Maria Delgado  
Prof. Ariyeh Maller

It is said that the field of astrophysics sets out to answer two big questions; “How did we get here?” and “Are we alone?” Scientists today utilize computer simulations in order to understand naturally occurring phenomena and attempt to shed light upon the answer to at least one of these questions. In this project, we set out to explore how the distribution of temperature in the gas halos surrounding galaxies is correlated to other galactic properties.

We used the computer programming language of Python to determine these temperature distributions. By plotting and examining datasets of simulated galaxies, we investigated the distributions of specific halo properties, such as density and metallicity, as a function of distance to the galactic center. We made pairwise comparisons of different properties against the distribution of temperature and across galaxy simulations in order to formulate conjectures. As we further understand the intricacies of temperature distribution in galactic halos, we hope to further illuminate the nature of galaxies.

## **5G Technology/Network**

Ahmed Dembele  
Prof. Asm Delowar Hossain

5G Technology stands for 5th Generation Mobile technology. 5G is a name used in some research papers and projects to denote the next major phase of mobile telecommunications standards beyond the upcoming 4G standards. Currently, 5G is not a term officially used for any particular specification or in any official document yet made public by telecommunication companies or standardization bodies such as 3GPP, WiMAX Forum or ITU-R. New standard releases beyond 4G are in progress by standardization bodies, but at this time are not considered as new mobile generations since implementation and rollout of systems compliant with 4G is still under way; the goals of a 5G-based telecommunications network would ideally answer the challenges that a 4G model would present once it has entered widespread use.

## **Mathematical Art Visualizations**

Meryem Elbaz, Gabrielle Langston  
Prof. Boyan Kostadinov

The goal of this project is to create mathematical art using the R programming language. The arrangement of leaves on a plant stem is controlled by spirals. This fact is called phyllotaxis and it is a good example of how mathematics can describe patterns in nature. In this project, we will create flowers using phyllotaxis, and if time allows, other forms of mathematical art.

## **Redefining Gender in Classroom Discussions**

Eleazer Espinosa Jr.

Prof. Alyssa Dana Adomaitis

In recent times, paradigm shifts have propelled cultural change, and our society is continually attempting to integrate these into a new consensus. These changes have not only influenced what is considered appropriate conversation but also in many other forms of behavior. One current shift relates to gender identity and expression. Gender pedagogy is an important topic as society moves forward to create new constructs of how society looks and define “gender.” “Gender conscious pedagogy aims at overcoming the myth of objectivity by questioning, through teaching, what is considered as common sense and normal” (Cuestra & Witt, 2014). Masculine and feminine are no longer adequate; this idea has changed in recent years to reflect/reflecting the diverse, ever changing society. Though there is a dualism in gender, there is much diversity between them. The proposed research is twofold. First, to investigate the current literature review of gender and gender identity of how individuals representing a range of gender identities are discussed in present day discourse in the classroom. Second, to define dress and how “gender identities” express their gender and use dress in such expression. This research may serve as a pedagogic tool to help educators and students in understanding gender and its many forms.

Keywords: Gender, Pedagogy, Identity, Expression, Dress

## **Works In Process – Scholar Edition**

Pablo Galindo Aragon

Prof. George Garrastegui

The creative field revolves around many professions. Creatives share a lot of common themes that are part of the creative process. It is with these themes that we establish a more impactful way to listen a podcast. Reviewing and breaking episodes up into chapters can effectively guide a student in their path to establishing a creative career.

Some of the most powerful ways to get ahead in the creative field is by networking and obtaining valuable knowledge from other creatives. Gathering this information and making these connections can be quite the task. Not all young creatives are aware of the behind the scenes work and the challenges creatives face such as growth, hustle, brand building, personal projects and more. By highlighting, comparing, and exploring the Works In Process Podcast, students will be able to easily identify guest insight and pick up tips of the trade.

This Scholars edition will breakdown the show through available podcasting features, chapters and visualized infographics. Chapters will signify times in the audio that will highlight specific advice and topics. Visual graphics will demonstrate how creatives share common themes, then branch out to more specific themes depending on the creative career.

Ultimately this will result in a shared abundance of knowledge and guidance in which other creatives can establish their own routine and continue to grow.

## **Cultural Competence: Issues and Benefits in Healthcare Delivery**

Tetiana Grygoruk, Fahameda Hassan and Amina Shahbaz  
Prof. Zoya Vinokur

The extreme growth of New York State population causes to bring more challenges and opportunities for healthcare organization to provide culturally competent service to meet the need of diverse population. According to data from the US Census Bureau, minority groups are projected to make up nearly 50% of the population by the year 2050 compared with 30% in 2000. Outside of ethnicity, there are also many cultural and social groups with which people identify that may affect how they view or receive healthcare. It is very difficult to provide quality service for a diverse population due to language barriers, health literacy gap, and cultural differences in communication styles. More medical programs are including cultural competency education to eliminate racial and ethnic disparities in care. As students in the healthcare field, we want to be able to understand and provide care that best serves the needs of culturally diverse patient body. The purpose of this study is to interrogate patients, medical professionals and students to better understand what the expectations and a reality are. Received survey data will be compared and analyzed for further improvement of a healthcare education.

## **Software Application - Light Emitting Diodes**

Lipi Haq, Lubna Sharmin  
Prof. Farrukh Zia

“Design is not just what it looks like and feels like. The design is how it works” -Steve Jobs. The purpose of the research project is to assemble a home decoration. The research project is focused on analyzing the applications of the specific assembly and adopt the analysis throughout the project to construct the design of the project. The encouragement for this research project comes from the desire to explore our creativity and design a home decoration specifically using LED lights as a result. Learning and analyzing how multiple LED lights can work on the same assembly is also a part of the curiosity and inspiration for this project.

## **Double Blind Professional Live Sound Console Listening Test**

Boaz Bailin He  
Prof. John Huntington

Sound consoles, or "mixers", combine and process audio signals and are important building blocks of professional sound systems. Within the industry, there is a lot of speculation on and opinions about the impact of mixers on sound quality. So to explore this issue, this research project compared the basic sound of two professional digital live sound consoles at very different price points: a Behringer X32 and a Yamaha CL5. The project used a double-blind testing method called "ABX", where listeners were first given a recording of a musical performance through a known console designated A, and then a recording through a known console designated B. Listeners were then asked to identify a clip recorded through console X, the identity of which was unknown to the listener but it is either A or B, selected randomly. A professional guitarist, played as consistently as possible each time, and the same microphones and cables were connected each time

to a randomly selected input on either console. The guitarist did not know which console was being recorded at any given time. Using ABX testing, it is generally accepted that to achieve a 95% confidence level in the existence of an audible difference between two devices under test, a listener should be able to clearly identify the unknown X as either A or B at least 9 out of 10 times. 58 respondents took our survey, and listening to the AKG C414, only 1 respondent (less than 2%) correctly guessed 9 or more unknown X's. This person reported that they were listening on "2018 MacBook Pro Speakers", so it's most likely that this person just hit the correct guesses by chance. No one (0%) guessed 9 or more unknown X's when listening to the Earthworks M30. Given the minuscule number of respondents who guessed 9 or more X's correctly, we feel--given our test setup--that there is no audible difference between these two consoles up through the A/D converter and internal bus structure. And this agrees with our measurements (below) which show a very flat frequency and phase response on both consoles up through about 3k, where the Behringer exhibited a slight difference in phase response. It's conceivable that different source material with more high frequency content could have made audible this slight phase difference. So is all this to say there is no difference between the \$2,200 Behringer X32 and the \$25,000 Yamaha CL5? Of course not. There is a dramatic difference in build quality between the two consoles, and the Yamaha is more likely to have more robust input circuitry. And there are likely dramatic and audible differences in the sound quality in EQ, reverb, dynamic control, summing, etc. To prove those differences, however, would require additional and different testing.

## **Implementation of Sensors in an Assistive Technology Robot**

Jannat Hoque

Prof. Farrukh Zia

Health Kit Educational Robot (HERO-1) went into hibernation after helping colleges and universities for 15 years since 1980 across the country to teach students about Computer and Robotics Technology. HERO is being revived to give new features with modern computer hardware and software technology, such as mobile robot obstacle detection and navigation and speech synthesis and recognition. This will enhance the implementation of Assistive Technology to enable her to help people with disabilities. The two most common modern devices that is used for mobile robot obstacle detection and navigation are ultrasonic sensor using sound waves and infrared sensor using light waves. By learning and comparing the advantages and disadvantages with testing and technical specifications of the two devices, we implement them on a mobile robot to test their effectiveness in real world situations. The main difference between the Ultrasound sensors and IR sensors is that IR sensor detects electromagnetic radiation and the Ultrasound detecting mechanical energy. In the future, a script of servo motor and ultrasonic sensor will be tested and replace the old hardware device in the HERO robot. Also, we are planning to work on connecting the robot to a Bluetooth device to replace remote control panel of the old HERO robot. This part of experiment was tested for people who need help with vision by producing speech output.

## **Life Saving Human Detector**

Abid Hossain

Prof. Ohbong Kwon

“The Life Saving Human Detector” is going to help rescue teams in their rescue mission to detect if there is an existence of human life. This device will be made as a transformable car and drone, so that it can be used in different conditions and different situations. The device will be made in such a way that it can be controlled manually or it can work on its own as an autonomous device. It will map its travel path and this will help the rescue team find the easiest way to accomplish the rescue mission.

## **Understanding Water Consumption and Energy Trends in New York City**

Wen Yong Huang

Prof. Johann A. Thiel

Using the NYC Open Data website, we examine publicly available data sets on water and energy usage in New York City. In particular, we will use various scientific programming and machine learning modules in Python to analyze and visualize trends in water and energy usage within the five boroughs.

## **Understanding the Impact of Peer-Led Workshops on Student Learning**

Afolabi Ibitoye

Prof. Nadia Kennedy, Armando Cosme

As students we often wonder why some subjects are easy to understand and requires not much effort in terms of re-reading the material, for us to grasp what it entails. One subject seems to remain elusive and uneasy for a vast majority of learners at all levels of education; that subject is Mathematics, it is one subject that most learners finds difficult even after doubling the amount of time spent on studying the material. The purpose of this project is to explore methods to make Mathematics more digestible for students using feedback from students enrolled in peer leading workshops and use these data feedbacks to simplify student learning.

In order to design a simplified approach to mathematics, I will be applying learning theories such as Polya’s Problem Solving, Tuckman’s Team Development Model, Vygotsky’s Zone of Proximal Development (ZPD) to name a few; in the peer-led or CO group workshops. The impact of the application of the aforementioned theories shall be used in analyzing how learners respond through observation. To gather reliable data, learners shall provide feedbacks through surveys conducted in the middle of the semester, because by then learners and peer-leaders will have had enough sessions to provide a thorough assessment. Questions I intend to answer are - what are the obstacles students perceive hinders them from learning mathematics; and ways in which peer-led workshops might help students overcome such obstacle(s). Thoughts and suggestions offered by students will also be considered for application with future students.

Upon completion, the limitations of the data sample can be overcome by being reduplicated in other colleges for a more comprehensive approach that can simplify students learning in Mathematics and the influence of peer leaders in learning. The purpose of this project is that mathematics doesn't have to be difficult and can be as easy or easier compared to other subjects.

## **The Impact of Peer-Led Workshops in an Intermediate Algebra Course for Women, Minorities, and First-Generation College Students**

Malika Ikramova

Prof. Janet Liou-Mark

**Abstract:** The implementation of the Peer-Led Team Learning (PLTL) instructional model have shown to increase student pass rates and decrease failure and withdrawal rates in foundational mathematics courses. New York City College of Technology has implemented mandatory PLTL workshops in selected sections of MAT 1275: Intermediate Algebra and Trigonometry. Students spend an hour working collaboratively with their classmates guided by peer leader. Results from this study showed gender, ethnicity, and first-generation college student differences in their responses on the effectiveness of peer supported groups in this fundamental mathematics course.

## **Injection Molding Using 3D Printed Molds**

Gavriel Ilyayev

Prof. Angran Xiao

The purpose of the research is to make a physical mold for a Morgan press G100T injection molding machine. Traditional injection molds are usually made using stainless steel or aluminum alloy, and are very expensive (more than \$10K for each mold) and takes long time (weeks) to build. By making the molds out of 3D printed plastic we can significantly reduce the cost to less than \$100, and time to several days. However, the 3D printed molds have their own flaws: it can only be used for couple of injections before it becomes distorted. The research in this semester involves studying the practice of injection molding, and creating the CAD model of the molds. The molds will be manufactured using 3D printer and CNC mills. In the following semester, we plan to continue this project to test the efficaciousness of the molds.

## **Motion Sensing Wearable Technology**

Jennifer Islam and Caroline Rodriguez

Prof. Farrukh Zia

This project involves the design, constructing and testing of a personal safety device using modern motion sensor wearable technology. The project involves two phases. In the first phase the motion sensor circuit is built and tested. In the second phase the circuit is put in a 3D-printed case which is to make it wearable. The device consists of a motion sensor attached to a microcontroller board. The device uses audio and visual output to alert the user of any physical activity from an individual. By creating this device, we can expect that it will detect motion of an intruder in proximity of the user through the sound of the alarm and warning lights. Furthermore, this device can benefit people by making them feel comfortable and safe when traveling outside of their homes.

## **IoT Home Automation Security System - Software Implementation**

Ayesha Javed, Arooba Sohail

Prof. Farrukh Zia

Home automation is "The Internet of Things". The way that all of our devices and appliances will be networked together to provide us with a seamless control over all aspects of our home and more. Sonoff is a low-cost, affordable device that help you to step into the amazing smart home. It is a WiFi wireless switch that can connect to appliance of different types and brands. Sonoff sends data to cloud platform through the WiFi Router, which enables you to remotely control all appliances with the App eWeLink on your smart phone. Sonoff makes all your home appliances smart, as long as your phone has network you can remotely turn on or turn off your appliances from anywhere at any time. And by setting timing schedules for your appliances, you can maintain a carefree life. Sonoff RF is a Sonoff version with a 433MHz RF receiver module inside. It can be paired with the RF remote controller, which enables you to control your appliances indoors. The App eWeLink enables you to control your devices easily. App is in iOS version in App Store and the Android version in Google Play.

## **Using READ (Reading Effectively across Disciplines) Strategies to Enhance Student Learning**

Nevila Kica

Prof. Michael Gotesman

Learning and understanding diverse material while studying different disciplines is a challenge that influences many students. The focus of this experiment was to determine whether the implementation of READ (Reading Effectively across Disciplines) strategies would aid in improving student's understanding of various topics covered in an introductory biology course, termed Bio 1201. For our study, the READ strategies of incorporating similes and metaphors into student-centered learning was used to improve reading and comprehension of topics covered in Bio1201, administered at New York City College of Technology. We believe that implementing figurative language, such as similes and metaphors is an effective tool that can be used to bridge the gap between reading and understanding of various topics to effectively gain knowledge of diverse scholastic material.

## **Thermally Active Wall Prototype Development for Building Energy Efficiency**

Leona Ko  
Prof. Jihun Kim

This research is supplement to design competition entry for Big Ideas for Small Lots NYC which seeks to build affordable housing in small lots to promote urban infill design. The design is evaluated through various factors including the ability to reduce energy consumption. We target this by transforming the physical properties of a building facade we can manipulate the amount of heat is absorbed and thus decreasing energy consumption. This is significantly beneficial during the summer months when solar heat gain and the need for cooling loads is highest. This study examines the efficiency and plausibility of a thermally active wall in a simulated environment. Our hypothesis is that by changing the properties of wall surface area we can decrease solar radiation by redirecting heat flow within the thermal mass.

## **Mechanical and Thermal Properties of Poly Lactic Acid (PLA) Nanofibers with the Reinforcement of Thermoplastic Nanofiber**

Khristian Lang, Saminur Miah and Astrid Frank  
Prof. Akm Rahman

PLA Nanofiber is biodegradable material and useful in biomedical applications. However, PLA nanofibers are weak in mechanical strength. Several efforts are on the way to improve mechanical strength of PLA. The goal of this project is to evaluate mechanical strength of PLA using poly-Imide in a form of composite blend. In addition to the mechanical strength, thermal and micro-structural properties will be evaluated using TGA, DSC, TMA and SEM. The resultant PLA/Polyimide composite will be useful in invasive biomedical structure.

The geopolymer will be prepared using Class F Fly ash, Metakaolin, Potassium Silicate and potassium Hydroxide. Several filler materials including Rice Husk ash, Fumed Silica, Zirconium oxide and Titanium oxide will be used in order to increase compression strength and reduce porosities. The results from previous groups showed improved compression strength with Rice Husk ash and Fumed Silica. Also, the results will be presented in terms of Compressive strength, Flexural Strength, Fire test, Optical and Scanning Electron Microscope. Additionally, currently we are still working on the research and its presentation through the website, which is being created by one of the students.

## **Assessment of Two Year Study of Cultural Competence amongst Healthcare Students**

Mary Lee, Teresa Lok and Tiffany Yip  
Prof. Zoya Vinokur

As students in the healthcare field, we want to be able to provide care that best serves the needs of a culturally diverse patient body. This study aims to look at whether healthcare students at City

Tech are able to clearly define and understand the concepts of cultural competence and implicit bias in their healthcare encounters. Our research expands upon existing data from the previous year. We opened the scope of the project to include students in non-healthcare majors to understand how the general student population perceives their healthcare encounters. While focusing on improving our data analysis, we distributed two revised questionnaires: one for healthcare students and one for general education. The results from this revised study will give us a look into the students' current understanding of implicit bias and cultural competence, and help us with patient interactions in our clinical encounters.

## **Hardware Implementation of an Assistive Technology Mobile Robot**

Joycephine Li

Prof. Farrukh Zia

Healthkit Education Robot (HERO) was used to teach computer and robotics technology to students and was discontinued after 15 years. This is a continuing two-part research project, where in the first part, Heathkit Education Robot (HERO) hardware circuits and features were upgraded by using modern hardware devices and sensors. The second part of the project will focus on using modern hardware to implement assistive technologies to help people with disabilities. Previous work had shown comparisons between old and modern technologies in addition to successful tests of modern sensors. Our current plans are to assemble and combine old and modern technologies to test its overall performance using HERO-1 schematic diagrams and assembly manual and to keep on upgrading the circuits to have a similar circuit as the old HERO robot, but with modern sensors and fewer wiring connections. One significant aspect of the project is testing of upgraded hardware and software. For troubleshooting, a sample code library was used to test individual hardware components. We discovered by combining the old and modern hardware, we can create smaller circuit connections compared to old circuits that requires a lot of wiring connections. In the future, we will connect the robot to a Bluetooth device to replace the remote-control panel of the old HERO robot to have its motion controlled wirelessly. After we test its overall movements, we will test other sensors and implement features, in addition to mobile obstacle detection and navigation, to help people with disabilities.

## **Waste to Energy: Eco Composter**

Xiao Lin

Prof. Masato Nakamura

Landfilling food waste results to increase the amount of the Greenhouse Gases emitted into the atmosphere. It will change the land surface characteristics directly influence of the climate. The goal of my project is to create a food waste composter. A small composter will process food wastes in a kitchen average amount of a household size food waste that currently goes to landfill. When using composter food waste to energy will reduce landfill impacted on the climate. The method that used to developing my design is Anaerobic Digestion It is a series of biological process in the microorganisms break down biodegradable material in the absence of oxygen. Fertilizer pellets is product, when composted applied and used as a soil amendment. The finial result of this project is a 3D model of this composter.

## **A Web Application that Implements Event Handlers in a Custom Directive**

Janet Llinas

Prof. Marcos S. Pinto

A common use of custom directives is to implement event handlers to interact with mouse and keyboard events that are occurring in the custom elements. This enables applications developer to provide enhanced user interactions to the custom elements. In this project I research, design and implement an AngularJS-based application. This application uses drag operations on images to resize and adjust the opacity. Using AngularJS requires users to write less and to have a cleaner code.

## **Designing a Brief Survey and Analysis of Undergraduate Research at City Tech**

Stephanie Lovett

Prof. Lin Zhou

City Tech has been dedicated to undergraduate research for more than ten years. Currently, more and more faculty and students are involved in the programs that support scholarly work. In this project we design and conduct a survey of full-time faculty across the three constituent schools to 1) ascertain the prevalence of such projects during Academic Year 2018-19 and 2) measure the extent to which these research partnerships are tied to funding sources both internal (i.e., City Tech, CUNY-wide) and external. Our hypothesis is that the majority of the research is funded by City Tech. We will explain the use of hypothesis testing, a statistical method, upon the data we will obtain from the survey to determine if we should reject this assumption. The topic of how to design an efficient and effective survey will also be discussed.

## **The Role of Sirtuins in T. Thermophila**

Christopher Magloire

Prof. Ralph Alcendor

Tetrahymena thermophila is a unicellular eukaryote. T. thermophila has two different nuclei, a big non-germline micronucleus and a small germline micronucleus. These nuclei carry out different functions with distinct biological properties. This characteristic of T. thermophila is one of the reasons scientists choose to use this eukaryote in research regarding gene expression and gene integrity. Sirtuins are a class of proteins that regulate important biological pathways in bacteria, archaea and eukaryotes. There are about 14 Sirtuins, each of which have different functions. Sirtuins have been known to regulate longevity in organisms such as flies and worms. Presently, little research has been done on the effects of oxidative stress on T. thermophila and Sirtuin THD17. The goal of this study is to examine the effects of oxidative stress on one of T. thermophila calpains. The effects of oxidative stress were examined by exposing T. thermophila

to hydrogen peroxide and looking at the response on Sirtuin mRNA levels. *T. thermophila* cells were grown and the cells were exposed to hydrogen peroxide. Then, the RNA was extracted so they can be examined. MTT assay was also performed to determine the amount of cell survival post oxidative stress. PCR was performed to examine the level of mRNA. Preliminary results suggest mRNA of selected oxidative stress genes increased in the presence of 0.2 – 0.5  $\mu\text{M}$  of hydrogen peroxide but decreased in the presence of 1 – 4 mM of hydrogen peroxide. Cell death also significantly increased in the presence of 1 – 4 mM. These results suggest oxidative stress does affect the activity of selected genes in *T. thermophila*. The effect on calpains will be examined in subsequent experiments.

## **Software Implementation of an Assertive Technology Robot**

Jannatul Mahdi

Prof. Farrukh Zia

This is a two-part research project in which Heathkit Education Robot (HERO) software code and features will be upgraded. Modern embedded system programming techniques and sensors will be added to implement assistive technologies that will help people with disabilities. An historical background of old software programs will be explained along with the use of new coding methods to control the robot. The old robot featured light, sound and motion detectors and a sonar ranging sensor. Right now for this project, the distance sensor is tested using Arduino programming. The sensor worked properly indicating obstacles to its nearest distance. This can help people who have problem with vision to alert them if there is any obstacle. For alerting the user of the robot, there is a speaker installed. We used Raspberry Pi programming to convert text to speech. This program can be used in future to do more variety of speech functions in different languages.

## **Penn Station Virtual Reality Experience**

Lenny Marin

Prof. Esteban Beita

Penn Station, which is a local hotspot, not only to New Yorkers but for tourists from around the world, serves as a gateway to New York City. The understanding of the original Penn Station and its beauty has been lost to history with the current Penn Station design. No longer does the space welcome you into the city with its grand scale and natural light; instead you arrive at a labyrinth of window less hallways.

Through this research, we look at the possibilities 3d modeling and virtual reality offer in recreating realistic experiences of important buildings. Through the use of original drawings and photography from Penn Station, it will serve as a guide for creating a detail 3d model, which can be projected through a virtual reality headset. A VR headset would then allow each person to experience complete immersion, developing feelings to understand the importance of the architecture. At the same time, through the use of an Igloo virtual reality screen, it would make it possible for a large audience to share an experience of exploring the original Penn Station.

After this simulation, the data should create a better understanding of how Penn Station was initially and give the user the immersive experience of being inside the space. This data will further create an understanding of how Virtual Reality can be used to experience architecture.

## **Students' Perceptions of the Impact of Peer-led Workshops on their Team-working and Problem Solving Skills**

David Mastalerz

Profs. Nadia Kennedy, Armando Cosme

The study will be centered on peer-leaders who conduct one-hour workshop, which represents a lab component of a Static course. The study will focus on the following research questions: a) Do peer-led workshops help students become better at team-working? And b) Do peer-led workshops help students develop problem solving skills? The participants in the study are the students taking part in the peer-led workshop. Data will be collected through surveys, and organized, analyzed, and presented in a poster.

## **The Role of Calpains in T. Thermophila**

Nakasie Matthews

Prof. Ralph Alcendor

Tetrahymena thermophila is a ciliated unicellular protozoan which is found in the Eukaryotic domain. Many studies have been conducted on this species but it is uncertain whether there may be possible correlation between Tetrahymena thermophila and human calpain. This has presented the opportunity to identify which human Calpain may be similar to the gene of interest TTHERM\_00051890. The motivation behind the investigation is to characterize a Tetrahymena thermophila gene, specifically TTHERM\_00051890, in a calpain family. This was examined with the use of bioinformatics tools such as BLAST, MAFFT, MEGA-X and Phyre to obtain information on gene structure and function. Algorithms were used to perform sequence alignments and find homologs of the TTHERM\_00051890 gene. The alignment tools were used to provide more information on which human calpain in particular, calpain 1-3 and 5-15 could possibly be closely related to the gene of interest, TTHERM\_00051890. To undergo the first step, selecting the appropriate alignment and protein structure prediction tool is essential to conclude the relation between TTHERM\_00051890 and human calpain while utilizing homology modeling techniques. With a better knowledge of TTHERM\_00051890 the structure and function can be determined to indicate whether it has the same intent as the human calpain. The analysis revealed calpain-15 was more closely related to TTHERM\_00051890.

## **Student Perspective on Enjoyment in Mathematics Classes**

Miralia Moreau, Yasmine Soofi

Profs. Nadia Kennedy

The project will focus on students' perspective of enjoyment in mathematics.

The research questions that will be explored are: 1) Do students enjoy math classes? If so, what aspects of the classes they find enjoyable and why? If not, what aspects they do not enjoy and why? And 2) what do students think would make the math classes more enjoyable? Data will be collected by administering surveys to students from two mathematics courses. The data will be organized, analyzed and presented at the poster session.

## **Measuring Health Behaviors on Diverse Samples: Exploring and Confirming Factorial Structure of Decisional Balance Scale**

Trianna Nunes  
Prof. Amanda Almond

It is of critical importance for health psychologists to explore health behavior change in order to reduce racial health disparities in the United States. The relationships between social, cognitive, emotional and health factors are key. Focusing on decisional balance, which informs us of a person's preparedness to change, we set out to learn about exercising, smoking and weight management for Black men and women.

These well-established measures have yet to be used and validated on populations as heterogeneous as Black Americans. Participant responses to these decisional balance measures, from two different samples of Black Americans, will be investigated. Our goal is to explore and then confirm the factor structure of these concepts, to help further understand disparities as a problem based on social perceptions, and not biology. Previous recruitment strategies and sample composition have influenced decisional balance measures, and their usefulness, but not for this population. Outcomes of this work include more accurate assessments of the intentions to promote health for a group that carries a disproportionate burden of disease in this country.

## **The Incredible CarryBuddy**

Patrick Older, Joyce Tam  
Prof. Angran Xiao

CarryBuddy an autonomous following container that can traverse obstacles. It is controlled with an Arduino Uno microcontroller and a Raspberry Pi microprocessor. An autonomous container can have many useful applications across many industries. Elderly individuals can use this product to help carry their groceries; students can use it to carry their heavy book bags; construction workers can use it to carry their tools. CarryBuddy has the ability to carry a large range of items and can function indoors and outdoors.

To manufacture this autonomous following container, the team, consisting of ten City Tech students, needed to create a layout of all the necessary parts needed for this project. Initially the product was bench-marked to other products currently available on the market. The team's autonomous following container is not a replica of a product already available but rather an entirely new product with a unique design. Additionally, the functional requirements of the autonomous following container were realized. Things like overall dimensions of the container, functional speed, storage capacity, sensor placement, battery capacity, and ease of use are just some of the

issues addressed when creating this product. Corporate constraints and legal/safety requirements were recognized during development.

If this product is to be sold on the market there needs to exist an accounting of the cost to manufacture it. The customer's safety needs to be addressed and considered when adding new designs and features. The team's product also needs to meet the requirements of existing laws relating to these types of products or else the product cannot be sold. Together, all the above-stated requirements need to be adequately covered.

Finally, the organization of the team is fundamental to the success of this project. Each group member will be part of a task force which will ensure that all the talent on the team is used properly. This project is not just a test of one team's ability to create a functional, autonomous carrying container, but a testament to a group's ability to work fluidly as a team.

## **Perovskite Solar Cells**

Bryan Ortiz

Prof. Masato Nakamura

Perovskite solar cells are a combination of materials that may help solar cells become more accessible to the public. The best to test this is by comparing between perovskites and their counterpart, silicon solar cells, in terms of their efficiency output and manufacturing cost. Although testing this in a real - world setting won't be possible without a lab, the topic can still be shown by using information from databases and reports from fellow researchers. With the data, there is a good chance that perovskite solar cells will be the key to bringing solar energy to the forefront of renewable energy.

## **Effects of Tetrodotoxin Concentration on Action Potential: a Computational Study**

Shaina Raklyar

Prof. German Kolmakov

Japanese Fugu (Puffer fish) is a member of the Tetraodontidae and like majority of members of this family is poisonous due to the presence of tetrodotoxin (TTX). Every year a number of people become affected due to consumption of not properly prepared raw Fugu or Fugu soup. The death rate is below 10%. TTX blocks Na channels in cell membrane, which leads to changes in action potential behavior. We hypothesizes that there should be some critical concentration of TTX which will block generation of action potential in nervous system. To investigate behavior of action potential in neuron under the TTX influence we performed computational simulations. We wrote Python scripts using modified time-honored Hodgkin-Huxley model. Instead of directly working on TTX concentration, we introduced to the model, a parameter  $f$  which accounts for the fraction of Na channels blocked by TTX. We investigated in detail behavior of action potential due to change in parameter  $f$  which correlates with concentration of the toxin in addition to change in input stimulus current such as its amplitude and duration. Longer stimulus produces a train of action potentials and we investigated whether TTX would affect its generation. We found that, as the stimulus becomes weaker, the critical value of the parameter  $f$ , above which axon fails to

generate action potential, decreases. We also found that  $f$  critical decrease with temperature. Moreover, there is another critical value  $f$  for which the train of pulses stop generating and this critical value firstly rise with increase of stimulus and then start to decrease.

## **Titanium Dioxide Sensitized with Porphyrin Dye as a Photocatalyst for the Degradation of Water Pollutants**

Kevin Reyes

Prof. Ivana Jovanovic

Titanium dioxide (TiO<sub>2</sub>) is a non-toxic crystalline semiconductor that has applications across many industries, from its use as a food additive, to solar cell panels. It is useful as a photocatalyst under UV wavelengths due to its electronic properties. More importantly, when treated with porphyrins, it is observed that the photocatalytic properties of TiO<sub>2</sub> shift to be more sensitive under the visible light spectrum. This molecular complex becomes a cost-effective candidate for the degradation of water pollutants. When excited, the TiO<sub>2</sub> valence electrons have enough energy to produce highly reactive oxidizing species (ROS) such as hydroxyl ( $\bullet$ OH) and superoxide (O<sub>2</sub> $\bullet^-$ ) radical anions that can promote the degeneration of water pollutants. In this project, TiO<sub>2</sub> was sensitized with a porphyrin, Tetra (4-carboxyphenyl) porphyrin (TCPP) and used as photocatalyst under visible light for degradation of aqueous solutions of methylene blue (MB) dye. The quantification of the degradation of MB was assessed by UV-Vis spectroscopy. The results of this procedure showed the decrease in concentration of MB over time when reaction is exposed to visible light.

The TiO<sub>2</sub>-TCPP complex was tested as well for the recovery of metals from the AgNO<sub>3</sub> aqueous solution. The reduction of silver cations to silver metal was observed through formation of black precipitate. The results herein show promise in methods beyond water treatment, as seen by the precipitation of silver metal from solution and can be extended to synthesis of metal nanoparticles. Nanoparticle synthesis is a growing research field because of its applications in numerous fields such as optics, information storage, or even battery production.

## **Geometry Expresses its Designs on Art and Architecture**

Evelyn Richardson

Prof. Anne Leonhardt

In the past ornamentation held great significance for architecture. The great Roman historian of architecture, Vitruvius, “advised architects to acquire extensive knowledge of history in order to realize underlying ideas through ornament as an expressive medium in architecture” [Khwarazm 227]. This project utilizes the tiling method of ornamentation as it evolved from mathematics as practiced by Islamic artisans to create highly complex effects. Persians believed the practice of geometry served as an intellectual means to conceive the order of the universe [Lawler 1982]. This geometry that aims to reveal the sublime and that appears throughout Islamic architecture, is particularly evident in the tile patterns. Some questions we will be considering in our study of these precedents involve: After one begins by generating the basic formula of a tiled pattern, how does one manipulate it rhythmically? In the absence of a written “recipe” for constructing this complex

system of tiling, how were the tile patterns conceived and produced? How does one integrate design considerations beginning from the basic equation? And what can be learned and understood utilizing this arrangement of a pattern over a larger surface?

### **City Tech Talk and Roll Bot**

Samiha Riham  
Prof. Farrukh Zia

City Tech Talk and Roll Bot is a mobile robot project which combines computer hardware and software technology with mechanical, electrical, data communication and networking technologies to create a working prototype of a computer controlled robotic system. In earlier phase of the project it was programmed with the help of open source software to greet people using voice synthesis. In the current second phase, it will be able to navigate its way around a room by using sensors to detect people and other nearby objects.

### **Smart Robot for Smart Home**

Pratima Roy  
Prof. Farrukh Zia

A smart robot is an artificial intelligence (AI) system that can learn from its environment and its experience and build on its capabilities based on that knowledge. Smart robots can collaborate with humans and learn from their behavior. The number and types of tasks that can be automated or augmented by software, robots and other smart machines is rapidly increasing. Smart robots have the capacity for not only manual labor but cognitive tasks. In this research project computer hardware and software will be used to make a mobile robot that can make announcements or provide useful information by sensing its environment with the help of different sensors.

### **Solar and Rain Catching Canopy**

Subhra Sen  
Prof. Alexander Aptekar

During the rainy season, the collection of rain water in city's water system is a great problem. To get rid of this problem, mini parks will be used to collect the excess rainfall. We are designing canopies using environment friendly technologies with rain catching canopies to educate the public about environment sustainability and bringing social awareness on environmental issues.

The canopies are designed to gain solar energy and to collect the maximum amount of rain water in a particular area. The design of the upper part of the canopy provide shade for benches near existing flower beds, collect rainwater for irrigation, and harness solar energy. Rainwater is accumulated on the canopies, flows into vinyl tubing and distributed to clay pots. The structure of the canopy is designed using bamboos and the density of the canopy shade proved to be stable enough for public safety. This new design uses environmentally friendly products made of recyclable materials and strong enough to stand alone.

## **Implementing READ (Reading Effectively Across Disciplines) in the Classroom**

Anisa Shkemi

Prof. Michael Gotesman

Biology 1201 is the second introductory biological course offered at NYC College of Technology. It is a reading intensive science course, which prepares students for careers in science and medicine. Biology 1201 requires understanding many concepts and the mastering of medical terminology, which can be difficult to learn. The purpose of this study is to investigate the effectiveness of using “Concept Mapping,” a READ (reading effectively across disciplines) strategy to enhance academic performance and achievement for Bio 1201 students. The experimental design of the study involved the use of a pre-assignment challenge to evaluate students’ progress as well as implementing the aforementioned READ strategy of “Concept Mapping” to enhance student learning. For sample size, thirty students in a particular section of Bio 1201 administered at New York City College of Technology participated in the study. To assess initial reading and concentration abilities, students were asked to read a short text regarding bacteria and to answer appropriate questions based on the allotted text. The first trial consisted of an illustration by the instructor that showed a concept map. Subsequently, groups of students that consisted of 3-4 individuals were advised to create a concept map on Fungi, the particular subject matter for that lesson. In the second trial, students were allowed independence to create their own concept map based on several weeks of Bio 1201 material. The results of the study indicate that “Concept Mapping” is a successful and effective teaching method that enhances students’ performance and therefore, implementation of READ strategies should be encouraged to improve student learning.

## **Artificial Intelligence Techniques in Analyzing Stroke Victim Data**

Kateryna Strokach

Prof. Joanne E. Weinreb

Technology and data are routinely used in virtually every aspect of daily life. As technology advances, the amount of data created grows exponentially. Big Data is a term that outlines the management and analysis of extremely large datasets. In the healthcare industry specifically, Big Data allows for continual synchronization with new technologies and advancements in medical science. Artificial intelligence (AI) is a collection of technologies, theories, processes, and procedures that use computing to simulate some of the aspects of human decision-making and cognition. Through a study of Artificial Neural Networks (ANN), a branch of AI, and biomedical imaging, this study explores how Big Data and Artificial Intelligence (AI) interact with one another to improve the diagnosis of stroke and the care provided to stroke patients. Stroke can happen to anyone at any time, and when it happens, it affects the whole family. In addition, it is the main cause of long-term incapacity. It is therefore extremely important to prevent and detect it as early as possible. With an increased ability to detect and visualize stroke, we can improve medical treatment and lead to better patient outcomes and quality of life. After studying and analyzing different Artificial Intelligence techniques that are used in analyzing stroke victim data, we would like to propose a new technique, where Big Data will be used as a main source for stroke prediction.

Some of the main stroke risk factors that should be taken into consideration are heart disease, cigarette smoking, and history of transient ischemic attacks, diabetes, cholesterol imbalance, age, gender, ethnicity and genetics. Our proposed hypothesis is that we can improve stroke prediction by adding known risk factors to biomedical imaging data and analyzing it using ANN tools to accurately predict impending stroke so preventative measure can be taken. Ultimately, Big Data and Artificial Intelligence work together to create a symbiotic relationship that will transform the medical field, healthcare, and the world as a whole.

### **Remote Sensing + ATF**

Luc Telemaque

Prof. Viviana Vladutescu

The applications of CO2 lasers were identified to understand their importance in the medical and industrial field. The unique properties of the CO2 laser are still being researched today at the Accelerator Test Facility at the Brookhaven National Laboratory, and implemented in such ways to increase the efficiency of the devices. CO2 lasers were found to be the most efficient in catalyzing processes such as photon injection, water sterilization, material curing and food disinfection.

### **Water, Race, & Class III**

Jean-Hus Theodore

Prof. Aida Egues

Water quality is one of the great environmental and health disparities in America, with Americans of lower income, rural residence, and Americans of color being affected the most. In hopes of rectifying the gap in water quality, comparative statistics (using R) can allow us to elucidate the matter with specification as to which elements of the matter are crucial to maintaining the optimal health of a community. By advocating for not only the improvement of water quality in underserved communities but also the training of individuals born and raised in these communities it should be expected that more “home grown solutions” will come about.

### **Sustainable and Resilient Kalinago**

Yesenia Ward

Prof. Illya Azaroff

The Kalinago are the indigenous people of Dominica. A persecuted minority group on the island, the Resilient Kalinago Initiative was started. Its goals are to retrieve and revive lost Kalinago tradition, culture and history. Document and map existing conditions in the Kalinago Territory for future master planning. Design and replace the housing and community shelter damaged by recent weather events. Provide a system for the Kalinago to achieve economic equality with the rest of the island. Make the territory as climate resilient and sustainable as possible with the ultimate end goal of making a carbon-zero model community that can be adapted for worldwide application.

## **Kinetic Study of Amine Cured Epoxy Resins**

Xiaolan Wu, Xiaona Zhou, Swati Neogi

Prof. Diana Samaroo and Urmi Ghosh-Dastidar

The epoxy resin is a class of polymer containing more than one epoxy group (or cyclic ether) and featuring a broad range of applications in the field of paints and coatings, adhesives, electronics. With utilization of different curing agents including amines, amides, acid anhydrides, phenols and metal oxides, epoxy resins can be hardened via curing reactions. Owing to their excellent mechanical, electrical properties, chemical stability and extensively industrial applications, many chemists have been interested in studying the curing kinetics of epoxy resins. However, one of the major challenges towards the kinetic studies of epoxy resins curing is the high-cost of laboratory simulation of epoxy resins formations. The construction of computer-simulating kinetic models are not only significant to overcome this challenge but also to optimize a better chemical environment and experimental parameters, which ultimately contribute to the success in formation of desired epoxy resin products. Our research focuses on establishing a suitable kinetic models to better study the curing reaction of epoxy resins. Presently, we are working on identifying potential proposed kinetics models based on mathematical analysis on experimental data. Future work will focus on using the functionality and accuracy of the proposed kinetics models to predict both the degree of cure and rate of cure qualitatively and quantitatively.

## **Modeling Changes in Cellular Micro-Environment in Mild to Moderate Head Trauma**

Xiangfu Zhang

Prof. Subhendra Sarkar

Our work aims to connect and model multiple small, inter-related tissue injuries as a consequence of mild traumatic brain injuries (mTBI). It has been shown that frontal and temporal lobes are vulnerable regions for brain traumatic injury. A brain injury from a blow or high-speed impact can cause undersurface of the frontal and temporal lobes to deform against the anterior and cranial fossae. This deformation can often trigger damage to the cerebral vasculature, which is ill-understood and can result in chronic damage to larger vessels over time. These physiological injuries can be manifested psychologically; such as patients' sleep-wake disturbance. The connection between mTBI and the cause of sleep-issues is found to be associated with vascular epithelial injuries to pineal gland that lies directly at the anterior to the tentorial ridge. In this research, we are modeling brain trauma with two injuries tissue gliding between temporal, frontal and parietal lobes. Frontal lobe may explain the psychological problem and parietal may explain large venous injury, while the mid brain including pineal and hypothalamus injury may explain sleep issues. Although white matter connectivity is disturbed, the literature is not enough for us to include that within our cell injury model. Learning from these devastating symptoms of mTBI, it is critical to push for more scientific researches to understand the mTBI and offer psychosocial as well as neurobiological interventions.

## **Simulation as a Predictor in Probability**

Xiaona Zhou

Prof. Satyanand Singh

In this study we simulate bivariate normal data. We gain intuition about the bivariate normal distribution by comparing the generated data to the associated bivariate normal density surface. We also get results about covariance and correlation. We will use tools from linear algebra to discuss transformations of random normal vectors, and the use of contours.



# **Book of Abstracts**

**The Louis Stokes Alliances for Minority Participation  
Program**

**Spring 2019**

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**New York City College of Technology**

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## Effect of Air Quality on Human Health: Asthma

Kiyatou Konate  
Prof. Pope Fischer

Air Quality is the measured amount of air pollution in the environment. This is a common problem in countries and urban cities because of the mass production of machines, and cars which lead to health conditions. Medical anthropology is one of the anthropology branches that studies this particular problem they look at health, illnesses, and diseases. Asthma is a chronicling disease that can be caused by the quality of air pollution in an environment such as in urban cities. Through this research I will focus on how air quality affects human health. How can we improve the air quality in urban areas such as New York? In what ways does the air quality in affect the children? What are the signs of the chronic disease and is it possible to cure them? I am a person with asthma, but I never knew what caused it, and this has inspired me to do more research about it because I am very passionate about human health and the environment. I will interview people who have asthma, parents and New Yorkers, maybe I will interview some doctors, professors, and teachers about what they think about an urban city such as New York City. Possible questions include: Do you think the air quality of an urban cities are bad compared to other rural areas? How bad are they? Does bad air quality cause health issues? What are some health issues associated with living in a city of bad air quality? That is my focus. Also, what has been New York City's Air quality index of the past years, is it good? How can we improve our air quality? What do we have to do as humans that care about our environment and our health? For this research, I will review scholarly articles from medical anthropology on the topic of air quality and health. How medical Anthropology study health and environment.

## An Anthropological study of Globalization: McDonaldization, Glocalization, Power and Resistance

Sumya Raha  
Prof. Pope Fischer

Anthropologists study human societies and cultures and their developments including globalization. Globalization impacts many factors in our world today, but most people are not aware of what globalization entails. Facilitated by mass forms of transportation, modern forms of communication, and technology, globalization affects many aspects of today's society worldwide. In what ways has American culture spread and influenced cultures around the world? Some fear that globalization strips away non-western countries cultural practices, replacing them with Western ones, creating a "homogenized" culture. This research will explore how anthropologists study the effects of globalization on everyday experiences, and address questions of power and inequality as the forces of Western culture spread. Yet, "globalization" shows forms of resistance as local populations take Western practices and make them their own. Specifically, this research will look at McDonald's fast food chains as a symbolic representation of the global spread of American culture and the ways in which local population shave altered or changed it to fit their own cultural practices and beliefs.

## Anthropological Study of Social Media: Snapchat's Dictatorship

Ida Touray  
Prof. Pope Fischer

Using the approach of Digital Anthropology, this research will explore how social media such as Snapchat acts as a catalyst for competition amongst its users. While Snapchat on one hand is an ideal platform for sharing daily updates of the individual's life, on the other hand, Snapchat's beauty enhancement features, location, number of views, and the number of points scored for each post can trick the viewers into believing that this person that they are viewing is living a greater life than they are. This could tempt the viewers to try as hard as they could just to be like that person with the "great life" on Snapchat or even better. Many youths nowadays spend most of their times on Snapchat comparing their status with others and constantly upgrading their status just to meet the "expectation" which in reality has no benefits to them. The never-ending competition could lead to anxiety and depression for those who try hard to copy others investing all their time and money on snapchat. People can also get too personal with their stories as the competition get more intense. They post stories which could turn against them in the future. The purpose of the research is to design an ethnographic study of digital use such as Snapchat among young people to further understand how social media has change the way they live their lives.

## Environment Mapping Robot

Caren Yang  
Prof. Zia

Design, build and test a small mobile robot, programmed to explore and map its environment by using an intelligent search algorithm. Several sensors such as Infrared sensor and Ultrasonic sensor are used to detect different type of objects and obstacles in the path of the robot.