Book of Abstracts

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1. Examining the Effect of Oxidative Stress THD14 mRNa Expression
   Emmanuel Adebola
   Prof. Ralph Alcendor

   Oxidative stress (OS) is an imbalance between the production of free radicals and the ability of the body to neutralize or detoxify their harmful effects. Free radicals such as superoxide radicals and hydrogen peroxide are known to be produced by the body and contribute to impairment of key biological processes. Examples of the possible consequences of free radical damage are lipid per oxidation and DNA damage. Diabetes, heart diseases and aging are all effects of OS. Antioxidants are molecules capable of inhibiting these harmful effects. They are found in many fruits and vegetables.

   Sirtuins are enzymes found in almost all organisms. Mammals have seven different sirtuins while organisms like yeast have about four different ones. These enzymes function in processes such as aging, transcription, cell death and cancer. They function as important stress resistant genes. Organisms deficient of one or more sirtuins are known not to survive or have developmental abnormalities. Although the amount of research conducted on sirtuins and their role in organisms is extensive, the complete picture of how they function is unknown. Tetrahymena thermophila is a free-living eukaryote found in fresh water all over the world. Studies involving these organisms have contributed to our understanding of histones, cytoskeletal proteins, nuclear division and cell cycle. In the area of OS, the amount of studies using T. thermophila as a model is lacking. T. thermophila is known to be very resistant and therefore are likely to be ideal for stress resistant studies. T. thermophila has several sirtuins. Very little studies in the role of T. thermophila sirtuins and OS have been completed. The goal of this study was to examine the effect of OS on THD14, one of the sirtuins found in T. thermophila, mRNA expression. Cells were incubated for 24 – 48 h in different OS-inducing conditions followed by mRNA analysis. THD14 expression increased in the presence of glucose, 0.5 – 1 mM of hydrogen peroxide, 0.8 mM of copper and 0.1 – 0.25 mM of ethanol. High concentration of hydrogen peroxide (2mM), ethanol (0.75 mM) and starvation resulted in decreased expression of THD mRNA. These results show that TTH_190 mRNA expression is affected by OS conditions, suggesting that TTH_190 may be involved in certain ROS regulation.

2. Build a Wireless Sensor Network with XBee
   Rachel Alexander, Amelia Ramnauth
   Prof. Xin-Zhou Wei

   XBee modules and ZigBee are very important devices to become acquainted with when learning the basic fundamentals of engineering. XBee and Arduino work hand in hand when it comes to creating wireless sensor systems. XBee is a wireless communication module that can be used to create wireless networks in any configuration. We will use XBee modules and Zigbee protocols to create a wireless sensor network. XBee modules are radio devices that use ZigBee or 802.15.4

protocol. It sends and receives data by the 2.4GHz at a relatively low power and can be used to set up simple point to point links. ZigBee is an IEEE 802.15.14 communication protocol used to create personal area networks with small low powered digital radios. ZigBee is simpler and less expensive than other wireless personal area networks such as Wi-Fi and Bluetooth. Its power transmits from 10-100 meters line of sight depending on power output and environment characteristics. It also provides a 128 bit encryption for data security. We are currently configuring the XBee module on a PC and testing its capabilities. We are conducting minor tests that ensure connection between two XBee modules. In the future, we will setup two XBee components with X-CTU program to make a wireless transmission. We will add two XBee routers in our wireless system and make an XBee network and write a program to encrypt the data transferred between PCs.

3. Bose-Einstein Condensation and Superfluidity of Photons in a Microcavity
   Mohammed R. Alif
   Prof. Oleg Berman

   We studied the Bose-Einstein condensation (BEC) and superfluidity of photons in a micorcavity. The interaction between photons is achieved by coupling of the photons to a dye molecule. The photons are trapped due to the curved shape of the mirrors, forming the microcavity. The curved shape of the microcavity results in the coordinate-dependent photon effective mass and photon-photon interaction. The temperature and coordinate dependence of the superfuid density for photons in a microcavity is analyzed. The possible experiments to observe the BEC and superfluidity of microcavity photons are discussed.

4. Site Analysis – Case Studies
   Cory Breegle
   Prof. Lia Dikigoropoulou and Prof. Jill Bouratoglou

5. PEGDA-based Scaffold Design and Fabrication for the Drug Delivery Tests
   David Cameron
   Prof. Ozlem Yasar

   Drug delivery plays an important role in cell growth within the engineered scaffolds to do tissue regeneration. In this project, PEGDA based scaffolds with different internal architecture designs are fabricated by photolithography at SET Research Laboratory at the department of Mechanical Engineering Technology. Then, the engineered scaffolds with different internal architecture designs are sandwiched between two glass slides to do drug delivery tests. Our initial results indicate that, PEGDA-based scaffolds with the various internal designs can be tested to inspect the drug delivery paths for the bioreactor experiments.

6. Endocrine Disrupting Chemicals and its Effect on Reproductive and Mental Health
Trevor Caraballo
Prof. Sanjoy Chakraborty

An extensive body of literature shows that writing about traumatic or emotional experiences results in improved physical health and emotional well-being. In Pennebaker's (1997) expressive writing paradigm, participants are instructed to write about either traumatic emotional events or neutral topics over several sessions. Those assigned to the expressive writing condition typically display physical and psychological health improvements over time compared to the control condition. This study extends pilot work we did in our lab which found that when participants engaged in cognitive restructuring (subjects were asked to reframe an emotional experience in positive terms i.e., meaning-making), vagal tone and heart rate improved. A second major difference in our study versus previous published work is that our study assessed the effects of expressive writing on autonomic nervous system responses (e.g., vagal tone, cardiac impedance) over time. Fifty subjects (25 male), ranging in age from 18 to 44 years (M=24.64; SD=6.18 yrs.), participated. Each was randomly assigned to the standard expressive (n=24) or the meaning-making (n=26) condition. Subjects wrote for at least two sessions and most wrote for three while physiological measures were recorded. Heart rate ($F(1,45) = 8.16$, $p = .006$) and to a lesser degree, vagal tone ($F(1,45) = 3.43$, $p = .071$), improved over time in both conditions but vagal tone ($F(1, 45) = 2.874$, $p = .097$) and respiration changes ($F(1, 45) = 6.229$, $p = .016$) were moderated by gender. It appears that women may benefit more from a meaning-making expressive writing paradigm compared to the standard whereas the opposite may be true for men and they may benefit more from a standard expressive writing format.

7. Significance of Entrance Door Infiltration to Building Environment
Lev Chesnov, Sean Eckelmann, Javonne Senior
Prof. Daeho Kang

The unwanted infiltration of air through doorways contributes to building energy consumption. Air infiltration through doorways depends upon many factors. They include types of doors, frequency of door use, outdoor climate, and indoor environment. Based on the literature studies of air infiltration through various entrance doors, we gained a better knowledge of energy loss. We measured various factors to quantify infiltration or exfiltration rates through doorways and also monitor the variation of indoor thermal environment due to door infiltration. Throughout the fall semester we conducted measurements such as relative humidity and temperature through the double swinging entrance doors and the entrance lobby of the Environmental Building. Our results will help us to show the importance of air infiltration through the entrance doors of buildings and make recommendations to improve energy savings as well as indoor climate.

8. Interactive Robotic Mannequin
   Aryuna Dashidorzhina
   Prof. Farrukh Zia

   Life size robotic mannequins designed for the fashion and retail industry are rare and expensive. Even though the New York City fashion industry is eager to adopt technology to enhance and improve their business, the extremely high cost and specialized nature of robotic mannequins as compared to normal static life size mannequins has prevented their adoption by the fashion industry.The goal of this project is to design, build and install a human like robot while minimizing power requirements and material; and at the same time maximize the functional purposes, such as interacting with humans.

   A life size interactive robotic mannequin prototype was designed and developed using low cost open source hardware and software, with an emphasis on using readily available, off the shelf construction matеrřial and hardware devices. A real life 3D body profile was created by using an innovative cardboard slice construction technique with the help of human body imaging and 3D CAD tools.

   The robotic mannequin prototype interacts with the customer by using a combination of low cost proximity and image sensors to detect its environment. The mannequin also features synthesized speech as well as head and arm movements to get customer's attention and strikes various poses to show clothing styles by wifi controlled setup of the angles and time of the motors. It has features such as RGB LED based eye color change and LED bar graph lips synced with its speech.

   Our next step will be to implement smartphone based VR (virtual reality) controller. Since VR capable hardware is readily available we want to include it in our project as well. We plan to control the mannequin by using smartphone's versatile motion sensors. The movement of the smartphone will be synchronized with the neck motors. It will allow the mannequin to move its head and also transmit live video to the smartphone through two cameras located in the head of the mannequin.

9. Design of a Cell Phone Charging Exercise Bike
   Ustad Dasrao, Christo Sam
   Prof. Angran Xiao

   In this project, the professor and students in Department of Mechanical Engineering Technology designed and built an exercise bike that is able to power a set of cell phone chargers. A mechanical system is designed to collect motions from the bike components, and transfer the energy into electric current through a small generator. The electric current is stored in a 9V battery, which is used to charge multiple cell phones. The entire system is compact and portable, and can be easily disassembled and clamped on a bike. This project will showcase the

design and manufacturing capabilities of the students, as well as promote environmental consciousness among faculty and students.

10. Cultural Competence Amongst Undergraduate Healthcare Students
Natalia Dembowska, Jerry Strklja
Prof. Zoya Vinokur & Prof. Elaine Leinung

The United States is a country of many culturally diverse populations. By 2050, minority populations will increase to 48 percent of the U.S. population and Hispanics will represent 24.4 percent of the total population (U.S. Census, 2010). Due to this demographic shift, cultural competence which is defined as the ability of providers and organizations to effectively   deliver health care that meet the social, cultural, and linguistic needs of patients is crucial in the curriculum of undergraduate healthcare students. This study looks to analyze cultural competence amongst undergraduate healthcare students by utilizing surveys and questionnaires of over 200 undergraduate healthcare students in The Radiologic Technology Program, Nursing Program and Dental Hygiene Program at New York City College of Technology. The study will explore undergraduate healthcare students perceptions of different subcultures such as LBGT and the results gathered through the study will aid in providing meaningful knowledge that impacts facilitating a meaningful cultural competency education that fosters cultural awareness and quality healthcare.

11. MoDAR (Mobility Detection and Auto Recognizing) Robot
Fatime Zahra El Fatimi and Felicia Jeter
Prof. Andy S. Zhang

MoDAR which stands for Mobility Detection and Auto Recognition, is a custom-made humanoid robot. Our work is in a multidisciplinary field which involves mechanical design and fabrication, electronic design, and software design. The team is currently working on the first phase of the project that deals with the facial recognition and voice recognition algorithm design and programming and upper body mobility mechanism design and programming. The work requires us to utilize the STEM skill and knowledge we learn inside the classroom as well as the practical knowledge and skill we learn outside the classroom through spending numerous hours in each week working in the mechatronics lab.

When completed, MoDAR equipped with artificial intelligence will be able to detect the presence of persons or objects in its surroundings and record these information for many applications. MoDAR can move autonomously or can be remotely controlled through a controller.

MoDAR serves as a testbed for us to enter into the bio-mechatronics field that will find numerous applications in the medical fields such as building functional and low cost prosthetic limbs utilizing state of the art sensor technology, actuation technology, and computer

programming technology that can aid in increased mobility for people who are physically challenged.

12. Design of an Alternative 911 Mobile Communication System Concept
    WeiJie Gao, Wen Yong Huang, Brian Taveras
    Prof. Daniel Wong

    The 9-1-1 emergency system is an essential service to our society and plays a critical role in the process of resolving emergency situations. The system could improve its efficiency by upgrading the platform it works on using a system that takes advantage of the latest technologies. Improvements to the current 9-1-1 system could save more lives if efficiencies can be made. This project will define the existing 911 communication system inefficiencies and create a mobile app solution. It will offer new functions such as determining location passively using GPS, optimizing it for foreign language situations, make it convenient for people with disabilities, potentially increasing the response time.
    The current 9-1-1 system does not fully incorporate the technologies many people use in their everyday life. Many people interact with their smartphones on a regular basis during the day. Communication can occur across the globe within seconds, which can allow for warning systems to activate in an event of a local and regional emergency.
    Our preliminary research investigates the existing 9-1-1 system. We will interview and collect information from users throughout the system pipeline to see how the current system functions, and ask for recommendations from users—first responders, call centers, people in emergencies, government agencies—to determine where efficiencies can be improved immediately.
    From that research, we will investigate existing technologies not currently being applied to the system. We will also extrapolate and suggest ways in which future systems might be incorporated to improve the response times.
    Our research goal would result in the proposal of an alternative or additional system for aiding in emergency situations. Adoption of these concepts would potentially save lives, avoid personal and physical damage/destruction, and minimize risks to those whose job it is to aid those in need.

13. Designing Bowling Ball with Concrete
    Bryan Hoy
    Prof. Navid Allahverdi

    The objective of this research is to design and build a bowling ball using fiber reinforced concrete. After the successful design and build of bowling ball it is possible to participate in the American concrete institute bowling competition. The winning ball is going to be judged based on the following categories the mass test, Bowling test, diameter consistency test, Final deformation load test, and Toughness load Test. The mass test is when you weigh the ball to see if it reaches the require mass. For the diameter test if the diameter is more than 15 mm and less

than the standard of 200mm the ball will be disqualified. The bowling test is a when you roll the bowling ball down a v shaped ramp to knock pins over and earn points. The final deformation test requires you to predict a load the ball can take. The Toughness load test while the final deformation test is being performed for every 5mm you records the 5 loads and average them. Different balls with varying portion of fiber will be designed and cast. Consequently these balls will be evaluated based on the competition criteria to arrive at the best design.

14. Structural Response of Fiber Reinforced, High Performance Concrete Under Elevated Temperatures
Stanimir Karamihaylov
Prof. Navid Allahverdi

Reinforced concrete experiences cracking and spalling when subjected under elevated temperatures; ultimately jeopardizing the structural integrity of the concrete member. Studies indicate that polypropylene fibers will improve response of concrete at high temperature, and will subdue cracking in the concrete. The objective of this research is to study the impact of high temperatures on polypropylene fiber reinforced concrete and its structural response through conducting experiments.

15. Drug Delivery Tests for PDMS-based Scaffolds
Maria Medina, Navid Samani
Prof. Ozlem Yasar

Drug delivery plays an important role in cell growth within the engineered scaffolds used in tissue regeneration. In this project, PDMS based scaffolds with interior hollow channels are designed and fabricated by micro-printing at SET Research Laboratory at the department of Mechanical Engineering Technology. Then, the engineered scaffolds are squeezed in between two glass slides to do drug delivery tests. Our preliminary test results show that, without a leakage problem, scaffolds can be tested for the drug delivery pathways for bio-reactor applications.

16. Race Springs
Timothy Medina
Prof. Gerarda Shields

From harmful chemicals, pesticides, nitrate, lead, arsenic, fluorides, or even petrochemicals that may reside in unfiltered contaminated water, water-borne diseases have led to 3,575,000 deaths a year. Humans are not able to survive without clean drinking water for no more than 3 days making water a necessary natural resource for human everyday survival. The average American uses about 101.5 gallons of water a day on activities such as washing hands, flushing toilets and showers. After water is considered contaminated by our usage, the water goes

through a process where at the end bacteria (secondary treatment) or chemicals (advanced treatment) are used to thoroughly clean our wastewater.

This is costly process with treatment plants spending respectively when needed $102.0, $95.7 and $48.0 billion on building new water treatment plants and updating or repairing current systems (Center for Sustainable Systems, University of Michigan. 2016). Whereas instead of building a new water treatment plant, New York invested $1 billion on restoring the watersheds that provide the City's with drinking water. In an effort to save money and instead let the ecosystem that contains the drinking source naturally filter the water.

By a more natural approach like being able to mimic our ecosystems' capability to filter and purify itself from contaminates. We can potentially gain both cost effectiveness and a more efficient use of reusing resources or finding more beneficial ways of using our resources. Water-borne contaminants and their harmful properties towards human life will be studied. The purpose of this research is to find an alternative direction of filtering water by gaining a better understanding of how water is cleaned by modern technology versus how our ecosystem purify and filter's the water supply. To further lead into identifying an innovative way to increase our resource productivity when treating contaminated water. With a more natural approach to counter the negative effects of water-borne disease, it is hoped that this research will benefit those who do not have accessibility to clean water and gain a more beneficial quality of life.

17. Optimizing Graphic Abstraction for More Effective STEM Education: Infograms for Anatomy and Physiology
Rachel Ofer
Prof. Vasliy Kolchenko

In order to pass the Anatomy and Physiology course students are expected to memorize an extraordinary amount of information. The task of learning all eleven organ systems in great detail is a daunting challenge for many students. What if there was a simple and reliable method to overcome the challenge of learning voluminous medical and scientific information? Previous studies have shown that simply rereading the textbook has low cognitive benefits. By using innovative learning materials called Infograms that were developed at City Tech by Prof. V. Kolchenko for BIO 2311, Anatomy and Physiology I, students are able to encode and retrieve information much more efficiently. Infograms are graphic symbolic summaries that employ key terminology, pictograms, diagrams and abbreviations for encoding complex material. Abbreviations and acronyms are a critical component of the Infogram and are the focus of this poster. Numerous abbreviations or acronyms can also be confusing or ambiguous. Our objective is to develop a methodology of generating unambiguous, clear and useful abbreviations. We have created guidelines for optimizing the efficiency and clarity of abbreviations. These include contractions, truncations, using one letter to symbolize one word, grouping common words together and building abbreviations using the first letter of each word (initialisms and acronyms). Utilizing this abbreviation methodology for creating Infograms may reduce confusion and ambiguity, enhance students abstract thinking skills, and result in improved learning outcomes for Anatomy and Physiology students.

18. Histological analysis of differentiation in PC12 neuroblastoma
    Tiffany Ramkisun
    Prof. Jeremy Seto

    PC12 neuroblastoma cells arise from adrenal medulla cancers in rat. The neuroectodermal lineage of these cells provide an easy model to dissect the processes underlying neurodevelopment through cytokine application. PC12 cells undergoing differentiation reveal markers of neural phenotypes. Through manipulation of the PC12 differentiation process, histological biomarkers can be reveal alterations of development and guidance into alternate cell fates. Through the perturbations in the differentiation protocol and identifying cellular markers in vitro, transcriptional activation of specific genes in migration and axon guidance can be studied as a model of changes found in neuropsychiatric diseases.

19. Application of High Performance Concrete in Structural Design
    Brandow Rojas
    Prof. Navid Allahverdi

    High performance concrete (HPC) exceeds in durability and strength compared to regular concrete. The materials that make up HPC must be engineered to achieve certain specifications of durability for the requirements of the project. HPC is used in the construction of tunnels, bridges and tall buildings. One of the many examples is the One World Trade Center. The type of concrete used for the construction of the One WTC is called ICrete. The compressive strength of such concrete exceeds the 12,000 psi mark. In this research activity, application of HPC in structural design is investigated. Also, high performance concrete samples is designed and tested in the materials lab in the CMCE department.

20. Scaffold Fabrication for Cell Viability Analysis
    William Santiago
    Prof. Ozlem Yasar

    One of the principle challenges in Tissue Engineering, especially with the production of large tissue constructs, is the cell survivability within the scaffolds. Cells can show healthy growth within the scaffolds if biocompatible materials are used to generate the scaffolds.
    In this project, collaborative work is done between the SET Research Laboratory at the department of Mechanical Engineering Technology at City Tech and Mechanical Engineering department at California State University, Chico to fabricate the scaffolds and to do the cell viability tests. Our preliminary results show that cells can survive within the PEGDA based scaffolds if 20% of PEGDA is used to fabricate scaffolds.

21. Selection of Materials and Techniques for Construction Under Extreme Heat Conditions
Harold K. Saquicela
Prof. Anne Marie Sowder

The construction industry is one of the biggest industries in the world representing 13% of the total global GDP. Research suggests that the construction industry is already affected by climate change, specifically extreme heat conditions which include high temperatures and prolonged periods of high temperatures. According to The National Cooperative Highway Research Program, about 50% of all construction activities are affected by weather to some degree, and the National Oceanic and Atmospheric Administration states that extreme heat conditions make up a growing share of weather and climate change related disruptions. Heat is very dangerous and costly. Heat can damage materials and equipment on sites, affect the health conditions of workers, and reduce labor productivity. This ultimately causes delays and additional costs to construction that run into the billions of dollars annually.

With extreme heat conditions expected to occur more frequently in 2016 and beyond, there is an urgent need to improve the planning of materials and techniques used in the construction industry. Unfortunately, there is a lack of research that connects construction practices to climate. For this reason, the objective of this research is to explore materials and techniques that will minimize the direct and indirect impacts of extreme heat conditions on construction. Thereby, allowing construction activities to progress during hot weather conditions and in an increasingly hot climate with minimal effects to health, safety, schedule and budget.

22. Factors Affecting Emotional Regulation and Vagal Tone in an Expressive Writing Paradigm
Christina Taitt
Prof. Jean Hillstrom

An extensive body of literature shows that writing about traumatic or emotional experiences results in improved physical health and emotional well-being. In Pennebaker's (1997) expressive writing paradigm, participants are instructed to write about either traumatic emotional events or neutral topics over several sessions. Those assigned to the expressive writing condition typically display physical and psychological health improvements over time compared to the control condition (Pennebaker, 1997). Our lab's research differs from much of the previous published work in that we incorporated a cognitive restructuring component where subjects are asked to reframe an emotional experience in positive terms (i.e., meaning-making). A second major difference is that our study assesses physiological responses including the parasympathetic (e.g., vagal tone) and sympathetic (e.g., cardiac impedance) nervous system over time. In our most recent study, we examined gender differences in vagal tone adaptation in a sample of fifty subjects (25 males, 25 females), ranging in age from 18 to 44 years of age, with a mean age of 24.64 years (SD = 6.18). Subjects were randomly assigned to the standard expressive writing (n=24) or the meaning-making (n=26) condition. Subjects wrote for at least two sessions and most wrote for three sessions. Before the first session, subjects completed a

demographic questionnaire. During each of the sessions, baseline physiological measures were taken while the participant viewed a neutral video (ocean waves) for three minutes. Next, participants were instructed to write continuously for 15 minutes after which participants again viewed the neutral video while post-writing physiological measures were recorded. Lastly, participants were asked a series of questions about the experience they elected to write about (e.g., "how traumatic was the experience you just wrote about?"). The results of this study show that expressive writing results in improved heart rate and a trend towards improvement in vagal tone over time for both expressive writing conditions. However, it is likely that women may benefit more from a meaning-making expressive writing paradigm compared to the standard whereas the opposite may be true for men and they may benefit more from a standard expressive writing format. Implications are discussed. Our research lab is currently preparing to investigate the effects of expressive writing on psychological outcomes in the short-term and after a month. In addition, our lab is conducting a content analysis of the discourses and investigating discrepancy between global beliefs and situational meaning, benefit finding, downward comparison, emotional tone, and locus of control. To date, all lab members have completed their CITI Human Subjects Research and Responsible Conduct of Research training and lab safety training. In addition, all lab members have trained in the role of subject interfacer and have learned how to set up and use the equipment.

23. Open Source Implementation of Cyber Physical Systems
    Mellissa Valle
    Prof. Farrukh Zia

The world of technology has been advancing at an unstoppable speed. In this world of technology exists the world of Cyber Physical Systems (CPS) and the Internet of Things (IoT). Cyber physical systems are the combination of devices such as sensors, actuators, and micro-controllers that communicate with one another and with users through wired and wireless networks. The Internet of Things monitors and interacts with the physical environment through cloud based services. It helps connect many aspects of industrial and consumer life through the use of sensor nodes and cloud services. Both CPS and IoT consist of components that are used in the real world to improve and enhance our daily activities.

When CPS and IoT are put together, projects can vary from collecting small scale data such as room temperature, to something as big as collecting health information and keeping track of our personal fitness without having to go to the doctor. The project, Open Source Implementation of Cyber Physical Systems, involves making slave node and master node circuits, combined with several different physical and environment sensors. The slave nodes send the sensor data to the master node wirelessly and the master node forwards the sensor data to IoT analytics web-site on the internet that decides an output action. Electrical circuits, computer hardware and software programing knowledge gained from the classroom and laboratory is employed in this research project to develop key components of a small scale Cyber Physical System, by using open source software and low cost open source computer hardware devices.