



Scientific Caribbean Foundation
Student Research Development Center

Winter 2018

Pre-College Research Symposium



Saturday, December 15, 2018
Universidad del Turabo Campus
Old Theater, School of Science and Technology
Gurabo, Puerto Rico

**SCIENTIFIC CARIBBEAN FOUNDATION
AND THE
STUDENT RESEARCH DEVELOPMENT CENTER**

ARE PROUD TO HOST THE

**WINTER 2018 PRE-COLLEGE
RESEARCH SYMPOSIUM**

SHOWCASING MINORITY HIGH SCHOOL STUDENTS' MENTORED RESEARCH

Leadership at

SCIENTIFIC CARIBBEAN FOUNDATION

Juan F. Arratia, Ph. D.
President and Founder
Research Professor and Mentor

SAN JUAN, PUERTO RICO

December 15, 2018

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**Scientific Caribbean Foundation
Student Research Development Center**

MISSION

Scientific Caribbean Foundation (SCF) was founded by Dr. Juan F. Arratias, a 2006 US Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring recipient, with the idea to continue the success of the Model Institutions for Excellence (MIE), a grant awarded by the National Science Foundation (NSF) to transform Universidad Metropolitana (UMET) into a nationally recognized undergraduate research institution, and a model in science, technology, engineering and mathematics (STEM). Mentoring of undergraduates and pre-college students by research mentors was the cornerstone of the MIE Project. Dr. Arratia was the Principal Investigator of the MIE grant at UMET. We believe that creative research is one of the best ways to prepare students to become persistent and successful in college, graduate school and professional careers. Today, the Student Research Development Center (SRDC), which is part of the SCF, is the entity that will continue the MIE strategy by impacting pre-college and university students from institutions in Puerto Rico and across the nation, as well as pre-college students from the Puerto Rico Educational System.

EXECUTIVE SUMMARY

The MIE ended in 2009 at UMET. The outcome of the program was over 280 UMET STEM-C majors completed their BS degrees and 175 were transferred to graduate school, with 65 achieving doctoral status (PhD, MD, VVM, Pharm D). In order to increase the number of BS degrees transferred to graduate school, we will continue with the strategy of an early research program and partnership with key research institutions in Puerto Rico, the US mainland and abroad. Research mentoring will be the central component of the knowledge transfer and creative thinking activities at SCF. Project based learning, collaborative learning strategies, presentations at scientific conferences, scientific writing and co-authorship, technology literacy, and preparation for graduate school are activities that are transforming the philosophy of competitive institutions.

GOALS

The main goal of the Winter 2018 Pre-College Research Symposium is to encourage pre-college research with research mentors, develop students' written and oral communication skills, provide a forum in the Caribbean for students to foster interest in undergraduate education, particularly in STEM-C fields, and set national research standards for pre-college research presentations.

SCIENTIFIC CARIBBEAN FOUNDATION

STUDENT RESEARCH DEVELOPMENT CENTER

**WINTER 2018 PRE-COLLEGE
RESEARCH SYMPOSIUM**

CONFERENCE AT A GLANCE

SATURDAY, DECEMBER 15, 2018

**UNIVERSIDAD DEL TURABO
OLD THEATER**

| | | |
|-------------------------|--|--------------------------|
| 8:00-8:30 a.m. | Registration | Lobby Old Theater |
| 8:00-8:30 a.m. | Judges Meeting | Room ECT 238 |
| 8:30-9:00 a.m. | Opening Ceremony | Old Theater |
| | Dr. Juan F. Arratia, Research Professor and Mentor | |
| 9:00-11:00 a.m. | Rubén A. García, Universidad Metropolitana Poster-Oral Sessions | |
| | Neurosciences-Genomics-Creative Writing and Scientific Research | Old Theater |
| | Biological Sciences-Environmental Sciences- Environmental Engineering | Room ECT 238 |
| | Engineering-Computer Science-Game Design and Development-Astronomy | Room ECT 239 |
| 11:00-11:30 a.m. | Pre-College Alumni Research Experiences | Old Theater |
| 11:30-12:00 p.m. | Awards Ceremony and Closing Remarks | Old Theater |
| 12:00 m. | Symposium Adjourns | |



Scientific Caribbean
Foundation

December 15, 2018

Dear Pre-College Students:

The Winter 2018 Pre-College Research Symposium is the culmination of the activities and dissemination process of the Fall 2018 Saturday Research Academy Program of the Scientific Caribbean Foundation. For a period of four months, since September 2018, all of you, over sixty pre-college students from private and public high schools of Metropolitan San Juan-Caguas, Puerto Rico worked long hours in the research laboratories of Polytechnic University of Puerto Rico, Universidad del Este, and Universidad del Turabo campuses, with the guidance and mentorship of faculty and student research mentors in research projects in STEM-C fields.

One of the objectives of the Winter 2018 Pre-College Research Symposium is to offer young motivated high school researchers the opportunity to learn and to practice their English communication skills in a formal professional scientific meeting. A second objective is to give high school students of Puerto Rico a forum for the presentation of the outcomes and findings of their research projects to research mentors, family members, and the educational community at large.

We at Scientific Caribbean Foundation are proud of the results obtained by the pre-college students and their mentors in the Fall 2018 Saturday Research Academy Program. I hope your experience inspires you and your peers to select science, technology, engineering, mathematics and computer science as your field of study in the near future.

My sincere appreciation goes to the staff of the Student Research Development Center and the student research mentors for their effort and commitment to implement the Winter 2018 Pre-College Research Symposium.

Sincerely yours,

A handwritten signature in black ink that reads "Juan F. Arratia". The signature is written in a cursive, flowing style.

Juan F. Arratia, Ph. D.
Founder and President
Research Professor and Mentor
Scientific Caribbean Foundation

KEYNOTE SPEAKER

Keynote Speaker's Biosketch



Rubén A. García is currently an undergraduate student in his senior year pursuing studies in Psychology with a minor in Biology at Metropolitan University (UMET), Cupey. Before deciding whether to pursue a degree in a STEM+ field, he participated in the Saturday Research Program sponsored by the SRDC and the National Science Foundation for two and half years in high school. Furthermore, he has received training and has conducted projects in Chemical Engineering, Bio-Mathematics, Biology, Neuroscience, Bioinformatics, Developmental Neurobiology, Organometallic Chemistry, Ecology, and Environmental Science. All of these experiences have been gained through his involvement as a pre-college and undergraduate student at Polytechnic University, UMET and through five internships now in U.S. mainland research-intensive institutions like The University of Vermont, Washington University School of Medicine in St. Louis and Argonne National Laboratory. Furthermore, for the last year and a half, he has been an NIH BP-ENDURE Fellow conducting research in nervous system development and regeneration at the University of Puerto Rico, Río Piedras Campus under the mentorship of Dr. José E. García-Arrarás, Ph.D. Thanks to his NIH fellowship, Rubén has presented his research work at national conferences such as SACNAS and the Society for Neuroscience (SfN) gaining national exposure for two years now. Consequently, since he started his undergraduate degree in 2015, Rubén has directed the Saturday's Academy Neuroscience Research Program achieving great success with his students earning multiple awards and competing in symposiums as Intel's ISEF and the Metropolitan Science Fair. He has mentored over 70 students and the overwhelming majority (99%) of them have continued towards STEM fields at universities all around the United States (Columbia, Dartmouth, Johns Hopkins, Arizona State, Yale, Brown, Clark, Stanford and MIT) including Puerto Rico (UPR Mayagüez, UPR Río Piedras, Turabo, Inter Bayamón, Inter Metro and UMET Cupey). After he graduates, he will pursue a Ph.D. in Neuroscience specializing in translational neuroscience and bioinformatics to produce work that can help advance treatments and therapies in people with psychiatric and psychological illnesses. In January 2019, Rubén seeks to empower even more pre-college students to pursue research careers returning as a Research Mentor in the new area of Translational Neuroscience and Bioinformatics.

RESEARCH MENTORS



Juan F. Arratia, PhD
Research Professor and Mentor
Scientific Caribbean Foundation

Dr. Juan F. Arratia was born in Pomaire, Chile. He graduated from Universidad Técnica del Estado with a BS in Electrical Engineering in 1973. He was awarded a MSc in Engineering from Louisiana Tech University, Ruston, Louisiana, in 1979 and a Ph.D. in Electrical Engineering from Washington University, St. Louis, Missouri in 1985. He has taught and conducted research at universities in Chile (Universidad Técnica del Estado and Universidad Austral de Chile), Puerto Rico (Universidad Interamericana de Puerto Rico and the University of Puerto Rico-Mayaguez), and in the US mainland at Washington University, St. Louis, and Louisiana Tech University, Ruston, Louisiana. He has lectured and given conferences on advanced automation, robotics, vision systems, artificial intelligence, total quality management and science and engineering education in Chile, Bolivia, Ecuador, Guatemala, Panama, Mexico, Brazil, Nicaragua, Perú, Canada, Spain, the Netherlands, Turkey, Japan, Philippines, Singapore, Australia, China, Puerto Rico and in the US mainland. He was the Advanced Manufacturing Manager for Medtronic, Inc., a leading pacemaker company, and is a consultant in advanced automation for pharmaceutical and medical devices companies in Puerto Rico. From 1998 to 2008, he was the Director and Principal Investigator of the Model Institutions for Excellence (MIE) Project, a National Science Foundation sponsored program based at Universidad Metropolitana in San Juan, Puerto Rico. From 2008 to 2018, he was the Executive Director of the Ana G. Méndez University System (AGMUS) Student Research Development Center, designed to disseminate MIE best practices at Universidad del Turabo and Universidad del Este. For twenty year he was part of AGMUS and during his tenure he wrote proposal to NSF and was awarded more than 85 million USD for MIE, CCCE, AGMUS Institute of Mathematics, MRI-AMISR, MRI-Puerto Rico Laser, Administration of Arecibo Observatory among others. Since 2018 to present he is the President of Scientific Caribbean Foundation in San Juan Puerto Rico. In November 2007, he was awarded the Presidential Award for Excellence in Science, Mathematics and Engineering Mentoring at a ceremony in the White House in Washington DC.

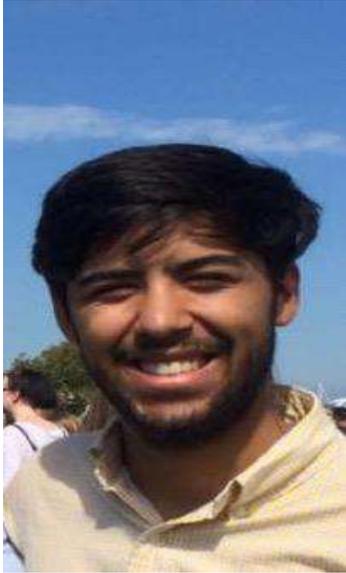
Ángel R. Arcelay Gutiérrez, Ph.D.



Ángel Arcelay finished his baccalaurean degree at the Mayaguez campus of The University of Puerto Rico in chemistry. He completed a Master degree with specialization in food chemistry at the same campus. A PhD in biochemistry and biophysics was obtained at The Ohio state University. Post-graduate research for chemical environmental remediation was held at the Kennedy Space Center, NASA. Long-term goal throughout my profession has been the service provided to under-represented pre-college, undergraduates and graduate students, which are the individuals that produce the pipeline of higher education at Puerto Rico. The contribution at the pre-college level arose from working at the science fair projects, being judge with students and as the coordinator of the branch of the Caribbean Computer center for Excellence at Universidad del Este. Most students from this research academy during Saturdays have been accepted to principal universities at Puerto Rico and other states for undergraduate degree and internships. With undergraduates, I have been involved since completing my bachelor as a laboratory instructor mentor, tutor, organic chemistry class assistance, research and personal assistance to professional schools. Several students have performed undergraduate research under my guidance with symposium presentations and admittance to graduate programs. Many students have been accepted to internships with my guidance. At the graduate level, my involvements have been at the research level and mentorship to complete thesis. I have been advisor to thesis completion and served in several research projects as a member of graduate committees. As a professor I have taught courses, served in committees, worked curriculums and training projects, worked with school science teachers and students. Wrote internally and externally funded proposals and mentored undergraduate research students. I have collaborated with several research colleagues to complete projects of students at different levels.



Olga F. Alfonso Rivera is a student at the Universidad del Este (UNE) majoring in Biology. I started research activities during the summer of 2018, contributing my knowledge in science under a boarding school. The main purpose of this research is to assess the water quality in the detention of heavy metals in recreational waters coastal area. Water quality was evaluated for the presence of heavy metals by biological bioindicators, lichen and vibrio bacteria. The lichen served us to indicate if in the bodies of water selected, they presented presences of metals. In the case of the vibrio bacteria to find susceptibility or resistant to heavy metals. The metals worked were copper, cadmium, and lead. An opportunity was obtained to participate in two symposiums and present my corporate work in the boarding school. At present, I am continuing the detention of heavy metals in lagoons and bioremediation in algae and bacterial monitoring. Specifically, identifying which types of bacteria are present in the lagoon. This research aims to determine the concentrations of the heavy metals found in the lagoon and determine which algae could be used to be used in the bioremediation method. During my baccalaureate, I have had the pleasant opportunity to work with researchers in the area of environmental toxicology. Also, during the Fall 2018 I was an Assistant Mentor at the Saturday Research Academy Program, mentoring pre-college students in biological sciences.



Michael A. Carrasquillo is currently a senior undergraduate Biology student at the University of Puerto Rico at “Bayamón”. He has done different volunteering experiences at the veterans’ hospital at San Juan in the cardiology department working with echocardiograms, Electrocardiography and stress echocardiogram. He has also done volunteering work in the Wilma Vazquez Hospital in Vega Baja with Dr. Cirilo on skin ulcers. Since a very young age Michael’s curiosity for how things work and his caring for others has been a mayor factor in his life, specially in guiding him towards his studies in sciences. He has research experience in Ecology and also well trained in the methods of conducting research experiments. He also has vast knowledge in Biology, Chemistry and Psychology. This is his first semester as a mentor’s research assistant in the Scientific Caribbean foundation working with a group of five students. In which he along with Fabiola mentored into the art of researching. His goals are to earn a MD/PhD in Neurology and share his knowledge and understanding with others.



Amanda M. Chavarria Colon is a junior biotechnology student at the Universidad del Este (UNE) in Carolina, Puerto Rico. She is a table tennis scholar, and represents UNE at local and national tournaments. So far; two bronze medals awarded at university tournaments. Also, she began her research activities in 2016 taking part of UNE-WAMS program, implementing a semester intern at “Fideicomiso de Ciencia y Tecnología”. During 2017, she was awarded an internship and traveled to Sichuan University in China. She is working with the public health issues of many countries, including China. During the summer of 2018, she traveled to Marshall University in West Virginia where she worked with Dr. Subah Arthur, researching a protein expression during chronic internal inflammation using rabbit’s models. This summer research project was presented at different symposia, University of Morgan Town of West Virginia, RISE project symposium at Universidad del Este and at the Annual Biomedical Research Conference (ABRCMS) for minority students. At UNE, she has been a tutor for the Retention Program at basics courses during the last two years. She started working as a research mentor in biological sciences during the Fall 2018 Saturday Research Academy at Universidad del Este, working with motivated high school students.



Chelsea M. Marrero Vidal began her research activities in 2012 as a high school student in the Saturday Research Academy Program currently sponsored by the Scientific Caribbean Foundation. She has 3 main presentations: “Synthesis of Gold Nanospheres-Citrate capped and Silver Hydroxylamine: Stability effect on RPMI-1640 cell medium” and “Effect of Silver Nanoparticles on E. Coli Growth” presented within the Saturday Academy, as well as “Chemical Synthesis and Morphology of Silver Micro-spheres” investigated and presented at the University of Texas in El Paso as part of an internship opportunity brought by the Saturday Academy. After graduating from high school, she decided to complete a Bachelor’s Degree in Chemical Engineering, realizing a few years later that her true passion was in completing a Bachelor of Science in Environmental Engineering (ENVE) at the Polytechnic University of Puerto Rico (PUPR). Since 2016 she has been President of the Enactus PUPR student organization and is currently doing research in Bioenergy and the development of the United Nations Global Goals with a project titled “A Plant Microbial Fuel Cell to Produce Electricity: Making lives better by Rebuilding Sustainable Communities” as part of her student organization group projects. She is now mentor at the Saturday Academy in ENVE at PUPR, and STEAM tutor in her spare time. Her future goals are to complete a Master’s Degree in Social Psychology with the purpose of doing research in the compatibility of human behavior and the environment as a mission to educate others in different areas of ENVE Research and, in addition, aims to pursue a Ph.D. in Environmental Laws and Enforcement.



Ángel M. Márquez Otero is currently an undergraduate student pursuing studies in Biology at Interamerican University of Puerto Rico at Bayamón. He has always wanted to study science since he was kid. He participated in the Saturday Research Academy Program (SRAP) since 2014. Furthermore, he's been trained and has conducted projects in Biology, Biostatistics, Bioinformatics, Ecology and Evolution in the academy and two internships in United States. The first internship was at University of Vermont (Summer 2015) conducting research with *Drosophila melanogaster* and see how exercise may had an effect on them. The second internship was at the University of Kansas (Summer 2017) where he conducted research with Geographic Information Systems to determine if climate change may have an effect on the species on the genus *Lynx* based on prediction models to 50 and 70 years form now. This is his second semester as mentor. Also, he had under his command a Summer group in the two weeks intensive program from SRAP. He wants to empower young students to pursue studies in science and to become researchers. Moreover, through the training given at the University, students gain valuable skills to think critically and to seek more information. As a future Ph.D., Ángel wants to focus his research expertise in Zoology and Wildlife Conservation. However, Ángel wants to enable a new generation of individuals to question and analyze our surroundings, the reasons why things happen. At the end, it is through the study of life and its components that we can find the answers to the most pressing problems in terms of biology and ecosystems.



Kenneth J. Martínez Torres is an alumnus of Universidad del Turabo, PR, who began his research activities in 2015 while assisting a group of students that were building a small vertical turbine, adaptable for light poles. He was in charge of processing installation and operational activities within the lifecycle of the turbine and of applying risk management techniques to mitigate hazardous effects on workers. This required a thorough investigation on how to evaluate risks and on what to suggest in terms of personal protection equipment and proper steps to follow, which allowed him to have his first project, with the title of “Evaluation of Occupational Risks in the Operation and Installation of Small Wind Turbines”. Next, in the year 2016, he had the chance to travel to Paris, France, and collaborate with programmers to work with autonomous systems, which led him to his second project: “ICP Point Cloud Registration for Autonomous Vehicles”. Thirdly, he also had the opportunity to work with professionals, professors, and doctoral students in his field of Industrial and Systems Engineering both in Puerto Rico and the US; his last project was concerned about improving linear-program solvers by inserting cutting planes to the programs. He completed his Bachelor’s Degree in June 2018, being honored as a Magna Cum Laude student and as an awardee of the student with best academic performance in his field, by the Institute of Industrial Engineers of Puerto Rico. A future goal is to complete a PhD in contingency systems as a topic of interest.



Osvaldo IV Massanet Ramirez is an alumnus of Universidad del Turabo, PR, who began his research activities in 2011 while still being on high school. Later on the summer of 2012 he participated in an internship at the National Center for Atmospheric Research (NCAR). As a pre-college student he developed a web-based application using the google earth map API and incorporating a private database from the NCAR laboratory containing over 250+ research locations around the planet. After returning from the internship he then proceeded to take the mentor position of the Computer Engineering and Robotics topics on the Saturday Research Academy on the University of Turabo campus. Since then he has been the research mentor and project overseer for the pre-college students. Massanet last internship was overseas on Lima, Peru during the summer of the 2016. In this internship he works on a project called “Developing a radar controller using the programmable FRDM-K64F and the Arduino UNO R3” together with other professionals from the fields of computer and electric engineers. At the moment he has a Associates Degree on Information Systems and 2 certifications on the same field. Future goals are to complete his bachelor’s degree during the next summer and 2 more certifications.



Víctor J. Ortiz León is an alumnus of Universidad de Puerto Rico in Bayamón, who began his research activities in 2018 while assisting a student that was creating a video game based on the stories of the native indigenous people that lived in Puerto Rico many centuries ago. He was the supervisor for the program created by the student, getting the right programs needed, the right help and answering any questions about the algorithms being implemented in the video game. This required a thorough investigation on how to program a video game, getting the correct physics of the game and even learning about game design. He will be completing his Computer Science Bachelor's Degree in May 2020. A future goal of his is to complete a Master's Degree in Data Base Management.



Fabiola D. Pagán Torres is currently a rising senior at the University of Puerto Rico at the “Bayamón” Campus pursuing a bachelor's degree in Biology. She has passed through enrichment opportunities in different areas of science. During her senior year of high school, she started to get involved in research. It began in the program of the Pre-College Saturday Academy of the Ana G. Méndez System sponsored by the National Science Foundation. She was able to complete two scientific investigations. After that, she had the opportunity to attend in an internship at the University of Vermont, where she worked with Dr. Vigouroux. Over time, the opportunity of mentoring was given in the Saturday Research Academy. She applied the skills learned from her past mentors. From that time through now she has mentored over 20 students on what research is. After all this, she had once again the opportunity to participate in the SNURF Program under the guidance of Dr. Ballif in the University of Vermont. The research was focused on being able to study the protein called TLT1 more thoroughly. During this process she acquired skills that are essential in biology. From learning how to culture cells, do immunoprecipitation, SDS-Gels and western blots. Her long-time goal is to acquire an MD / PhD.



José M. Pastrana is an undergraduate at Universidad del Este (UNE). His research experience began in the summer of 2017 under the guidance of Dr. Nydia Rodríguez, a professor at UNE. The focus of the investigation was to identify the presence of enterobacter in recreational waters of Puerto Rico. Segregation, clean-up, biochemicals test and species identification the by PCR were among several duties. This research work has been presented in local and national conferences. At present, he is an assistant mentor at the Saturday Research Academy Program at UNE, providing guidance and support to pre-college students in biological sciences. My educational goal is to complete a PhD in Immunology after finishing my BS at UNE.



Alexa D. Pérez Torres is an undergraduate senior majoring in natural sciences with a concentration in biology at the University of Puerto Rico Cayey Campus. Having participated three consecutive semesters as a student in the academy, she got the opportunity to participate in a summer internship at the University of Texas at El Paso mediated by the pre-college program. In the second semester of her freshman year, she began as an assistant mentor in the area of neuocircuitry at Universidad del Turabo research site. Alexa has now been a mentor in the area for two years and has also reintegrated the area of genomics at the UT campus. Last summer Alexa conducted her second major research project as an undergraduate in the area of biochemistry mentored by Dr. Maria Cristina Vega at the Center of Biological Investigations of the Superior Spanish Research Council in Madrid, Spain. Her project was focused on the Immune Evasive Factor Glyceraldehyde 3-Phosphate Dehydrogenase and its chemical inactivation for crystallographic studies. Graduating next year, Alexa plans to apply for a PhD candidacy in Virology, focusing in oncogenic viruses.



Bryan A. Rodríguez López is a freshman college alumnus from the Polytechnic University of San Juan, P.R. whose interests are focused to make his way up the top as an Aerospace Engineer. His academic background expansion started 4 years ago when he was granted the opportunity for a college internship in Haverford Pennsylvania as a Chemistry and Engineering Sophomore. Throughout the years he has performed in different internship programs in fields such as astronomy, Epidemiology and Mechanical Engineering. In senior high school, he had excelled in various engineering clubs and programs, including the SHPE Jr. Program (Society of Hispanic Professional Engineers) in which he had become the President for 2 exciting years. Parallel to his academic background, he has also devoted himself for the participation of the Saturday Research Program for 4 consecutive years, finally granting him a spot as a research mentor recently this year. Nevertheless, to say, in 2016, Bryan ranked up between the top 6 members of the Saturday Research symposium by developing a project entitled “A Sonar Device with the Capability of Detecting Biomass Estimates”. Throughout time, he has developed different researches and currently possess a kin grasp on different software developing such as Arduino Programing, Python Basics, Gamemaker Mechanics and Java Script. Moreover, from 2014 to 2017, His high school framework also included a series of robotic engineering events as he had taken part in the VEX Programs implemented in his ongoing academy. Other Topics such as oratory, In-depth Videogame design, and hardware development has also captured throughout the years but his ultimate goal is to graduate with All Honors in 2022 and uncovering an engineering job in the renowned SpaceX Program for years to come.



Pedro R. Trinidad Pérez started research at the Fall 2014 Saturday Research Academy at UMET. He researched in the area of Bio-Mathematics working with Fractal Areas. His work found that polygons have a specific pattern when they are manifested in fractals. Pedro presented his research at the AGMUS Research Symposia in December of 2014, where he won an award for Best Poster Presentation. After his first semester, Pedro developed an independent research for the School Fair, where he tested and proved an alternative method that is a more efficient and cost-efficient way for pasteurizing the raw milk, so it can comply with the state regulations. This research was performed and analyzed in the Milk Quality Laboratory of the PR Dairy Industry. After a year, he returned back to the Saturday Research Academy to conduct research in the area of Neuroscience under the mentoring of an experienced investigator. In the following three semesters, Pedro developed three different projects, where he used a Neural Simulator to test and simulate different techniques of simulated neurogenesis in different kinds of neurodegenerative diseases. After Pedro graduated from high school, he worked with the academy as a research mentor assistant for the group of neurosciences for a year. Currently, Pedro is an undergraduate student at the University of Puerto Rico, Rio Piedra, where he is completing his bachelor's degree in Chemistry, and also researching in Dr. Cabrera's Lab synthesizing catalyst for Oxygen Reduction Reaction. Additionally, Pedro is the research mentor for the neuroscience group of the Saturday Research Academy Fall 2018.

SCHEDULE OF EVENTS

SATURDAY, DECEMBER 15, 2018

UNIVERSIDAD DEL TURABO

9:00 – 10:50 a.m.

POSTER/ORAL SESSION

OLD THEATER

NEUROSCIENCE - GENOMICS

Chairperson: Mr. Rubén García

NEUROSCIENCES

- 9:00 – 9:05 a.m. **Natalia Algarin Carbo**rell, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, Puerto Rico.
False Memories: Indicatory Test & Effects in Behavior
- 9:05 – 9:10 a.m. **Javier A. Avilés Bonilla**, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, San Juan, Puerto Rico.
The Effects of Change in Concentration of Serotonin in Bipolar Disorder
- 9:10 – 9:15 a.m. **Isabel Báez Alicea**, Puertorriqueño de Niñas School, Guaynabo, Puerto Rico.
Effectivity of Treatments for Ranging Severities of Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infection (Pandas) in Children
- 9:15 – 9:20 a.m. **Vashty González Ramkhelawan**, Radians School, Cayey, Puerto Rico.
Quantification of the Neurodegeneration Associated with Aging
- 9:20 – 9:25 a.m. **Daniela González Romano**, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, Puerto Rico.
Indicator Tell-a-Tale Game: Clinical Depression Effect in Academic Performances
- 9:25 – 9:30 a.m. **Gabriela Meléndez Rivera**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.
Developing a Treatment with Transcranial Brain Stimulation (TBS) to Trigger Neuronal Regeneration After a Traumatic Brain Injury (TBI) in the Neocortex
- 9:30 – 9:35 a.m. **Nayellie Morales Maysonet**, The School of San Juan, San Juan, Puerto Rico.
Dissociative Identity Disorder: Brain Activity and Effects
- 9:35 – 9:40 a.m. **Tayma N. Richards Rodríguez**, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, Puerto Rico.

- Informative Application of Neurodegenerative Disease Symptoms: Early Onset Alzheimer's Disease
- 9:40 – 9:45 a.m. **Kamileh A. Rivera**, Puertorriqueño de Niñas School, Guaynabo, Puerto Rico.
- The Reaction of Fluoxetine on a Post-Traumatic Stress Affected Model
- 9:45 – 9:50 a.m. **Paula D. Rivera López**, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, Puerto Rico.
- Decision Making Influenced by Anxiety: Computer Model
- 9:50 – 9:55 a.m. **Josué Rodríguez Cordero**, Espíritu Santo School, San Juan, Puerto Rico.
- Amyotrophic Lateral Sclerosis: The Death of Movement
- 9:55 – 10:00 a.m. **Lara I. Rodríguez Vega**, Espíritu Santo School, San Juan, Puerto Rico.
- Childhood Apraxia of Speech: The Importance of Physical Therapy
- 10:00 – 10:05 a.m. **Adalys Sánchez Mangual**, Escuela Especializada en Matemáticas, Ciencias y Tecnología de San Juan, Puerto Rico.
- Regeneration Capacities: Comparing and Identifying the Gene that Gives Starfish and Sea Cucumbers the Capacity to Regenerate

GENOMICS

- 10:05 – 10:10 a.m. **Héctor A. Alicea Cardona**, Radians School, Cayey, Puerto Rico.
- The Development of Antibacterial Resistance in *Mycobacterium tuberculosis* via Point Mutations in CPNT_MYCTU
- 10:10 – 10:15 a.m. **Gabriela De Jesús Claudio**, Radians School, Cayey, Puerto Rico.
- Quantifying the Liability of Selected Point Mutations in the HBB Gene Regarding Beta Thalassemia
- 10:15 – 10:20 a.m. **Daniella M. Hernández González**, The San Juan Math, Science & Technology Center, San Juan, Puerto Rico.
- Studing the APOE E4 Gene and its Risk of Developing Alzhimers In Puerto Rico

- 10:20 – 10:25 a.m. **Valeria Herrero Martínez**, Radians School, Cayey, Puerto Rico.
Evaluating the Susceptibility and Severity of Point Mutations in the APP Gene Causing Cerebral Amyloid Angiopathy
- 10:25 – 10:30 a.m. **Anayra Maldonado Quiles**, Radians School, Cayey, Puerto Rico.
Gene Selectivity of Oncogenic HPV Types in Lysogenesis
- 10:30 – 10:35 a.m. **Paola Martínez**, Escuela Especializada en Matemáticas, Ciencias y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.
Gene Comparison of *Nemastotella Vectensis* and *Anolis Cristatellus*
- 10:35 – 10:40 a.m. **Nicole Rivera Maldonado**, Radians School, Cayey, Puerto Rico.
Dubin-Johnson: Changes in Mutated Gene *ABCC2*
- 10:40 – 10:45 a.m. **Eduardo L. Soto Flecha**, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.
Genotoxicity Caused by Fried Foods and Failure of Gluthathione Synthase
- 10:45 – 10:50 a.m. **Leonardo C. Zambrano Tapia**, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.
Point Mutations in the *SLC2A2* Gene Affecting Transmembranal Attachment of Glut 2

**BIOLOGICAL SCIENCES- ENVIRONMENTAL
ENGINEERING**

Chairperson: Dr. Ángel Arcelay

BIOLOGICAL SCIENCES

- 9:00 – 9:05 a.m. **Natalia Isabel Acosta Laboy**, Rosa Bell School, Guaynabo, Puerto Rico.
HGSNAT in Muccopolysacaridosis Type III
- 9:05 – 9:10 a.m. **Rodolfo Acosta Laboy**, San José School, San Juan, Puerto Rico.
Habitat Suitability and Niche Analysis for the Conservation of *Crocodylus siamensis*
- 9:10 – 9:15 a.m. **Gabriel I. Arroyo Figueroa**, Wesleyan Academy, Guaynabo, Puerto Rico.
Health Risks and Digestive Analysis in Consuming Genetically Modified Foods
- 9:15 – 9:20 a.m. **Amanda Sofía Arrufat Román**, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.
Finding and Digitally Modeling the Causes for Idiopathic Scoliosis
- 9:20 – 9:25 a.m. **Yeliann M. Benítez Cabrera**, Math Science & Tech Center, San Juan, Puerto Rico.
The Knowledge of the Students of the Schools of San Juan, Puerto Rico about the Material Safety Data Sheets (MSDS) in the School Laboratories
- 9:25 – 9:30 a.m. **Sergio I. Caraballo Gonzales**, Wesleyan Academy, Guaynabo, Puerto Rico.
The Brutality of *Osteogenesis imperfecta*
- 9:30 – 9:35 a.m. **Celismar Casillas Pérez**, Escuela Especializada en Ciencias, Matemáticas y Tecnología del Municipio de San Juan, Puerto Rico.
Was there an Increase in Leptospirosis Cases in Puerto Rico after Hurricane María?

- 9:35 – 9:40 a.m. **Mia Nicole Llera Encarnación**, Robinson School, San Juan, Puerto Rico.
How Children with SLI Catch up with their Age Group
- 9:40 – 9:45 a.m. **Fabiana Z. Pagán Torres**, Discípulos de Cristo School, Hato Tejas, Bayamón, Puerto Rico.
Psychological Distress Post-Hurricane Maria in the Youth of Puerto Rico
- 9:45 – 9:50 a.m. **Alfredo Parrilla Quiñonez**, University Gardens School, San Juan, Puerto Rico.
Time Test in How Many Times can a *Fragaria ananassa* Reproduce in two Months
- 9:50 – 9:55 a.m. **Verónica Pérez Cardona**, Marista School, Guaynabo, Puerto Rico.
How Different Levels of Cortisol Affect a Dog's Behavior
- 9:55 – 10:00 a.m. **Claudia L. Ríos López**, Wesleyan Academy, Guaynabo, Puerto Rico.
Myxoid Muroid Degeneration: A Research Study of Medial Meniscus
- 10:00 – 10:05 a.m. **Adrián Rivera López**, University of Puerto Rico, Río Piedras, Puerto Rico.
Translocation of *Chamaecrista glandulosa* on Tortuguero Lagoon National Reserve
- 10:05 – 10:10 a.m. **Aaron Wiesner Proan**, Escuela Especializada en Ciencias y Matemáticas, San Juan, Puerto Rico.
How can Aloe Vera Gel Affect the Growth of a *Solanum lycopersicum*?
- 10:10 – 10:15 a.m. **Alexander Zambrano Tapia**, Specialized School of Science, Mathematics and Technology (CIMATEC), Caguas, Puerto Rico.
The Importance of Bats in the Ecosystem of Puerto Rico after Hurricane María

ENVIRONMENTAL ENGINEERING

- 10:15 – 10:20 a.m. **Alondra María Arrufat Román**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.
- Design of a Chemical Process to Make Synthroid and Ibersatan Degradable to yhe Human Body
- 10:20 – 10:25 a.m. **Maricelis Casillas Pérez**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.
- Ecological Study on the Delimitation in the Contribution of Nutrients of Birds in an Urban Estuary Environment
- 10:25 – 10:30 a.m. **Larisa Isabel Cordero Campos**, The School of San Juan, San Juan, Puerto Rico.
- Design for Effectiveness of Indoor Hydroponic Systems During Hurricane Seasons in Puerto Rico
- 10:30 – 10:35 a.m. **Sean Deresh Larin**, San Ignacio de Loyola School, San Juan, Puerto Rico.
- Improved Energy Production in Microbial Fuel Cells by Means of Organic Mediation
- 10:35 – 10:40 a.m. **Gabriel A. Fernández González**, Espíritu Santo School, San Juan, Puerto Rico.
- Typhoon Impact to Puerto Rico Throughout History
- 10:40 – 10:45 a.m. **Alondra Oliver Rivera**, Escuela Especializada en Matemáticas, Ciencias y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.
- The Capacity of the Coccoloba Uvifera to do Fitoremediacion
- 10:45 – 10:50 a.m. **Stephanie K. Reyes Vargas**, Escuela Especializada en Matemáticas, Ciencias y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.
- Bio-Monitoring of Heavy Metals in the Mangrove Oyster Spatial Distribution at San Juan Estuary
- 10:50 – 10:55 a.m. **Bomani Richards Rodríguez**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.
- Elaborating Cellulose Bottles in Order to Susbtitute Plastic Bottles
- 10:55 – 11:00 a.m. **Emily Rodríguez Cleto**, Escuela Especializada en Matemáticas, Ciencias y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.
- Photovoltaic Hydroponic System with Modified Design to Withstand Hurricanes

11:00 – 11:05 a.m. **Camila Nicole Rodríguez Tolentino**, Escuela Especializada en Matemáticas, Ciencias y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.

A Proposal for the Remediation of Groundwater in Guayanilla Bay After the PPG Industries Caribe Company

11:05 – 11:10 a.m. **Gianpablo Vázquez**, CIMATEC School, Caguas, Puerto Rico.

Sargassum Biodiesel for Communal Power Production

9:00 – 10:50 a.m.

POSTER/ORAL SESSION

ROOM ECT 239

**ENGINEERING-COMPUTER SCIENCE-GAME DESIGN
AND DEVELOPMENT-ASTRONOMY-CREATIVE
WRITING-SCIENTIFIC RESEARCH**

Chairperson: Mr. André Hernández

ENGINEERING

- 9:00 – 9:05 a.m. **Juliana de Cárdenas Marrero**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.
How to Charge a Cellphone with Hydraulic Energy
- 9:05 – 9:10 a.m. **Derekh Feliciano Morales**, Wesleyan Academy, Guaynabo, Puerto Rico.
Design for the Re-Enhancement of Electric-Based Vehicles
- 9:10 – 9:15 a.m. **Carlos Alexis Figueroa Del Valle**, Caguas Private School, Caguas, Puerto Rico.
Science Emphasized Applications
- 9:15 – 9:20 a.m. **Bryan González Morales**, Caguas Private School, Caguas, Puerto Rico.
Hydroelectricity
- 9:20 – 9:25 a.m. **Alexander O. Molina Ortiz**, Bautista de Caguas School, Caguas, Puerto Rico.
Electrolysis
- 9:25 – 9:30 a.m. **Luis Antonio Muñoz Cruz**, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.
Substantial Improvement of the Elimination/Cleaning System of Bacteria in Aquatic Micro-Bots
- 9:30 – 9:35 a.m. **Néstor Y. Navarro Castro**, Caguas Private School, Caguas Puerto Rico.
Morse Code Investigative Model
- 9:35 – 9:40 a.m. **Luis O. Pérez Méndez**, Caguas Private School, Caguas, Puerto Rico.
Electromagnetism with Neodymium Magnets

9:40 – 9:45 a.m. **Alejandro A. Pérez Pabón**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.

NFT Hydroponic System Mechanized to Measure Acidity Levels and Temperature

9:45 – 9:50 a.m. **Ricardo Rivera Villahermosa**, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

Reduction of Time in the Modeling Sample of Bacteria

COMPUTER SCIENCES

9:50 – 9:55 a.m. **Shanttale Aquino López**, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.

Design of an App for Deaf Children's Improvement in Education and Communication

9:55 – 10:00 a.m. **Alexander Guzmán Pepín**, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

USB Port Surveillance for Company Fraud Prevention

GAME DESIGN AND DEVELOPMENT

10:00 – 10:05 a.m. **Rodrigo Alfonso Santana**, CIMATEC School, Caguas, Puerto Rico.

Using Role Playing Video Games to Help Reduce Stress, Anxiety and Depression

10:05 – 10:10 a.m. **Gabriel Calvente Tenorio**, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

Video Game Design for People with Color Blindness

10:10 – 10:15 a.m. **Sofia Victoria Collazo Alindato**, Wesleyan Academy, Guaynabo, Puerto Rico.

In the Makings of a Video Game Using Cocos Creator

10:15 – 10:20 a.m. **César Ulises Espaillat Mejía**, Espíritu Santo School, San Juan, Puerto Rico.

Food Wars: A Complementary Educational Game with the Value of Healthful Eating

10:20 – 10:25 a.m. **Yereth Kenay Álvarez, Noah Del Valle Cama, Thais Camacho Torres,** Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

Dangerzone: A Mentally Challenging Video Game Designed for any Player

10:25 – 10:30 a.m. **Gianni Plaza Pizarro,** Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

Mad Mind Battles: Video Game Design Specializing on A.D.H.D. Treatment

ASTRONOMY

10:30 – 10:35 a.m. **Lorean Del Mar Delgado Ortiz,** Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.

Study of Topography and Gravitational Fields of the Moon by Means of Spherical Decomposition

10:35 – 10:40 a.m. **Cristal N. Rivera Molina,** Escuela Especializada en Matemáticas, Ciencias y Tecnología De San Juan, Puerto Rico.

Design of Qualitative Detector for Impact-Prone Asteriod

10:40 – 10:45 a.m. **Francisco Rivera Méndez,** The School of San Juan, San Juan, Puerto Rico.

Modeling of the Stellar Mass Estimates and Distributions of Galaxies

CREATIVE WRITING-SCIENTIFIC RESEARCH

10:45 – 10:50 a.m. **Najelis Sambolin De Jesús,** Escuela Especializada en Ciencias, Matemáticas y Tecnología del Municipio de San Juan, San Juan, Puerto Rico.

A Comparative Overview of Creative Writing and Scientific Research

ABSTRACTS
ASTRONOMY

STUDY OF TOPOGRAPHY AND GRAVITATIONAL FIELDS OF THE MOON BY MEANS OF SPHERICAL DECOMPOSITION

Lorean Del Mar Delgado Ortiz, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.

Research Mentor: Kenneth J. Martínez Torres, Universidad del Turabo, Gurabo, Puerto Rico.

Scientists are interested in the study of the moon, especially its topography. The topography concerns the surface of any matter, and it is a very important subject to know much about. With this knowledge, the explorers can discern where to land on their expeditions to the moon. The gravitational field could be merged as another topic of importance, along with the topography, because scholars need to know what to expect when stepping onto the surface of the moon. However, the spherical decomposition may affect positively or negatively these two elements. The investigation thereof submerges into the suspicion that spherical decomposition tends to harm the gravitational field and topography; this is what is intended to be tested. This could be tested theoretically by contrasting the before and after's of the elements of discussion, in harmony with the decomposition phenomenon. To be more specific, there are units to measure the spherical harmonics that have showed deterioration throughout time. The research also proposes the alternatives that could resolve the decomposition to make explorations to the moon safe and secure; moreover, encouraging audiences to be receptive to further understandings of space and its effects on Earth. Expected results are to develop an app to update and present, in a facilitated way, a model of a topographical map of the moon.

DESIGN OF QUALITATIVE DETECTOR FOR IMPACT-PRONE ASTERIOD

Cristal N. Rivera Molina, Escuela Especializada en Matemáticas, Ciencias y Tecnología De San Juan, Puerto Rico.

Research Mentor: Kenneth J. Martínez Torres, Universidad del Turabo, Gurabo Puerto Rico.

A space object less than 10 meters in diameter is considered an asteroid. The asteroids can reflect a part of light, received from the sun, and it is possible to obtain spectra of the reflected light. The Yarkovsky effect tells us that the surface of asteroids absorbs sunlight. Being a constant process, it suggests that an opposite force that contributes to the asteroid may lose potential energy and fall towards the sun. In 2014, approximately 10,596 NEO's (Near Earth Objects) were known, of which 10,502 were recorded as asteroids, and 94 are still cometary orbits. It has been also found that asteroids PHA's (Potentially Hazardous Asteroid) are the most dangerous; they have been found over one kilometer. NEA's (Near Earth Asteroids) can be classified into several groups: those that the orbit meets the conditions a (orbit) > 1.0 U.A (semi-major axis) and q (perihelion) < 1.02 U.A are called Apollo (population of NEAs 62%). Just as there are others, such as Love and Aten, they are equally classified by their orbit. With these different terms, in this research, it is possible to classify the asteroids and differentiate them between meteorites or other space bodies. Through the collected data, it can be determined the physiognomy of the asteroids to be able to classify them in terms of their diameter and other dimensions. This research, furthermore, works with the law of Kepler, the second, and third law of motion; this phenomenon of asteroids behavior can be also be studied through the lenses of Newton's gravitational law to become more knowledgeable of impacts. The Astronomy and Ionosphere Center of Arecibo, in Puerto Rico, have studied and determined different PHA's asteroids, but very unlikely have detected an asteroid prone to hit Earth, which the data gathered in this research will help predict.

MODELING OF THE STELLAR MASS ESTIMATES AND DISTRIBUTIONS OF GALAXIES

Francisco Rivera Méndez, The School of San Juan, San Juan, Puerto Rico.

Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

In the beginning of the universe, it is thought that a big explosion occurred, giving birth to the observable universe there is today. It has almost been a century since Hubble discovered galaxies and yet science doesn't know enough about them. Galaxies are big cumulous of gas and dust in which take different forms depending of their mass and density. The base of the experiment is a theory that explains formation of galaxies and possible scenarios for the Big Bang. When this happens, both atomic compositions are thrown in the universe and take form of galaxies, giving them their shape and mass. When stars die they release certain amounts of dust and gas out to space, these particles released into space can find a certain gravitational pull depending on the amount of mass they have. The theory presents that in the beginning of the universe, when the Big Bang just happened it released big amounts of gas and dust, eventually these particles found a gravitational pull in different parts of the observable universe. The experiment will be proved through math, first is to calculate the amount of gas and dust found in the hottest stars, type O stars that are catalogued as a population II type. The amount of particles released by the hottest and heaviest elemental stars can be measured; galaxies are measured for the amount of gas and dust and give an estimate of the amount of mass the Big Bang must have had in its explosion. If stars release gas and dust and galaxies contain these same particles, then galaxies are big remnants of a huge or multiple explosions in the beginning of the universe.

ABSTRACTS
BIOLOGICAL SCIENCES

HGSNAT IN MUCCOPOLYSACARIDOSIS TYPE III

Natalia Isabel Acosta Laboy, Rosa Bell School, Guaynabo, Puerto Rico.

Research Mentor: Ángel M. Márquez Otero, Interamerican University of Puerto Rico, Bayamón, Puerto Rico.

The Sanfilippo Syndrome (scientifically known as Mucopolysaccharidosis type III or MPS III) was named Dr. Sylvester Sanfilippo. Dr. Sylvester Sanfilippo was the first to discover the cause of this disease in 1963. He identified that people with this disease are missing one of four specific enzymes important for breaking down glycosaminoglycans (GAG). This enzyme is known as heparin sulfate. MPS III is divided into three subtypes known as: IIIA, IIIB, IIIC and IIID. Each subtype is caused by a mistake in a different gene. All of the subtypes of MPS III are associated with some level of mental deterioration, but the rate of progression and severity depends on the type of MPS III. The Sanfilippo Syndrome is a progressive disorder that mostly affects the central nervous system (brain and spinal cord) but can affect other body systems as well. People with this disease don't show the symptoms right at birth. Most people start displaying the symptoms between the ages of two through five years' old. Some symptoms in affected children can be behavioral problems and delayed speech. Mental and motor development reach a point between the ages of three to six years old in which behavioral issues and intellectual decline occur. The children might become restless, destructive, aggressive, anxious or have sleep disturbance, others might display symptoms of Autism, characterized by difficulty in communication and social interaction. MPS III also causes progressive intellectual disability and the loss of previously acquired skills (developmental regression). The Sanfilippo Syndrome might seem similar to Alzheimer's in adults. Children with this disease might die before reaching their third decade of life, the age average of death is between the ages of 15-20.

HABITAT SUITABILITY AND NICHE ANALYSIS FOR THE CONSERVATION OF *Crocodylus siamensis*

Rodolfo Acosta Laboy, San José School, San Juan, Puerto Rico.

Research Mentor: Ángel M. Márquez Otero, Interamerican University of Puerto Rico, Bayamón , Puerto Rico.

Crocodylus siamensis, commonly known as the siamese crocodile, is a species of crocodylian that once inhabited lakes, rivers and swamps in various Indonesian provinces. The siamese crocodile usually has a dark green or olive coloring and can reach up to 12 feet in length. At some point in history, the siamese crocodile inhabited multiple provinces in Indonesia but now, with less than 200 individuals left in the wild, it is considered a critically endangered species. *Crocodylus johnstoni*, known as the freshwater crocodile, is native to calm waters in northern Australia. Unlike the siamese crocodile, the freshwater crocodile has a slender snout, which is due to a mainly piscivorous diet. *C. johnstoni* also has a lighter coloration than *C. siamensis*. The possibility of translating into environments inhabited by freshwater crocodiles, if possible, may be the saving grace for the siamese crocodile, as the species is in an extremely hard spot in the wild. To view compatibilities, the R program will be used to develop coding to make the niche comparison for this species. GIS (Geographic Information System) will be used to download occurrence data for the three species. Bioclimatic variables will be downloaded from the Worldclim database (Global Climate Data Program) and used to find such compatibilities between species. If such compatibilities are found between these crocodylians, then it may just be the salvation for *C. siamensis*, as the future is looking bleak for this species of crocodylian.

HEALTH RISKS AND DIGESTIVE ANALYSIS IN CONSUMING GENETICALLY MODIFIED FOODS

Gabriel I. Arroyo Figueroa, Wesleyan Academy, Guaynabo, Puerto Rico.

Research Mentor: Fabiola D. Pagán Torres, University of Puerto Rico, Bayamón, Puerto Rico.
Assistant Mentor: Micheal A. Carrasquillo Rivera, University of Puerto Rico, Bayamón, Puerto Rico.

Due to population increase and climate change, humans are generating more genetically engineered foods that can be preserved, grow faster, and keep away harmful organisms from foods. Genetically modified foods (GMF) consist of using chemicals to produce “perfect” foods that are visibly appealing to the population and help economically. These chemicals in foods can produce various serious illnesses in the human body. If it keeps a constant increase in the production of GMFs, Earth’s main source of food will be altered with chemicals. If humans are heading that direction, it is necessary to find out how these foods affect people, are digested, and figure out if they are necessary in our lives. A dietitian was interviewed and asked how they assign diets to their clients because of people eating too much GMFs. The focus of this research was how these types of chemicals are made and how are integrated into foods, most important how the body reacts to them. Research indicates that chemicals act as a process disruptor in humans that does not permit body functions to occur. Nutritionists add to this by assigning patients organic diets to counter attack these diseases that may affect humans by eating GMFs. They are classified as a way to improve sales and solve the problem of food shortages worldwide, but the health aspect of the foods out-weights the benefits because of the diseases that can occur. These are not worth the risk and an organic diet arranged by a certified nutritionist is the best way to keep up healthy and avoid such diseases.

FINDING AND DIGITALLY MODELING THE CAUSES FOR IDIOPATHIC SCOLIOSIS

Amanda Sofía Arrufat Román, Escuela Especializada en Ciencias, Matemáticas y Tecnología, San Juan, Puerto Rico.

Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

What I desire to do in the investigation is to find a possible cause of the idiopathic scoliosis according of the experiences of people who have gone through it. The scoliosis is a lateral deviation of the spine from the midline, characterized by a lateral curvature on the spine and a vertebral rotation in form of “s” or “c”. Generally, the scoliosis is idiopathic and occurs, mainly, in adolescent girls. According to the National Scoliosis Foundation (2015), the total number of scoliosis cases in the United States is estimated to be greater than 4 million. Also according to Clear Scoliosis Institute there are 29,000 of surgeries performed on adolescents in United States every year. Having scoliosis can cause sword pain, deterioration of respiratory function to higher mortality rate because the spine is very rotated and can touch some organs. The scoliosis can be caused by neuromuscular conditions, birth defects and injuries of infections on the spine. The scoliosis that I choose is idiopathic because until today the cause is still unknown. If I can find a possible cause for this scoliosis, or model the causes, it’s going to be a great advance for medicine. The investigation is going to focus on cases of people that have idiopathic scoliosis to view the experiences and opinions of the people that have the condition to recollect the data to find a possible cause of this scoliosis. Eventually leading to a digital design to print an orthosis suiting the specific needs of every patient.

THE KNOWLEDGE OF THE STUDENTS OF THE SCHOOLS OF SAN JUAN, PUERTO RICO ABOUT THE MATERIAL SAFETY DATA SHEETS (MSDS) IN THE SCHOOL LABORATORIES

Yeliann M. Benítez Cabrera, Math Science & Tech Center, San Juan, Puerto Rico.

Research Mentor: Amanda M. Chavarría Colón, Universidad Del Este, Carolina, Puerto Rico.

Assistant Research Mentor: Bianca Serrano, Universidad del Turabo, Gurabo, Puerto Rico.

The Material Safety Data Sheets (MSDS) is a document that broadly informs you of the dangers to which you may be exposed to chemicals that will be used in a laboratory. Likewise, it informs you about the precautions and the measures that should be taken in case of emergency. This document is an important tool for the laboratory, teachers do not show emphasis or are unaware of this, so students are not informed or are in a safe environment when conducting a laboratory. For this research, a survey will be conducted in different schools to evaluate the knowledge of students and teachers about this document. Through a questionnaire we can measure the knowledge and application of this document in the laboratories of the schools of San Juan, Puerto Rico.

THE BRUTALITY OF *OSTEOGENESIS IMPERFECTA*

Sergio I. Caraballo Gonzales, Wesleyan Academy, Guaynabo, Puerto Rico.

Research Mentor: Fabiola D. Pagán Torres, University of Puerto Rico, Bayamón, Puerto Rico.

Assistant Mentor: Micheal A. Carrasquillo Rivera, University of Puerto Rico, Bayamón, Puerto Rico.

Brittle Bones Disease is a condition that may affect just about anyone. This investigation deemed to be appropriate to further understand what it is. The purpose of this it to comprehend the complexity of the disease and what factors are present when one has any of the known types of *Osteogenesis Imperfecta* (OI). Also, to understand what causes the disease. Research about OI was conducted using various sources. An approximate of twenty-five to fifty thousand people in the US alone have OI, all varying in ages. Does it affect children and adults differently? Yes, adults tend to have hearing and vision loss in their mid-twenties, while children's condition might still be progressing. But most importantly, what is the cause? It has been found that the trigger of OI is due to a deficiency of collagen in the body of the people with such disease. Therefore, adults' tent to have even less collagen, hence they find viable options to lessen the effects of the disease. So, what can be done, if there is no definitive cure? Patients with OI may choose to pursue treatment options that improve their quality of life. Although the prognosis depends on the type of OI the patient has, there are some common choices that can be taken. Bisphosphonates and growth hormones can strengthen the bone structure of patients, leading to a better lifestyle. The disease is very rare, but it can still affect anyone in the world.

WAS THERE AN INCREASE IN LEPTOSPIROSIS CASES IN PUERTO RICO AFTER HURRICANE MARIA?

Celismar Casillas Pérez, Escuela Especializada en Ciencias, Matemáticas y Tecnología del Municipio de San Juan, Puerto Rico.

Research Mentor: Amanda Chavarría, Universidad del Este, Carolina, Puerto Rico.

Assistant Mentor: Bianca Serrano-Torres, Universidad del Turabo, Gurabo, Puerto Rico.

Hurricane Maria, a category 5 hurricane, was one of the most dangerous atmospheric phenomenons that passed through the Caribbean. Maria entered Puerto Rico through the east on September 20, 2017 and caused many structural and surface damage. Hundreds of people were left homeless, there was shortage of food and everyone on the island lost electricity, causing a lack of common hygiene routines. An increase in rodents in Puerto Rico was observed in the next 3 months after the hurricane. Rodents are the main carriers of different pathogens, including *Lepstospira*. *Leptospira* is a genus of spirochetel bacteria that causes leptospirosis, a disease that affects animals and humans. The animals that are infected discard *Leptospira* through the urine, commonly in rivers, and this can be transmitted to the human by having direct contact with the bacteria. A rise in leptospirosis cases was also observed during this period of time, nevertheless, an amount was never reported. Since no accurate amounts of cases have been reported still, this research focuses on determining if there was a direct connection between the passing of Hurricane Maria and the increase of leptospirosis cases in the northern region of Puerto Rico or if there wasn't truly and increase in these cases. To achieve the objective of this project, different immunologists, epidemiologists and infectious diseases professionals will be interviewed regarding the cases of leptospirosis that have been attended after Maria until October of 2018. The expected results of this project are that after Maria's passing, the increase of leptospirosis-based cases have risen and throughout the months of recovery, these cases have balanced themselves, meaning that they've decreased but have stayed a steady number.

HOW CHILDREN WITH SLI CATCH UP WITH THEIR AGE GROUP

Mia Nicole Llera Encarnación, Robinson School, San Juan, Puerto Rico.

Research Mentors: Amanda Chavarría, Universidad del Este, Carolina, Puerto Rico.

Assistant Research Mentor: Olga Alfonso Rivera, Universidad del Este, Carolina, Puerto Rico.

Specific language impairment (SLI) is a disorder that prevents children from mastering language skills. Children with Specific Language Impairment probably have another family member with the same disorder. 50 out of 70 children have this disorder. Genetic research has shown a common variant on chromosome 6 called KIAA0319, and it plays an important role in Specific Language Impairment. This variant also takes role in other learning disorders, like autism. In a kindergarten class, 7 out of 8 kids have this disorder. People don't know what the cause of Specific Language Impairment is, but they think it has something to do with DNA. Some symptoms are that children have are that they struggle to learn and pronounce words properly. The signals of Specific Language Impairment are that children stutter, they drop the "s" and they cannot talk properly. Our focus is to find out how children with Specific Language Impairment catch up with their age group. Children with the SLI disorder are not made for poor reading only. To try and help, parents can talk to doctors or another option is a speech and language professionals. Some schools can add after-school programs to help the children with SLI. If parents decide not to do this, they can homeschool their children, or send them to a school specialized school to help them. By doing this, children with SLI might be able to go to school normally as they grow up.

PSYCHOLOGICAL DISTRESS POST- HURRICANE MARIA IN THE YOUTH OF PUERTO RICO

Fabiana Z. Pagán Torres, Discípulos de Cristo School, Hato Tejas, Bayamón, Puerto Rico.

Research Mentor: Fabiola D. Pagán Torres, University of Puerto Rico, Bayamón, Puerto Rico.

Assistant Mentor: Micheal A. Carrasquillo Rivera, University of Puerto Rico, Bayamón, Puerto Rico.

The psychological distress Post-Hurricane Maria in Puerto Rico is a limited area of study, especially in the youth population. Thus, is important to classify the distress variables cause by the situation, and moreover to identify is the population has a big gap in the way they perform in similar situations. Natural disasters can be traumatic; this type of events can cause pain, sorrow and extreme anxiety. Is important to pay attention to "red flags" that in general the population is signaling because is necessary to have a healthy population to succeed in the future. The problem is due to lack of information and investigation, and therefore this situation is not being treated in Puerto Rico. An amount of young kids where interviewed with some questions related to their experience Post- Hurricane Maria, a Psychologists was interviewed with other questions related to how psychology distress affect the development in the youth and the way they are going to act in similar situations. The youth population showed that they are affected by having stress disorder, depression and anxiety. A year after the hurricane there is average amount of young kids that are affected by Psychological Distress because of the lack of resources and the amount of problems that they are still going through. In conclusion the youth population is still affected a year after by the hurricane Maria because of the lack of needed resources and the economic stability of the people.

TIME TEST IN HOW MANY TIMES CAN A *Fragaria ananassa* REPRODUCE IN TWO MONTHS

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Research Mentor: Ángel M. Márquez Otero, Interamerican University of Puerto Rico, Bayamón, Puerto Rico.

The garden strawberry is a widely grown hybrid species of the genus *Fragaria*. It's widely appreciated for its aroma, flavor, and its color. The garden strawberry was first bred in Brittany, France in the 1750's via a cross of *Fragaria virginiana* from eastern North America and *Fragaria chiloensis*, which was brought from Chile by Amédée-François Frézier in 1714. The main goal of this experiment is to know which fertilizer is more effective. This way customers will know which fertilizer they should use. All stolon of all four strawberry plants were almost the same size. The plants 20-20, 14-14 and 14-20 will be the experimental group and the control won't receive fertilizers. The fertilizers will be applied according to their instructions and the growth will be measured in centimeters. It is expected that the 20x20 will be more effective at the moment. However, since it's just a powder mix with water most of this fertilizer could be wasted. In the other hand 14x14 will help the plant growing at a steadier rate. In other words, 20x20 is a good option when the plants are dehydrated and the 14x14 will keep the soil in the pot full of nutrients. To insure the fastest growth for plants they must be free of pathogens such as fungus and ants.

HOW DIFFERENT LEVELS OF CORTISOL AFFECT A DOG'S BEHAVIOR

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The behavior of dogs is constantly changing for unknown reasons. This investigation was conducted to better understand a dog's behavior. Cortisol is a glucocorticoid, hormones that help the body adjust to stress. It is the most important out of all the glucocorticoids and that is why it is frequently called the "stress hormone". This means that cortisol influences how the body adapts and reacts to stress. When dogs face a stressor a lengthy process, commonly known as the stress response or fight-or-flight, is activated to help the dog return to its natural state. Cortisol is a hormone that is highly present in the activation of this process. In addition, glucocorticoids, cortisol being the most important of them, are known to have effects on the psychological state and behavior of the dog while adapting to stress. Therefore, this investigation determined how low and high levels of cortisol affect the behavior of dogs. To achieve the understanding of this, this investigation gathered data on how low levels of cortisol and high levels of cortisol affect the behavior of dogs. Little data regarding low levels of cortisol in dogs was found, but the data discovered showed that dogs with low levels presented panting and head resting. Data also demonstrated that dogs with high levels of cortisol showed low postures, increased movement, lifting of the paw extremity, urinating and nosing. In conclusion it can be said that the levels of cortisol in a dog were associated with changes in its behavior.

MYXOID MUCOID DEGENERATION: A RESEARCH STUDY OF MEDIAL MENISCUS

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Due to the limited information and research for the medial meniscus and its importance for the knee, this research is concentrated on the multiple causes and possible treatments for the medial meniscus deterioration. If the medial meniscus is one of the most crucial cartilages of the knee, why is it so susceptible to deteriorate? For this reason, it is of high importance to be aware of the behavior of the knee and the sudden movements that may affect it. In this investigation the procedure for the analysis of the anatomy of the knee where according from an interview with a colleague from the Orthopedician branch. The knee takes on the daily impact as a result of being responsible for taking in all the body weight. The medial meniscus can be deteriorated with higher facility due to the weakening of the connective tissue, which indicates that the mucosa of the knee is being affected as well. In account of this information, it is affirmative that the meniscus will suffer consequences that are one or more of the possible deficits like myxoid mucoid degeneration or meniscus tear among others. Because of the paucity of rest of the knee, the medial meniscus will easily be affected and therefore very susceptible to any deficit and weakening of the knee. For further investigations, the focus can be diverted to the nutrition of the patient, and how the missing elements or nutrients are of crucial importance for the knee in the cytology branch.

TRANSLOCATION OF *Chamaecrista glandulosa* ON TORTUGUERO LAGOON NATIONAL RESERVE

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Research Mentor: Ángel M. Márquez Otero, Interamerican University of Puerto Rico, Bayamón, Puerto Rico.

Chamaecrista glandulosa var *mirabilis*, better known as *Cassia mirabilis*, is an endemic species of plant located in the south and east of the Tortuguero Lagoon Natural Reserve and in some areas of Dorado, more specifically in the silica sand deposits found in the dry forest evergreen vegetation of the reserve. The *Cassia mirabilis* species is a bush that grows approximately 30 inches tall with yellow flowers of $\frac{3}{4}$ inches in diameter and fruits from 1 to $\frac{1}{2}$ an inch, each with 12 to 15 seeds. This species is in danger of extinction due because of the never-ending threat that imposes the expansion of residential areas, industrial development and sand extraction of the area that limit their reproductive cycles thus creating the real possibility of extinction. The main target of is to identify, if any, a different kind of area as a substitute for the silica sand that acts as the primary option for the development of this species and that is currently, with no signs of stopping any time soon, a profitable mineral constantly being mined for different purposes. The possibility of translocating *Cassia mirabilis* into other types of soil alongside the Tortuguero Lagoon might help this species to recover from the endangered status. For this research ecological niche compatibility will be made with *C. glandulosa* and *Utricularia caerulea* to see if they might be a compatibility with each one. To view compatibilities, the R program will be used to develop coding to make the niche comparison for this species. GIS (Geographic Information System) will be used to download occurrence data for the three species. Bioclimatic variables will be downloaded from the Worldclim database (Global Climate Data Program) and used to find such compatibilities between species.

HOW CAN ALOE VERA GEL AFFECT THE GROWTH OF A *Solanum lycopersicum*?

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Aloe Vera plant is a medicinal herb with a gel-like substance inside of each leaf called Aloe Vera gel. Its place of origin is thought to be South Africa. The earliest recorded documents to mention the plant were in ancient Egypt, about 6,000 years ago. They described it to have the secrets of beauty, health and immortality. Therefore, humans have always known and used this plant for medicinal and cosmetic use. The gel of this plant contains many rich minerals like iron, calcium, magnesium, zinc, potassium and various others. These minerals improve and rejuvenate the human body, but would these same minerals have the same effect on fruits such as a tomato, or at the very least have a change in the growth of it? The fruits that would be used are, in fact, tomatoes. These tomatoes that would be used in the experimentation are hothouse tomato seeds. These are the commercially available tomatoes found in all supermarkets. The seeds would be placed in normal plant pots, being in the same place, getting the same amount of sunlight for the whole growth process. The temperature would be room temperature, which in Puerto Rico is about 25.6 degrees Celsius (78.1 degrees Fahrenheit). The amount of Aloe Vera gel that would be used in the tomato that would be tested on, would be $\frac{1}{2}$ a cup or 4 ounces. The tomatoes would be ready in about 59 days, which is the amount of time it takes for them to be ready.

THE IMPORTANCE OF BATS IN THE ECOSYSTEM OF PUERTO RICO AFTER HURRICANE MARIA

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Research Mentor: Alexa Pérez, Universidad Del Turabo, Gurabo, Puerto Rico.

There are 13 species of bats in Puerto Rico and they bring many benefits to the ecosystem and human beings. They control pests, pollinate many plants and help spread seeds. A bat can consume up to a third $\frac{1}{3}$ of its weight in insects in a single night and considering the large populations of bats that exist, it can be understood that they provide free pest control for farmers. Also, they inhabit caves maintaining a balance in the fauna of the caves. However, since the tragic landfall of Hurricane Maria, many vegetative and animal populations have plunged due to the harsh nature of the conditions during and after the phenomenon. The purpose of this research is to try to establish the importance of bats in the ecosystem of Puerto Rico in the face of the immense devastation in the flora and fauna of the Island because of Hurricane Maria. This will be accomplished by using a detailed survey, which will be answered by farmers and personnel of the agriculture industry. The results of this research propose the need to help the protection and preservation of the bat population in Puerto Rico.

ABSTRACTS ***COMPUTER SCIENCE***

DESIGN OF AN APP FOR DEAF CHILDREN'S IMPROVEMENT IN EDUCATION AND COMMUNICATION

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A problem in communication exists between the community of deaf children and the rest of the population. These minors are brought up without the advantage of being understood; that is why they follow their instincts in sign language. An inconvenient situation would be to always have an interpreter around to be a vocal of three patients out of a thousand children, but it is not financially convenient. The purpose of this investigation, nevertheless, is to provide a proper app design to assist kinder patients to learn basic terms of their language despite their disability. This app also would provide fundamentals in science, math, writing English and Spanish, and reading. In order to conduct this research, an interview with the community was needed to become knowledgeable about the challenges raising a deaf child may bring, and thereof come across certain suggestions from parents or closer relatives. In addition, it will be necessary to view and analyze current platforms (those that are used for audio disorders) to consider any as a base for the new app. The newly-developed app will also be built with a user-friendly interphase that can be quite useful for anybody that is interested in communicating with the patient, so it will be a bidirectional benefit. It is expected to have the app finished in a year: this will include the system request, the requirements from the stakeholder, the use cases, the relationship diagrams, the design, and the final product. With the creation of this application, the interaction between deaf minors and the people surrounding them will be more effective.

USB PORT SURVEILLANCE FOR COMPANY FRAUD PREVENTION

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According to the publishers of *USB Based-Attacks* N. Nissim (September 2017) the favorite weapon that attackers use are the Pendrives, since it's an easier way to access the core of the computer -and it makes the attacker easier to get what he wants. This project has the purpose to counter-attack those situations and to protect the company's computer from malicious data. Acquire information from the source of *AT&T Teleholdings* (1998) that this program is possible to make. This project is going to be worked on the programming language of "*JavaScript*" with the purpose of making this program universal on any computer devices. The program will work as a restriction for employees who attempt to enter USBs without the permission of the main administrator, and so to prevent data stealing or malicious intent. The program will work with the next functions, "*Accept Flash Drive to access this laptop*", this will be a choice for the Administrator to accept the USB from another computer, allowing the *Flash Drive* to enter the data. Now, if the function of "*Decline Flash Drive to access this laptop*" made by the administrator will automatically eject the *USB* from the computer and decline the *USB*. The administrator of the company has the ease to access the data base in MySQL to check all users inside, the users will be identified with an ID which the administrator has the ease to check who or who isn't working inside the company's computer.

ABSTRACTS ENGINEERING

HOW TO CHARGE A CELLPHONE WITH HYDRAULIC ENERGY

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When Hurricane Maria struck Puerto Rico, there was a colossal power outage, but some people had solar panels that were authentic energy sources for the community. However, another power outage could happen again, propelled by another hurricane or transformer explosion. People can use their power plant if accessible, but the fact is that it is not beneficial for anybody since they deliver carbon monoxide. Carbon monoxide has been the primary emission from cars, trucks, and other machinery (the same ones that require gasoline for functionality). This substance can disseminate easily in places that do not have an appropriate ventilation system, and many machine users may ultimately breathe this. Some of the symptoms of carbon monoxide inhalation are headaches, dizziness, nausea, and chest pains. On the other hand, hydraulic generators use water to produce clean energy, which is hydraulic power. This type of power matches hydraulic motors and water to produce the best and safest energy for charging of electronics, including therein the apparatus put in use every day for communication. This research studies this power as a vital source of energy, administered by the arrangement of a set of specific pieces. By this mean, people do not have to rely on the authorities that provide electricity or fuel-dependent generators in the event of a catastrophe. In other words, an alternate energy source will be suggested that might charge a cellphone in approximately three hours, with an optimum water flow that neither slows down the revitalization process nor blows up the system.

DESIGN FOR THE RE-ENHANCEMENT OF ELECTRIC-BASED VEHICLES

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Research Mentor: Kenneth J. Martínez Torres, Universidad del Turabo, Gurabo, Puerto Rico.

Nowadays, electronic motors are difficult to maintain running for an extended period of time. They are slow in charging because their engines are too small; in addition, they are very costly. However, gasoline cars are used more and cost less; that is one of the main reasons why people are still buying them. There are two types of electric cars in the industry: battery cars and solar cars. The difference between them is that a solar one, as its name stands for, is powered by the photovoltaic cells to convert the energy from the sun into charge for the battery while the sun is out. Unlike a battery car, that needs to keep the constant plugging in to work. On the other hand, lithium-ion batteries are used in cell phones and laptops everywhere, and batteries for cars, are used to store high levels of energy. These also resist high temperature, making it convenient for avoiding engine overheating. At first, the gasoline cars that have run by internal-combustion engines need constant refilling of water to keep their engines from blowing up. This research will allow knowing further details and the differences between the gasoline cars and electric cars and how and which electric cars could be made more efficient. This research will suggest a way of designing and building a better engine for electric cars by improving the duration on track, increasing the amount of electricity that it absorbs during a recharging without overheating, and the time that takes in charging the battery. The costs of the electric cars, are expected to drop to benefit others in this design, ensuring the safekeeping of nature with less gasoline cars.

SCIENCE EMPHASIZED APPLICATIONS

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Have you ever wanted to search for an important experiment information but all you find is unrelated documents? An informative science emphasized application is the project that will improve the way we search for reliable scientific information. The application will mainly concentrate on astronomy but will have information about other science topics. The app will act as a central database for different investigative projects and documentation. The app will illustrate the information in a page with pictures about the certain information. The purpose for this application is to make it easier to find information about science and investigative projects. Before, it was complicated to find specific information about science experiments. It could help others that are looking for reliable information on a specific topic. The app will be made on android studio and programmed using the Java language. It makes usage of a friendly user interface, to make navigating the app a hassles free task. The application will sustain the documented information inside a database, and then it will populate the app based on what's available in the database. This way we make sure that every single piece of data in our database, is reliable. A prototype for the application was completed.

HYDROELECTRICITY

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Research Mentor: Osvaldo IV Massanet, Universidad del Turabo, Gurabo, Puerto Rico.

Nowadays, the world has many serious issues. One of them is the depletion of the ozone layer. Since the 1970's the ozone depletion started to capture the attention of scientists. Our ozone layer is being destroyed by our own doing and is our responsibility to fix it. In this project, I am trying to find a way to help, not to fix it, but to stop damaging it. The fuels use to power our homes, cars, and energy plants create fumes that damage the ozone layer so much needed for our survival. My main goal is to find another type of fuel that won't adversely affect the ozone layer. During this exercise, we'll use water to move a turbine to generate electricity. My goal is to show that gasoline (being the most used fuel in the world) is not the main source of energy and can be replace with an ecofriendly and less harmful source of energy. In this experiment, water will move a turbine that will generate electricity. For this we will use a simple method, take a mini water turbine and move it by the force of water. This will generate a little electricity yet, if I multiply it in a bigger scale (that's the purpose of this project, to do it in a bigger scale) it can generate enough to power a phone. My goal with this is to create a station in a river (that doesn't affect the river or the ecosystem in it) and get a turbine to be moved by the own flow of the river thus, generating energy. This way in case of an emergency, like the hurricane Maria, people can go there and recharge their phones or electronic devises. And even, if in a future this technology is more advance, it could be incorporated in houses, eliminating the need of gasoline.

ELECTROLYSIS

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Research Mentor: Osvaldo Massanet, Universidad del Turabo, Gurabo, Puerto Rico.

Water, is the most abundant resource on Earth. It covers 70% of the surface, but currently we know more about the land than we know of our seas. Because going to explore the seas is difficult for the perspective that we need different equipment for to breathe underwater. And I think, if we use the water like a source of Oxygen, using the process called electrolysis as the mechanism to produce the molecules. This invention will mostly help the marine biologists and any person that want a safer way to explore the sea. The prototype works using the process electrolysis. This process separates the molecules of the water with electricity getting the oxygen we need. Also, it will have a working water level detection sensor and a gyroscope. This should help stabilizing the different compartments and making sure the airways don't get flooded. The prototype will function like this: The water goes into a chamber with a cable that produces the electricity to separate the water into its basic form of oxygen and hydrogen. The oxygen will rise from the water and go in to another compartment where we store the recollected oxygen for our use. In the first chamber a water sensor will monitor the water level and if the limit pass over the level indicated it sends a message to the Arduino to close the flow of the water and stop the electrolysis. Using a mechanism like a gyroscope will help the equipment to be more precise on when to open or close the water hatch. Additionally, on the second chamber, there will be a small tank of nitrogen, that mix with the oxygen it produces Nitrox that is one of the many gases that is use by scuba divers. The prototype was made using the Arduino Uno R3, a water level sensor, a gyroscope and a small battery.

SUBSTANTIAL IMPROVEMENT OF THE ELIMINATION/CLEANING SYSTEM OF BACTERIA IN AQUATIC MICRO-BOTS

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Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

As for starters, this project's purpose is to build a robot that is capable of destroying almost all type of bacteria that can procreate in water bodies. Mostly any type of aquatic bacteria (such as Autotrophic bacteria, predominantly cyanobacteria and E. Coli) can be harmful for the human body and other animal. All of which the humans have contemptuously made worse due to global industrialization and pharmaceutical contamination. The old models designs explicitly mention as of their studies information "Our laboratory tests show that micro-bots can navigate through water for 15 to 20 minutes before running out of magnesium and, in this time, they are able to trap more than 80% of E. coli bacteria in water with a high concentration of them". As part of the chemical reactions needed to be explained it is most important to mention that the existing model has a face made of magnesium, which reacts with water to produce hydrogen bubbles that propel the micro-bots. The bacteria adhere to the gold are eliminated by the silver nanoparticles. In the aftermath of this robots cleaning action, a Digital image of the residue will be created for any type of structural analysis. This digital modeling will later be registered in a configured API database for safeguarding. The ultimate goal of this project is to increase the production rate of this robot locally and decrease its overall cost, all with the sole intention of raising global awareness on water contamination and making this apparatus nothing less than a significant step towards more healthy and clean water bodies.

MORSE CODE INVESTIGATIVE MODEL

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Research Mentor: Osvaldo Massanet, Universidad Turabo, Gurabo, Puerto Rico.

The Morse code system was first invented during the 1830's by Samuel F.B Morse which its purpose was for electrical telegraph. This version that was created by Samuel F.B Morse was further improved by Alfred Lewis Vail, who was a scientist and a business man. Additionally, he was also Morse's assistant and partner. After its introduction to Europe, it became apparent that the original Mores code was inadequate for the transitions of much non-English text, since it leaked on the code's for letter's and diacritic marks. To fix this deficiency, a variant called the International Morse Code was devised by a conference of European nations in 1851. The investigative model will be used to communicate through a generated Morse code via Ethernet or Bluetooth using the Arduino UNO R3. This will also help us to develop and understand ways to communicate when a catastrophe happens or to provide some communication on places with no reliable method of transporting a message. This investigative model will consist of Morse to English and English to Morse translation. This will also provide sound on semi-long distances. The purpose of this model is to provide communication where there is none. This project will also work with low frequencies because it travels better through rubble and walls. This will help people communicate on cataclysms or places that don't have good communication since the sound emitted can travel smoothly through semi-long distances and rubble. The prototype is completed but will need future work to implement better features.

ELECTROMAGNETISM WITH NEODYMIUM MAGNETS

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The fundamental reason that gives rise to this investigation is the interest that arises in a personal way as far as the magnets are concerned and their function in our daily life. How it has influenced our day to day and the benefit that this kind of theory once carried out changed the lives of many people. Using a fan of cooling computer towers to break the inertia in it. By using neodymium magnets attached to the blades and the center of the fan creating a magnetic field and thus achieve the principle of electromagnetism. A magnetic field is formed around the fan achieving the movement of the blades. After different ways of placing the magnets to achieve a movement, the last was the most effective with the rotating movement of the fan. The first test was using the magnets in the North + position; no movement was achieved. In the second test using the magnets in South position -; no movement was achieved. The third test was used the two magnets in the South position - and two in the North position + the four magnets of category N52 the result was equal to the previous one, in a negative way. The most effective way to achieve the movement of the fan was with the magnets attached to the blades and the center, achieving an intermittent attraction at close range of the fan. Finally, a movement is achieved with the magnets in the fan, making a rotating one. To achieve the effect of this experiment I focused on the futuristic ideas of a great electric engineer of great visions Nikola Tesla. Who in a visionary way would use electromagnetic waves to send radio and television signals. Likewise changing the way to send the current through a driver, all this for the 1800s.

NFT HYDROPONIC SYSTEM MECHANIZED TO MEASURE ACIDITY LEVELS AND TEMPERATURE

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In agriculture, the percentage of workers is declining, causing situations such as little food production. An example of a country in this situation is Spain. In this country, the percentage of young farmers is 5.3%, while in other countries they are at most 14%. When Hurricane Maria lashed Puerto Rico, the country raised awareness about greening the island, and the easiest and most effective method that the people chose is hydroponics. Some benefits of hydroponics are that water can be reused; hydroponics requires 20% less space to grow and less labor. Although there are several benefits of hydroponics, one situation is that people are not well educated about hydroponics: they do not verify hydroponics, and this causes lack of discipline, which equals abandonment. This is the first cause that is seen nationally in countries, but in Puerto Rico, in the percentage of food, only 15% of the food consumed by the country is from agriculture. This is bad because it represents that our agriculture is not efficient (and it is true). In this research, a hydroponic NFT will be mechanized, so that the lack of discipline can be addressed. It will be done by programming a microcontroller called Arduino and sensors, which will sustain the process of verifying the variables of temperature and the levels of acidity in the hydroponics. The expectations of this research are to obtain a final product that would facilitate the growth of healthy food while promoting the idea of clean agriculture in a tropical ambient.

REDUCTION OF TIME IN THE MODELING SAMPLE OF BACTERIA

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Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

This project consists of making a machine in conjunction with an application that can detect and highlight bacteria faster than regular bacteria detecting procedures. Later, the data recorded from the procedures will be stored in a API app for further studies. A side goal that I want to achieve in a near future would imply making an application with the capacity of storing the amount of bacteria growing in the platform by percentages. The reason as for why I'm investigating the following is because currently all types of bacteria/virus detecting procedures/machines take days to cultivate a living example, at least in the local market. Most times the bacteria been cultivated simply don't suffice the investigations needs and have the possibility to perish within the week. The steps of the following investigation are as follows: pinpointing the ongoing methods for the cultivation of bacteria, either aerobic culture and/or microscopic procedure, a DNA probe procedure and/or immunological reagents. Following this, we will quantize the amount of variables that influence the procedure (period of time that it takes to cultivate, environment,etc) and model them digitally. Yet, the development of diagnostic tests for a periodontal infection raises the issue as to what the appropriate reference standard, or "gold standard," should be for the evaluation of a new test, so, my ultimate goal will be to certified them most effective procedure.

ABSTRACTS
ENVIRONMENTAL – ENGINEERING

DESIGN OF A CHEMICAL PROCESS TO MAKE SYNTHROID AND IBERSATAN DEGRADABLE TO THE HUMAN BODY

Alondra María Arrufat Román, Escuela Especializada en Matemáticas, Ciencias y Tecnología, San Juan, Puerto Rico.

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Pharmaceutical pollution has become a major complication in the environment. By this concept, it is referred to what are considered medical residues that are ejected from the human body through urine and feces. These medical residues technically are some ingredients used in the elaboration of pills (to be more specific, in their compression or encapsulation processes), which the digestive system cannot deconstruct. Because these elements are unnecessary for relieving patients, their bodies dispose of them as they enter; statistically, 50% to 90% of the medicines are sent out to the oceans by means of human waste. The purpose of this research is to reduce these medical residues and propose thereof a chemical process, in which the elements that are not degraded in the recipe of the pills, are traded with others that successfully are. It has intended to answer the inquiry: can the same pills be made “as-is” with distinct ingredients in the recipe to minimize the pollution? Another objective has been to identify the popular non-degraded elements in a medicine, and also those that may serve as a substitute. It has been intended, since the commencement of this investigation, to work with two common drugs: Synthroid, used to soothe the symptoms of thyroid deficiency, and Ibersatan, used to treat high blood pressure. These drugs were chosen since more than 70.5 million prescriptions are made between both medicaments. The results could respond quite favorably if the modifications can be undertaken not only in a lab, but also in an industrial setting, from where countless of pills are distributed.

ECOLOGICAL STUDY ON THE DELIMITATION IN THE CONTRIBUTION OF NUTRIENTS OF BIRDS IN AN URBAN ESTUARY ENVIRONMENT

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Research Mentor: Amanda Chavarría, Universidad del Este, Carolina, Puerto Rico.

Assistant Research Mentor: Bianca Serrano, Universidad del Turabo, Gurabo, Puerto Rico.

This search aims to explore the contribution of nutrients in the Condado Lagoon, using birds as indicators. The Condado Lagoon is classified as an estuary, an estuary is a body of water that flows an immense course of different bodies of water towards the ocean. The purpose of this research is to calculate the amount of nutrients that come from the birds, which are present in the Condado Lagoon and the ecological role of the birds in the lagoon, in terms of the nutrients they produce. We hypothesize that the birds will have a great contribution to this body of water. In terms of methodology, the first step would be a study of water quality, in this study we want to take samples to see if the water contains Nitrogen (N) and Phosphor (P). Then a bird census, in this census where we would be making approximations of each bird that is observed as well as the bird species. After we will look for excrement and guano cares (nutrients) in the trees and finally we will calculate the amount of nutrients that contribute to the body of water. This research will be done several times but with different species. The area that will be used is more important because it provides for recreational activities and as a home for the species established there.

DESIGN FOR EFFECTIVENESS OF INDOOR HYDROPONIC SYSTEMS DURING HURRICANE SEASONS IN PUERTO RICO

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Research Mentor: Kenneth J. Martínez Torres, Universidad de Puerto Rico, Gurabo, Puerto Rico.

To protect Puerto Ricans from going out in extreme conditions, an indoor hydroponic system, which is the practice of growing plants without the use of soil, is proposed to be a method of food acquisition during hurricanes. To improve these food acquisition methods, such as going to supermarkets, the efficiency of an indoor hydroponic system will be measured. 80% of Puerto Rican harvest was lost, so growing their fresh comestibles from the households could be really convenient. The research consists of an indoor hydroponic system that will be able to provide organic, and therefore, healthier food choices that can be grown indoors, taking in consideration the increases and decreases of temperature in an indoor environment during hurricane seasons in Puerto Rico. These systems can be built indoors, which during a troubled scenario they are very convenient because an outside hydroponic system would be blown away by a hurricane's strong winds. Using an indoor hydroponic system, they can be able to grow their own healthy food without the need to go out in extreme conditions to search for food. The indoor hydroponic system shall be proved to work as the best food acquisition method during hurricane seasons and especially basic for people with plant-based diets. The standard food acquisition methods used by most of the citizens of Puerto Rico, was going to the supermarket, which some were inaccessible, but the establishments did not have the necessities in stock or the time in queues to purchase these articles were of three hours long in the worst of cases. With this research project, however, consciousness about more efficient and healthful ways to acquire food during hurricane seasons in Puerto Rico, will be created, and the efficiency of creating such a system will be proved.

IMPROVED ENERGY PRODUCTION IN MICROBIAL FUEL CELLS BY MEANS OF ORGANIC MEDIATION

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Research Mentor: Chelsea Marrero, Polytechnic University of Puerto Rico, San Juan, Puerto Rico

In a polluted world driven by energy consumption, one innovative idea, the microbial fuel cell (MFC), has risen as a solution to anthropogenic demands. MFCs are biological reactor systems that use metabolic activity in bacteria as a source of electrical energy. As bacteria oxidize compounds in their normal reactions, the released electrons are used for alternative energy production. Recent discoveries have demonstrated the effects of different mediation factors in the design of MFCs; however, researchers have encountered obstacles when it comes to increasing power production in them. Based on previous experimentation, a series of trials are developed to propose an alternative method for enhanced energy production in MFCs. It is predicted that higher energy in MFCs will result from increasing concentrations of organic substrate in the anodic chamber and added external mediators. The goal of this project is to formulate a cost-effective, sustainable way of producing energy.

TYPHOON IMPACT TO PUERTO RICO THROUGHOUT HISTORY

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Research Mentor: Chelsea Marrero, Polytechnic University of Puerto Rico, San Juan, Puerto Rico.

Typhoons, most commonly known as Hurricanes have been for centuries making landfall on wherever their tracks lead; they are generally formed on the Atlantic Ocean because of hot ocean waters and thunderstorm activity that come from African waters, mostly composed of winds of up to more than 130 mph with massive rain that causes excessive flooding. One of the first most destructive typhoons ever to make landfall in Puerto Rico was hurricane *San Felipe II* in 1928 The last hurricane to reach Puerto Rico was hurricane *Maria* in 2017, leaving behind massive damage in the island. Starting from 1928 to 2017, the most damaging hurricanes to hit the island will be analyzed using Microsoft Office Excel to understand its behaviors when making landfall in Puerto Rico, and in addition, measure its impact in matters of homelessness, deaths, and lack of a proper electrical energy grid. The results of this study will propose improvements to current land structures and citizen readiness for future natural disasters to prevent major losses in the island.

THE CAPACITY OF THE COCCOLOBA UVIFERA TO DO FITOREMEDIACION

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This research was based on observing the ability of Pistia Stratiotes to absorb copper sulfate. In that work will be demonstrate that this aquatic plant can be used for the phytoremediation of this metal. The only problem was that this plant only grows in fresh water and copper sulfate is a type of salt, which caused the Pistia stratiotes, being freshwater, to dehydrate. For this reason I modified my research using a plant that could survive in salt water. I wanted to improve my research using the Grape of the Sea scientifically known as Coccoloba uvifera: a plant that occurs in salt water places. It is our objective to observe if this plant has the capacity to absorb metals as effectively as the Pistia Stratiotes. Coccoloba is a tree that is easily found on the coast and in the river deltas; where the seas and rivers are connected and metal pollution decreases. The Coccoloba uvifera is the second species of native plant that has greater survival and that adapts to the environmental conditions of the ecosystem. This plant has been recognized for its medicinal functions as they have astringent properties, is used as a diuretic, for the treatment of chronic diarrhea, and for eye pain. Our hypothesis is that plants can contribute to solve the excess of metals in the environment.

BIO-MONITORING OF HEAVY METALS IN THE MANGROVE OYSTER SPATIAL DISTRIBUTION AT SAN JUAN ESTUARY

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Mangrove oysters are organisms that have the capacity to filter water, which contributes to the improvement of water quality, and the development and survival of numerous marine organisms. *Crassostrea Rhizophorae* are mangrove oysters that are used as a bioindicator that points out the existence of heavy metal contamination, and its population will be studied in the entire system of the San Juan Bay Estuary. The objectives of this project are to evaluate the spatial distribution of the mentioned oyster in the estuary system, analyze the population relationship of the oyster colonies with some chemical-physical parameter of the water, examine the enrichment of heavy metal content in the water quality and in the oysters shell, and evaluate the negative effect of the oysters because of heavy metal content, in terms of anatomic and physiologic structure. It is expected to determine the damage on the spatial distribution of the oyster within three locations of the San Juan Estuary to be studied: The Condado Bay, San Jose Bay and *La Torrecilla* Lagoon. The main purpose of this study is to identify the environmental conditions that favors the recruitment of oyster colonies in the waters of the San Juan Bay Estuary and develop measures that help increase and conserve the population of this species. Once the information has been obtained, the environmental preference of *C. rhizophorae* oyster in the selected localities will be determined. The results of this study will establish measures that allow the conservation of the species and, in turn, improve the water quality of the estuary system.

ELABORATING CELLULOSE BOTTLES IN ORDER TO SUSBTITUTE PLASTIC BOTTLES

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We live in a society in which our lives depend on man-made products and evolving technology. In the last few years, we have accomplished many discoveries that lead to new technology and products, but along with this, pollution has also increased drastically. Most of these products are made out of plastic. Plastic is a material made of monomers and a prime matter, and is the most used material for manufacturing, since it's easily moldable and it's easy to produce, and, because it's one of the longer lasting materials. This material is used in both complex things, such as computers and cars, an in simple things like bottles and containers. Plastic bottles are one of the most used products made out of plastic and is also the most disposed product. Plastic is harmful to nature because of its long lasting property. A single bottle can last five hundred years to degrade naturally. Through this research it is expected that a substitute for plastic bottles is found using cellulose. Cellulose has been an object for investigation for years due to its properties and qualities, like not being soluble in water, but still being able to become soluble after a reaction. Also, cellulose is very easy to get since it is found naturally on trees and wood. Cellulose is the perfect material to manufacture a product that will substitute plastic bottles.

PHOTOVOLTAIC HYDROPONIC SYSTEM WITH MODIFIED DESIGN TO WITHSTAND HURRICANES

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In the past year, a hurricane devastated Puerto Rico and its agriculture causing extreme losses in home-grown food production. After the hurricane affected the island, citizens needed a system that would provide security to their crops and a new way of cultivating. To have a safe and efficient harvest an innovative technique has been proposed for its cost-effectiveness and easy development: Hydroponic Systems. Marwan H. (2011), defines hydroponics as a widely and frequently used technique for growing plants without soil, providing a considerable degree of control of the elemental environment surrounding the root. However, a hurricane is strong enough to tear down a homemade hydroponic system, therefore, a structure of up to 130 mph wind resistance has been designed. The designed structure will include photovoltaic panels as the main energy source and provide security for the system and plants, modified to ensure the operation of the hydroponic system before, during and after an atmospheric event. Results of this investigation will allow Puerto Rican citizens a renewable and innovative form of successful home-grown food production.

A PROPOSAL FOR THE REMEDIATION OF GROUNDWATER IN GUAYANILLA BAY AFTER THE PPG INDUSTRIES CARIBE COMPANY

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A brown site is known as an area which may be complicated by the potential presence of hazardous substance, pollutants or contaminant. Guayanilla brown site located in PR Route 2, Guayanilla, Puerto Rico 00656 has a zone where the company PPG Industries Caribe was established. They started manufacturing chemicals products, later establishing a master paint corporation and finally began operating as a maintenance company giving the island petrochemicals products. The PPG Industries Caribe facilities developed a refinery heavy zone which created a potential chemical concern found on groundwater compounds such as vinyl chloride monomer (VCM) and acetone (ACE), which were the most abundant contaminants in the zone. The VCM were used for production of chemicals or petrochemicals, its solvent destinations and other uses produced by the company PPG Industries Caribe caused air, soil and water pollution. Due to past leaks problems from the company plumes of contaminated groundwater were generated. That is why a remediation proposal was planned and a strategy was identified. Bioremediation will be proposed for VCM compounds because it's a technology that uses microorganisms to treat contaminants throughout natural mechanism. In the other hand, chemical remediation for ACE use a combined of biotic remedy that provides the reactivity and persistence needed for effective treatment of pollutants in a certain area. Bioremediation of transgenic pseudomonas bacteria organism will work with VCM and chemical remediation will work with ACE. To be able and carry out this proposal, will reduce the impact of pollutants on the environment and the amount of toxic waste on groundwater.

SARGASSUM BIODIESEL FOR COMMUNAL POWER PRODUCTION

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Research Mentor: Chelsea Marrero, Polytechnic University of Puerto Rico, San Juan, Puerto Rico.

Have you ever thought how expensive producing or buying fuels like gasoline and diesel can be? Or, have you ever thought how dependent we are of fossil fuels? For years, scientists have been researching different sorts of biofuels to reduce the use of fossil fuels and greenhouse gas emissions in the world. The purpose of this investigation consists of producing a low-cost energy source from the creation of biodiesel. Biodiesel is a renewable diesel or biofuel, used as a substitute for petroleum, that will be made from Sargassum algae which is a brown microalgae or seaweed typically found in the coasts of the Caribbean Sea. This research project proposes a new procedure for the creation of cost-effective biodiesel to be used for communal power production. A new power machine model will be designed for its implementation in different communities. Results are expected to confirm and demonstrate its adequate implementation and other potential uses.

ABSTRACTS
GAME DESIGN AND DEVELOPMENT

USING ROLE PLAYING VIDEO GAMES TO HELP REDUCE STRESS, ANXIETY AND DEPRESSION

Rodrigo Alfonso Santana, CIMATEC School, Caguas, Puerto Rico.

Research Mentor: Osvaldo Massanet, Universidad del Turabo, Gurabo, Puerto Rico.

In this days and age, it's very common for teens to suffer from depression or anxiety. About 25% of teens suffer from anxiety and 20% suffer from depression. For the past 25 years depression and anxiety among teens has risen by 75%. Role playing games could be a viable solution for this problem. This game purpose is to help reduce anxiety by online multiplayer or single player. It is proved that online gaming may help boosting or improving the ability to befriend or make friends. On the other hand single player games could be a lot more controlled and safe; it is my preference to make a game to reduce these disorders. I will digitally construct a school inside of the game and simulate various scenarios and the player character will control partly of what happens by being able to choose what he says and how he behaves. This will help develop social skills and help relieve anxiety. The game was done using Unity3D programmed in C#.

VIDEO GAME DESIGN FOR PEOPLE WITH COLOR BLINDNESS

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Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

In the vast selection of video games available to commercial industries, there are plenty of choices for the overall average player. Yet, there aren't many at all that cater to the audience that carry some sort of disability. There are, of course, some exceptions, In my case, in which in this project I want to focus on people with color blindness, there are already some video games with a feature implemented to better suit their needs, such as sound enhancement. Some examples of this are the popular games and franchises such as "Call of Duty", "Overwatch", between others. For this project though, I want to make a video game application that is designed specifically for them, it's a simple and efficient way to appease to this community. I chose to do an app as a simple starting point to something possibly big and successful. Even though color blindness is very common, especially in males, that most people that have it don't even know they are color blind until they get tested, which indeed is interesting yet quite alarming. In the future, I intend to create different types of testing within this community to study up-close how efficient this can be as an app or game. In the end, the only goal will be doing the color blind community aware that games are not completely entitled to those who don't possess retinal conditions, because in the end, everyone deserves the same chance to enjoy a good, classical game.

IN THE MAKINGS OF A VIDEO GAME USING COCOS CREATOR

Sofia Victoria Collazo Alindato, Wesleyan Academy, Guaynabo, Puerto Rico.

Research Mentor: Víctor Ortiz León, University of Puerto Rico, Bayamón, Puerto Rico.

At the start of this Saturday Research Academy Program we were assigned to do an educational app game, after much thought we decided to base it on Taian Mythology. It is a subject that is not very much talked about but it is very interesting to learn how our ancestors explained, characteristics of nature as being the work of some omnipotent god. This was aimed to be a small platform game in which often gave the player trivia to test in what the player has learned throughout the game. In the game, the player gets to meet other gods and learn about them and important (or popular) places in Puerto Rico. The game was implemented in a software called Cocos Creator, a program that is very common in the development of app games. There we planned to complete two projects. The first project was a small animation of the character flying across the screen, the second had the intent of being slightly more playable. The second project was going to demonstrate the avatar being controlled with the mouse dodging bullets. All the information gathered for these two game projects were all found on Youtube or in CoCos Creator's own website. The game was made following each of its instructions.

FOOD WARS: A COMPLEMENTARY EDUCATIONAL GAME WITH THE VALUE OF HEALTHFUL EATING

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Research Mentor: Bryan A. Rodríguez López, Universidad Politécnica, San Juan, Puerto Rico.

The world of video games is very diverse, but the vast majorities of these are not educational and do not carry a good symbolic message for the young masses, specifically people born on and after the year 2000. That is why my goal with this project is to create an educational, deeply embracing videogame with the value of digestion and healthy, none artificial food (with its benefits). The main character will be a melon, the melon is exceptionally good in reducing weight and to stay hydrated, and helps prevent some types of cancer such as prostate, breast, lung and uterus. The ultimate point of the game is to save the melon's comrades, the fruits. To be able to recover the melon's friends we have to defeat the army of the rather known "fast food" or "junk food" (junkies). As for the Fast food, it'll be the main enemy, this will be determined such way because recent and older studies have explicitly discovered the harmfully direct and indirect effects of junk food within the human body, which can be the creation of addiction and fattening. The main villain will be a hamburger; since it is one of the most consumed meals in the world but this type of food, (highly concreted masses of triglyceride) increases your cholesterol and could give you colorectal, prostate and pancreas cancer. The setting of the game will be the city as you could say that is the natural and more predominant environment for fast food. My complete goal for the project will be to transpire a game that will intensively develop a desire of dietary habits within its players.

DANGERZONE: A MENTALLY CHALLENGING VIDEO GAME DESIGNED FOR ANY PLAYER

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The goal of our project will be creating a main stream game to challenge the full capacities of the human brain. Of course, the game will include such variables as the description, objectives, characters, and others. We will then proceed on to making the game. We will be using Unity as our game engine since it has good capacity for creating 2D games. In the stage of creating the game, we'll start by making the base and then we'll continue by working on level design, sprites, and other aspects. After finishing the creation, we will focus on the marketing and promotion to put the game out to the public. Basically our game is a swipe and tap multiplatform phone game that focus on keep going on levels while avoiding traps and enemies. Our game will be in 2D; the game itself will also be made on Unity engine. The aim for the game is to reach the end of the level without being damaged/killed by the enemies or traps. The game will look grim and dark but with a little color, to allude to certain senses on the player. Our expectations are keeping up with the creation of the game and adding more content like levels, skins, other game modes, things like that so that the game have more content for people to get more challenged. Our expectations do not come as far because we are still learning to make the basics of a game. Yet, we are dedicating time in developing our skills to future get this game to the next level.

MAD MIND BATTLES: VIDEO GAME DESIGN SPECIALIZING ON A.D.H.D TREATMENT

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This investigation focuses on the development of an educational videogame (Mad Mind Mazes) that will help students with A.D.H.D better their academic efforts. It has been accredited that low levels of dopamine, a neurotransmitter, may play a role in A.D.H.D diagnosis; the videogame will be put to test as to solve that problem directly. The students will be tested via a written test to measure the improvement on their academic rendition before and after playing the videogame., this way, via the tests, we will prove that Mad Mind Mazes will be able to help students with A.D.H.D from all around the world to learn. Also, the game idealizes a "Community" feature in which teachers and students will be able to download and upload various Question Packs of their desire so they can proceed to expand their academic experience utilizing Mind Mad Mazes as a tool for learning in their classrooms.

ABSTRACTS ***GENOMICS***

THE DEVELOPMENT OF ANTIBACTERIAL RESISTANCE IN *MYCOBACTERIUM TUBERCULOSIS* VIA POINT MUTATIONS IN CPNT_MYCTU

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Of the estimated 154 million prescriptions for antibiotics written in doctor's offices and emergency departments each year, 30% could be considered unnecessary. Antibiotics are medications used to fight bacterial infections. They work by either killing or decreasing the growth of bacteria and are powerful enough to be lifesaving to people with serious infections. However, there is a persistent problem, bacteria can become resistant to antibiotics. Bacteria such as *Clostridium difficile*, *Vancomycin-resistant enterococcus*, *Methicillin-resistant Staphylococcus aureus* and *Carbapenem-resistant Enterobacteriaceae* have developed resistance to antibiotics caused by inappropriate use and unnecessary prescriptions. When the patients take antibiotics, the susceptible bacteria are killed but the bacteria that remain have created resistance to antibiotics. For example, the antibiotic Streptomycin attacks bacteria by blocking protein synthesis, if this antibiotic is abused or overused it will cause a small-scale natural selection of resistant bacterium to mutate its messenger RNA (mRNA) to create resistance to Streptomycin. The purpose of this project is to analyze the reduction of efficiency in antibiotics due to the overuse of antibiotics and how bacteria eventually mutate to create resistance. The project will be specifically focused on Streptomycin and how *Mycobacterium tuberculosis* targeted by it mutates its mRNA. To evaluate the antibiotic resistance, mutations in CPNT_MYCTU were evaluated and modeled using Swiss Protein Model.

QUANTIFYING THE LIABILITY OF SELECTED POINT MUTATIONS IN THE HBB GENE REGARDING BETA THALASSEMIA

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Hemoglobin is an iron-rich protein in red blood cells that carries oxygen to all parts of the body. However, a single point mutation can throw off the balance of this carefully orchestrated system. The Hemoglobin subunit beta is a gene that encodes for two of the four subunits of hemoglobin. When the gene is faulty it is known for causing a disease in which there is a disparity in proportions of beta and alpha hemoglobin subunits. Beta Thalassaemia is a recessively inherited blood disorder. When someone suffers from thalassaemia, your body makes less hemoglobin than normal, or the alpha subunits can even form agglomerates and further alter oxygen transport. In order to understand how liable are the mutations that cause this disease a protocol was designed to assess the damage. For this reason, SIFT PROVEAN was used to quantify how responsible were each point mutations that are known for causing the disorder. Then the protein was modeled and structurally studied with and without the mutations. The results revealed that all four evaluated mutations were deleterious and most likely cause problems in oxygen docking by steric hindrance.

STUDING THE APOE E4 GENE AND ITS RISK OF DEVELOPING ALZHEIMERS IN PUERTO RICO

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Alzheimer's Disease (AD) is a neurodegenerative disease that causes memory lost and cognitive impairment. The APOE (Aerial Port of Embarkation) gene has been studied in detail due to its relation to AD. APOE has 3 major allelic variants, e2, e3 and e4. The e4 alleles frequency is around 10-14% in Hispanic and Caucasian and around a 20% in African-Americans. Carriage of the APOE e4 allele generally increases the risk of AD. The e2 allele unlike the e4 exerts a protective effect against Alzheimer's. The aim of our research is to study the presence of the APOE e4 gene at Puerto Rican patients with Alzheimer's. The APOE is the gene responsible for AD. Information for therapeutic approaches will be revised. The research will be conducted through a questionnaire that will provide information about Alzheimer's and the incidence of the APOE e4 gene. The APOE gene and its properties have been a promising target for therapy drug developments against AD. Studied genes will lead to a better understanding and extra information on the role of genetics in Alzheimer's.

EVALUATING THE SUSCEPTIBILITY AND SEVERITY OF POINT MUTATIONS IN THE APP GENE CAUSING CEREBRAL AMYLOID ANGIOPATHY

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In the United States cerebrovascular disease is the fifth most common cause of death. Cerebral amyloid angiopathy (CAA) is caused by the deposition of amyloid- β A4 peptides ($A\beta$), which is the breakdown of a protein called amyloid precursor protein (APP), in blood vessels of the brain. The gene that produces the amyloid precursor proteins is also called APP. $A\beta$ is deposited mainly in the vessel walls of small and medium sized arteries in the cerebral cortex, or the outer part of the brain. These amyloid plaques replace smooth muscle fibers around the arteries, which cause the vessels to become fragile and susceptible to breakage, leading to cerebral hemorrhages. The disease may cause the obstruction of blood flow and, in turn, causes dementia, ischemic strokes, and seizures. The purpose of this project is to evaluate how damaging selected point mutations of the APP protein can be, how they cause CAA and the severity of this disease. To accomplish this, the original template for the APP protein was searched for Uniprot, as well as the point mutations related to CAA. Then, the original template of the protein was manually mutated and tested for liability using SIFT PROVEAN. Finally, some mutations were chosen to be modeled on Swiss Protein Model. The results showed that almost three-quarters of the point mutations chosen were deleterious and the mean PROVEAN score was -4.48: a deleterious score. The mutated models were assessed, the overall structure was found to be altered by steric factors.

GENE SELECTIVITY OF ONCOGENIC HPV TYPES IN LYSOGENESIS

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One of the factors that make women prone to cervical cancer is infection with high risk Human Papillomavirus. HPV is an oncogenic virus and it is the most common sexually transmitted disease. High-risk HPV types, such as HPV type 16 and 18 are associated with malignant genital cancers in humans. During the lysogenic cycle the virus integrates its DNA to a host cell, interrupting the genes that control the proliferation and growth of the cell. It is highly probable that the Human Papillomavirus has a selectivity for genes involved in transcriptional processes and apoptosis such as the p53 gene and polymorphic genes of the major histocompatibility complex (MHC). MHC is a group of genes that code for proteins found in the surfaces of cells that help the immune system recognize foreign substances while the p53 gene acts as a tumor suppressor. To confirm or discard this hypothesis, the original and mutated gene sequences were compared using BLAST to address a pattern of selectivity.

GENE COMPARISON OF NEMASTOTELLA VECTENSIS AND ANOLIS CRISTATELLUS

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The *Nemastotella vectensis* is a type of sea creature of the Phylum Cnidaria, considered a really attractive model among the nonbilaterian animals. The cnidarians are animals with ectodermal and endodermal tissue which demonstrated the understanding of the evolution of regenerative science. Among millions of animals, this tiny sea creature is known to “hold the key to regenerative medicine” since it has the capability of regeneration. As well as *Nemastotella Vectensis*, the *Anolis cristatellus*, which is the common type of lizards, also known as the common Puerto Rican anole, also has the capability of regenerating its body. This species belongs to the Polychrotidae family of reptiles. The purpose of this investigation is to compare genes in animals with the ability to regenerate their bodies and gain more knowledge about their specific functions. The blast program will be used to compare both sequences of genes WNT1 for the *Anolis carolinensis* and WNT7 for the *Nemastotella vectensis*. Previous studies have showed that both of these genes participate in the regeneration process of these two animals. It is expected that this study will present sufficient compatibility between the genes, making them able to be used in regeneration for other animals. We hypothesize that the data can apply to the regenerative science field.

DUBIN-JOHNSON: CHANGES IN MUTATED GENE ABCC2

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Dubin- Johnson Syndrome (DJS) is common in Iranian and Moroccan Jews living in Israel. Jaundice, which is the yellowing of the skin and eyes, is a very characteristic symptom of this illness. This symptom worsens when the liver stress is induced by alcohol, birth control pills, infection, etc. This syndrome presents an autosomal recessive pattern, in which the person inherits two mutated genes, one from each parent. This is caused by changes in the gene ABCC2, which has more than 40 mutations associated with Dubin-Johnson Syndrome. This gene codifies for the Multidrug Resistance Protein 2 (MRP2), a protein associated with hepatobiliary excretion. This protein is primarily found within the outer membrane that surrounds cells in the liver, with smaller amounts in the kidneys, intestine, and placenta. The mutations that lead to DBJ in ABCC2, cause a production of its protein with reduced or absent activity, meaning it cannot effectively transport substances out of cells. For this reason, the purpose of this investigation is to study five of the most common point mutations associated with DJS in order to determine how the nature of the point mutations is related to the severity of symptoms by affected protein functionality. In order to complete this objective, PROVEAN SIFT was used to measure if the protein would tolerate the mutations. To assess the structural changes in the protein, SWISS Protein Model was used. With these results, the structural differences were assessed and correlated with the symptoms.

GENOTOXICITY CAUSED BY FRIED FOODS AND FAILURE OF GLUTATHIONE SYNTHASE

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There are approximately 2 million deaths related to fast foods per year. For their convenience, some people have a daily diet comprised by 'fast-foods' and others eat them sporadically. They can bring many dangers to the body, the most common being obesity, but they are also able to cause mutations in the proteins that are related to the control of cell growth and proliferation. This being so due to glycinamide, a known genotoxic compound. The glycinamide is a metabolic byproduct of acrylamide, which is produced when amino acids and sugars found on foods are heated at high temperatures. Regardless, humans have found metabolic pathways to avoid this adverse effect of fried foods. Glutathione is a non-peptide thiol that resides in the intracellular fluid where it completes an array of functions. One of these functions include reducing oxidative stress and detoxification. This thiol is produced by Glutathione Synthase. Alterations to the gene that codifies for this protein, can have pivotal roles in the development of cancer. For this reason, selected point mutations were evaluated for their liability in causing deleterious changes in Glutathione synthase. To measure the anomaly, SIFT PROVEAN was used to obtain these values. The protein was modeled to evaluate the tridimensional structure and how the point mutations affect spatial arrangement.

POINT MUTATIONS IN THE SLC2A2 GENE AFFECTING TRANSMEMBRANAL ATTACHMENT OF GLUT 2

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Diabetes has affected 422 million diagnosed people in the world. Puerto Rico represents the second place worldwide with the highest incidence in diabetes. This has been a problem concerning most of the island's inhabitants and will keep rising if something isn't done about it. This condition causes the third most disease related deaths in the island. It is caused by cells rejecting insulin intake or by the pancreas not providing cells with the necessary insulin to be able to convert glucose into energy. The gene SLC2A2 codes for a protein known as GLUT 2, a facilitative glucose transporter. This protein has many functions, such as the transportation of glucose in the blood stream and, most importantly, it functions as a glucose sensor in the blood. Damage to the gene sequence responsible for coding GLUT 2, can cause abnormal levels of glucose and accumulation of glycogen in the liver. It has been associated with causing alteration in glucose level conditions such as Fanconi Bickel syndrome, caused by a mutation that lowers the glucose levels in the blood. The purpose of this research is to find if one of these point mutations has a correlation with the development of diabetes through its disruption in GLUT 2 functioning of protein attachment or docking. Genomic data bases (Uniprot, Ensemble, NCBI) were used to have a further understanding of GLUT 2 and its amino acid sequence. The online web tool SIFT PROVEAN was used in order to quantify how liable the mutations were in the protein malfunction. Swiss Protein Model was used for the modeling of Glut 2 when affected with by three selected point mutations.

ABSTRACTS ***NEUROSCIENCES***

FALSE MEMORIES: INDICATORY TEST & EFFECTS IN BEHAVIOR

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Something that most people don't recognize is just how common False Memory Syndrome really is. False memories are memories of events that your brain makes up when it never actually occurred. The most common cause is that it can be formed from past childhood abuse or any dramatic trauma. Moreover, patients that suffer from False Memory don't notice the effect of the syndrome or won't accept it. Also, there is not a trustworthy method or test in order to diagnose it. Therefore, it is crucial to understand false memories, so an easy diagnosing method can be designed where it could simplify the process of diagnosing False Memories. Furthermore, a cognition test designed in order to diagnoses patient of False Memory Syndrome. The test was provided to a psychological clinic where patients will take the test. The test consists of a list of 20 random words that were given to the patients of the clinic. Consequently, the people that wrote words that were not at the list but had a correlation to one of the 20 random words, were considered to have False Memory. Throughout and after the test, the behavior of the patients was monitored, as well as their pressure. According to the results obtained, then a possible treatment for it will be theorized.

THE EFFECTS OF CHANGE IN CONCENTRATION OF SEROTONIN IN BIPOLAR DISORDER

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Bipolar disorder (BD) has four subtypes, bipolar disorder 1 (BD1), bipolar disorder 2 (BD2), cyclothymia, and bipolar disorder not categorized. The four bipolar disorders are estimated to affect 4.4% of the population in the United States, with 1.0% of them being BD1 and BD2. BD is a brain disorder that causes severe unusual shifts in mood, periods of depression, activity levels, and the ability to do daily tasks. This brain disorder affects mainly the parietal lobe, causing the shift in mood resulting in problems with relationships and social interactions. Most medications for BD are mood stabilizers that are known to cause tremors, polyuria, polydipsia, weight gain, dyscoordination, acne, and edema. Previous works have implicated that low levels of serotonin in the brain causes psychopathology problems. Therefore, this project analyzes data that can help find an alternative treatment for BD by elevating serotonin levels in the parietal lobe. Moreover, the parietal lobe was coded and modeled to study and plot the effects that a change in serotonin levels will affect the BD in the parietal lobe; then it was compared with a parietal lobe with low levels of serotonin, and a healthy unchanged parietal lobe. The models were built using "Simbrain" to collect all the necessary data from the simulations, it was then plotted to be statistically analyzed and compared. The model was built taking into consideration the anatomy and physiology of the parietal lobe. Furthermore, neurological complications were taken into consideration in the process of interpreting the data.

EFFECTIVITY OF TREATMENTS FOR RANGING SEVERITIES OF PEDIATRIC AUTOIMMUNE NEUROPSYCHIATRIC DISORDERS ASSOCIATED WITH STREPTOCOCCAL INFECTION (PANDAS) IN CHILDREN

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PANDAS, which most often targets children, originally starts simply as a strep throat infection and then branches into a sudden onset of neuropsychiatric disorders, including tics, convulsions, among others. The connection between the virus and said neurological impact lies in strep throat's cell mimicry. As these bacteria assimilate brain cells, the body is unable to differentiate between them and authentic cells, leading to an autoimmune disorder causing neurological damage. In most cases, children with PANDAS are undiagnosed, treated instead with medications specific to their tics, compulsive tendencies, and other behavioral issues. Moreover, many professionals deny the existence of PANDAS, and brush off the correlation as a simple "coincidence". Nevertheless, multiple studies show the sudden changes in behavior immediately after a strep throat infection. Treatments for PANDAS hold great variance, some focusing on the eradication of bacteria and others on therapeutic measures for the onset of neuropsychiatric changes. Nonetheless, few treatments offer neurological repair to the areas affected by the autoimmune response, while also implementing proper brain cell-bacteria differentiation. Many of the treatments available vary in intensity, in accordance with the severity of the child's symptoms. Four of the main treatments offered to patients include antibiotics, steroids, plasmapheresis, and intravenous immunoglobulin (IVIG). Using the brain-simulation program *Simbrain*, a neural network will be designed to be targeted by an autoimmune response caused by the cells' crossing over. We will test different levels of damage, resulting in varying severities. Subsequently, we will implement all four treatments on the different severities, weighing in their pros and cons, and including their side effects.

QUANTIFICATION OF THE NEURODEGENERATION ASSOCIATED WITH AGING

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From the view of the naked eye, it is possible to tell how old a person is due to the lost in elasticity of their skin and general signs of aging. All the different types of tissues start to lack integrity and functionality. As we age, it is normal to begin to lose certain cognitive and motor abilities as well. This being because one of the tissues affected by years of constant stimulation and excitability is nervous tissue. Neurons are the basic unit of nervous system, and in contrast to many other cells, most of them lack the capability of mitosis due to the absence of centrioles in the cell. The purpose of this investigation is to prove or dismiss the possibility of there being a direct correlation between aging and loss of nervous tissue causing an array of physiological and behavioral changes. Methods followed: look for images of the human brain such as magnetic resonance images. The images are from people with ages from 20 years to 89 years. The images were then isolated to focus the image on the brain. Quantitative analysis was followed using the program of Cell profiler, which detects the area of the image that is covered by tissue. The values were then graphed to establish the rate of progression. As a qualitative analysis, the affected areas were evaluated and correlated to the loss of functionality, memory and motor skills.

INDICATOR TELL-A-TALE GAME: CLINICAL DEPRESSION EFFECT IN ACADEMIC PERFORMANCES

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About 3.1 million adolescents and 16.2 million adults suffer from clinical depression in the United States. Clinical depression is the most severe type of depression there is, defined as a major depressive disorder. Moreover, the most common symptoms for clinical depression are persistent sad moods and feelings, loss of interest, difficulty concentrating, among others. Currently, in the United States, more people are being diagnosed with clinical depression yearly, most of them being young adults or adolescent, which means that clinical depression will change their overall performance in many activities, but especially in their academic performance. Therefore, detecting early on clinical depression in young adults and adolescent is important to their academic performance will not suffer as well. In order to accomplish the detection of clinical depression, a tell-a-tale game was designed in order to be attractive to the group of the age of the young adults and adolescent. The game consists of asking specific questions for different scenarios, where the player will have options to choose what will happen, applying the butterfly effect. Each answer and action the player chooses will be taken into consideration to determine if the player has clinical depression. If the player is considered to have clinical depression, the game will follow with different kinds of questions for those who may have clinical depression. Once the player is identified with clinical depression their academic performance will be monitored carefully, looking into their past academic reports. Then, the collected data will be compared with their past and current performance in order to establish a correlation between the players' academic performance and clinical depression.

DEVELOPING A TREATMENT WITH TRANSCRANIAL BRAIN STIMULATION (TBS) TO TRIGGER NEURONAL REGENERATION AFTER A TRAUMATIC BRAIN INJURY (TBI) IN THE NEOCORTEX

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Transcranial brain stimulation (TMS) is an FDA approved non-invasive treatment for patients with unipolar depression. In 2014, a theoretical research paper was published by J Head Trauma Rehabil, that utilized pre-existing research to discuss the possible role of TMS to treat traumatic brain injuries (TBI). Since then, the necessity for data is still very eminent. This research seeks to obtain information on TMS as a possible treatment for TBI's by triggering cell brains axonal regeneration. Utilizing commands of a software itself, a simulation was developed to study the effects of TMS on damaged axons. Specifically, the TBI is a controlled cortical impact caused by a pneumatic impactor. The treatment was inflicted on the brain cells during a period of five days a week for six weeks (similar to what the FDA specifies for treating depression patients), after this, the effects were studied for two weeks post-treatment. This research wonders on the possibility of adopting magnetic stimulation as a direct treatment for victims of TBI.

DISSOCIATIVE IDENTITY DISORDER: BRAIN ACTIVITY AND EFFECTS

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Dissociative Identity Disorder (DID) is a very misunderstood mental condition that affects less than 200,000 people in the United States in a year. DID is a condition in which a person has two or more personalities. Its symptoms may vary between patients, but the most common are hallucinations, suicidal tendencies, drug abuse, mood swings, high levels of anxiety, memory oppression, among others. Around 70% of the people suffering from this disorder have admitted to at least thinking of taking their own life. Therefore, an intervention is crucial, not receiving medical attention can cause strong and negative repercussions in the patient's development and may ultimately end in the patient's death. Therefore, theoretically stating what parts of the brain DID affects, and identifying the best treatments for it is crucial for all of those who suffer from DID. In order to state this, first, the symptoms were identified and researched in what part of the brain they primarily manifest. Later, the chosen region was analyzed to identify what are the type of neurons that are the most abundant in that area. Then, after researching different types of therapeutic treatments, one will be chosen according to the identified areas of the brain in which it will serve as a standard or parting way for treatment. Keeping in mind that every patient is different and what works for one may not work for the other, that will serve as a starting place for identifying a correct treatment for DID.

INFORMATIVE APPLICATION OF NEURODEGENERATIVE DISEASE SYMPTOMS: EARLY ONSET ALZHEIMER'S DISEASE

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Today, 6.5 million Americans suffer from common neurodegenerative diseases. These diseases affect brain cells by deteriorating them until they reach eventually their death. An example of these neurodegenerative diseases is Alzheimer's Disease (AD), which is one of the most common causes of dementia, and that affects the talking, writing, eating, and thinking of the patient. AD can also lead to death if unattended or the can result in having permanent nurse care. Moreover, AD affects mainly people of old age and there are rare cases where it is reported to be inherited. Because of this, informing and teaching family members what to do if another familiar member is diagnosed with the disease is very important for the warfare of the patient and the family members. Therefore, the detection and understanding of AD symptoms information will be delivered through an informative application. Furthermore, the application will have various interactive options where patients and family members can talk to specialists. Moreover, a draft of the app was made, with the layout of the home page, and the design of how the information will be aligned. Consequently, after the app is developed, users will have an option where they can give feedback of experience in the app so it can be continually modified based on past experiences.

THE REACTION OF FLUOXETINE ON A POST-TRAUMATIC STRESS AFFECTED MODEL

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Post-traumatic stress disorder (PTSD) is a mental health condition that is triggered by extreme events, these can either be by experiencing it or witnessing it. PTSD symptoms are reexperiencing the trauma through mostly flashbacks, and nightmares. It is a normality to feel fear after a traumatic situation, yet most people recover from the initial symptoms. People experiencing PTSD will not recover from the normal symptoms and most of the time can feel frighten in times when they aren't exposed to any danger, this brings various downfalls in their day to day life. PTSD can be classified into two, these include, chronic or acute. It can start affecting a person's mental health from a month since the experience occurred, but in some cases, it takes up to a year to show any signs of PTSD symptoms. Like various diseases, how PTSD affects a person may vary. Some people recover relatively quickly while others may be suffering for various years. In order to treat PTSD, there are medications and psychotherapy. In relation to medication, various antidepressants can be given to the patient to help relieve symptoms, but there is no current absolute cure for PTSD or its symptoms. Through computer simulations of neural networks, three models would be made (control, PTSD affected, PTSD treated). These models were built using "Simbrain" to collect all the necessary data from the simulations to see how antidepressants work in a simulated PTSD patient. The data was then plotted to be statistically analyzed and compared. All models were tested throughout a given period and conducted using different types of situations. All of the dissimilar aspects were compared and contrasted.

DECISION MAKING INFLUENCED BY ANXIETY: COMPUTER MODEL

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Decision making is the act or process of deciding in any situation. Every human experience a situation where they have to take a decision, that may be influenced by others factor. One of the most common factors that affect your decision making is anxiety that can lead to poor and irrational decisions. Anxiety is an expected part of life that does not go away and can get worse over time. Past research has proven that the prefrontal cortex (PFC) in the frontal lobe is that part of the brain responsible for decision making, planning complex, cognitive behavior, personality expression, and moderating social behavior. Moreover, the PFC was coded and modeled to study the effects of anxiety in decision making; then it was compared with a healthy brain. The models were built using "Simbrain" to collect all the necessary data from the simulations, it was then plotted to be statistically analyzed and compared. The model was built taking into consideration the anatomy and physiology of the PFC. Furthermore, neurological complications were taken into consideration in the process of interpreting the data. Furthermore, understanding what happened in the PFC while making decisions with and without anxiety will help find a correlation between them, and find a way to help improve decision making.

AMYOTROPHIC LATERAL SCLEROSIS: THE DEATH OF MOVEMENT

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Amyotrophic Lateral Sclerosis (ALS) was first diagnosed in 1869 by French neurologist Jean-Martin Charcot, however, it wasn't until 1939 that the disease was brought to light when Lou Gehrig brought international attention to this disease. ALS is characterized by the progressive degeneration of motor neurons, which are in charge of motor movement in our body. ALS degenerate the upper motor neurons (UMN), located in Motor Cortex, and the lowers motor neurons (LMN), located in the Brainstem and Spinal Cord. Moreover, ALS most common symptoms are trouble walking, muscle weakness, slurred speech, muscle cramps, and muscle twitching. However, this disease gets gradually worse and can cause muscle atrophy, paralysis, and trouble breathing. Familial ALS are 5%-10% of cases, caused by the gene SOD1 or SOD2, and Sporadic ALS are 90%-95% of cases of ALS, which the cause is currently unknown. Therefore, this project analyzes data that can help understand how ALS spreads in the Motor Cortex, Brainstem, and Spinal cord. Moreover, the Motor Cortex, Brainstem, and the Spinal cord was coded and modeled to study and plot the effects of ALS; then it was compared with a healthy brain. The models were built using "Simbrain" to collect all the necessary data from the simulations, it was then plotted to be statistically analyzed and compared. The model was built taking into consideration the anatomy and physiology of the parietal lobe. Furthermore, neurological complications were taken into consideration in the process of interpreting the data. Finally, ALS degeneration was successfully recreated and modeled in plots that numerically represent the degradative pattern.

CHILDHOOD APRAXIA OF SPEECH: THE IMPORTANCE OF PHYSICAL THERAPY

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Childhood Apraxia of Speech (CAS) is a neurological disorder and speech impediment that currently affects 1 of 10 in 1000 speech-impaired preschoolers in the United States. CAS is frequently missed diagnosed due to its rarity. The main symptoms of CAS are the loss of the ability to execute or carry out skilled motor movements and gestures. Moreover, CAS is said to be localized principally in the parietal lobe, where the brain sends out messages to the motor speech muscles, but cannot execute the action correctly, despite having the physical ability to do so. The current treatment for CAS is various types of physical stimulation of speech, sounds, and motor movements through physical therapy. Therefore, understanding what happens to the brain with CAS untreated is essential for theorizing a possible cause. Moreover, the parietal lobe was coded and modeled to study and plot the effects that physical therapy has in a brain affected by CAS. The models were built using "Simbrain" to collect all the necessary data from the simulations, it was then plotted to be statistically analyzed and compared. The model was built taking into consideration the anatomy and physiology of the parietal lobe. Furthermore, a speech therapist who is familiarized with this condition was consulted to make a possible theory of the effect of CAS in a child's brain.

REGENERATION CAPACITIES: COMPARING AND IDENTIFYING THE GENE THAT GIVES STARFISH AND SEA CUCUMBERS THE CAPACITY TO REGENERATE

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They are only a handful of animals that have the capacity to regenerate the vast amount of an organ, two of them are the starfish and the sea cucumbers. First of all, starfish and sea cucumbers are both from the echinoderms (animals with bilateral symmetry) family and share the capacity to regenerate parts of the body. Sea cucumbers may regenerate their guts, which they spill to defend themselves since its guts are toxic to other animals. Meanwhile, starfish have the capacity to regenerate their damaged extremities. Learning how to locate and manipulate the genetic code of these animals are essential in the understanding of the regeneration process in animals. Therefore, the genetic code of the sea cucumber and the starfish were analyzed to pinpoint the gene that codes the essentials components that makes the regeneration process. The similarities of both of the genes were also analyzed to get a further understanding of the regenerative process. Furthermore, after the analysis, it is believed that the Homeotic gene, one that regulates the development of anatomical structures in various organisms, has to do with this process of regeneration. These genes encode proteins called transcription factors that direct cells differentiation to form a part of the body, which may lead to regeneration. Therefore, knowing a possible gene that may be the principal cause of regeneration in echinoderms, it can be manipulated using biotechnology for various regeneration uses in other animals or humans.

ABSTRACTS
CREATIVE WRITING-SCIENTIFIC RESEARCH

A COMPARATIVE OVERVIEW OF CREATIVE WRITING AND SCIENTIFIC RESEARCH

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Creative Writing is mostly composed by these elements: characters, setting, theme, dialogue and style. Writers, for the most part, must go through an investigating process by which they look for the information pertinent to their story, then, they decide how to use that information to get the story going on. On the other part, scientific creativity is an ability that helps scientists reduce a search space and solve their research problems through the methodological process. This research paper seeks to find those two elements (creative writing and scientific creativity) in the works of two famous philosophers and scientists: René Descartes and Plato. The data will be qualitative, that means no numbers will represent the data recollected in the research. The data instead, will be shown by a textual quotation of the works (of the philosophers) and a description saying why or why not there's use of creative writing and scientific creativity.

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