

**Fahim Ahmed**

***A Self-Driving Toy Car Using Deep Learning***

**Faculty Mentor:** Professor Benito Mendoza, PhD

**Department:** Computer Engineering Technology

Self-driving cars technology is one of the hottest areas of research and business. In the last few years, we have seen an enormous evolution in the area with cars from Uber, Tesla, Waymo; what seemed like a science fiction, some years before, now seems more like something that is soon to become part of life. Different technological advancements, in both hardware (LIDAR sensors, cameras, GPS, ultrasonic sensors) and software (advanced algorithms for fusion and analysis of data in real time, making the autopilot functionality) are making Self-driving cars are now a reality. For the later, Artificial Intelligence, and in particular two its subfields Machine Learning and Deep Learning have contributed to developing the latest generation of algorithms for the five essential steps to form the self-driving pipeline Localization, Perception, Prediction, Planning, and Control. Although this technology sounds relatively sophisticated, it is not far out of reach for the public. Recently, platforms such as Amazon DeepRacer or DonkeyCar.com are available to the public. These platforms allow to build and train scale model cars 1/10th or 1/18th. These small, toy-like cars have a mounted camera and an onboard computer module. The computer module runs self-driving pilot algorithms, neural network, trained by the user, which can drive itself along a track. These platforms provide developers with the opportunity to go hands-on with advanced techniques used on training real self-driving cars, such as reinforcement learning. However, the cost of the hardware goes from \$300 to \$400 and the learning, depending on how much assembly is required. The goal of this project is to explore current developments of Open Source hardware and software to build a low-cost platform for autonomous driving scale model cars (car chassis/framework and software). This platform should allow, for example, other students with low budget enter into the world of Deep Learning, during self-driving cars, and self-driving cars racing competitions.

**Shital B K**

***Browsing worldwide news in the web application***

**Faculty Mentor:** Professor Marcos Pinto

**Department:** Computer Systems Technology

The purpose of the project was to build a worldwide news browsing web application using different programming language and IDE (Integrated Development Environment) which is a software used for coding in different programming languages. The other tools used for the project was MAMP server which is an application that allows you to have access to the local PHP server and MYSQL server. The PHP server allows to read and execute the PHP programming language and the MYSQL server is used to store the data in the MYSQL database. The data of all the countries were collected and stored in the database server and the data was retrieved by using PHP programming language. To create the design and interface of the page HTML and CSS were used. HTML is a hypertext markup language and CSS stand for Cascading Stylesheet. Once, the user selects the dropdown list in the webpage according to the region the title and the country of the newspaper is displayed in the page. After that the user can select a newspaper they want to read and the page redirects to the newspaper website. The project helped me to learn about PHP programming and host the web application in the local web server. The combination of the database and programming language was also the part to be learned in the project for creating the application.

**Marlon Cameron Jr.**

***Application for CST Faculty Spring 2019***

**Faculty Mentor:** Professor Marcos Pinto

**Department:** Computer Systems Technology

Near the end of every semester, students are given the opportunity to register early for classes to be taken during their upcoming semester(s); though, when they are applying for these classes, it is difficult to select a class due to the lack of the associated faculty members' names. Throughout the development of the application, the programming language HTML (Hyper Text Markup Language) in addition to JSP (JavaScript) was used to develop a User Interface application. The HTML code was built with a form element which had the action equal to a server-side program and used a hard-coded select element entailing faculty information found in a given file `cst_faculty_names_only.csv`; and a csv file containing all information – `cst_faculty.csv`, being both faculty names and associated courses, was read and displayed for each faculty member. A submit button was added to the form. In the future we hope to complete this application and possibly bring it before a board to contribute toward bettering the present issue.

**Kelvin Chabla**

***Artificial Neural Network***

**Faculty Mentor:** Professor Marcos Pinto

**Department:** Computer Systems Technology

A company's stock value is what's considered the most value to its owners and investors. If a stock value drops down, it will make investors unlikely to sell their stock at that point in time, which can affect the way economy works in general. Meaning, stock prices can affect how daily prices are to the general public. This research project focuses on a software program call NeurophStudio that allows the user to load up a company's previous stock value history and using that data, are able to make an accurate prediction of whether or not the stock prices will rise or fall. Artificial Neural Network (ANN) is a Java implementation NeurophStudio will use to show the results of being able to predict a company's stock value, with Maersk (shipping company) being the prime subject to this experiment. With this research program, companies can use NeurophStudio as a way to predict how and why their stock values react the way it does and use it to their advantage.

**Mike Charles**

***Security Management Study in IoT***

**Faculty Mentor:** Professor Yu Wang

**Department:** Computer Engineering Technology

Technology as we know it today is filled with many mysteries pertaining to how far it can go. With the soon to come emergence of 5G, many believe this will be the furthest leap forward technology has ever taken. The Internet of Things (IoT) requires several methods in insure the security of all devices that are linked within it. We utilize different model types to best figure out which mean of security implementation compliments each other and ultimately find the perfect model as a result. The different sectors that are implicated need to be taken into consideration as well. Education, energy, law enforcement and even medicine have a stake in the evolution of IoT as well. Again, we visit model layers, different attack types and various roles that we as a society play to ensure the best security possible for our devices.

**Soulemayne Diakite**

***Cloud Based-Object Detection in Computer Vision***

**Faculty Mentor:** Professor Xiaohai Li

**Department:** Computer Engineering Technology

The recognition of a real-time object in interest has become a central problem for many industries, such as navigation, security, etc. In this research, we focused on cloud-based object detection in computer vision to train a model to recognize cars in real-time. We used Stanford's cars databases, which consists of over 16,000 cars divided evenly among 2 set, train\_set, and test\_set. We stored these datasets in Amazon Web Service (aws) 's Simple Storage Service (Amazon s3) and used Amazon SagerMaker to apply eXtreme Gradient Boosting (XGBoost).

**Ibeth Erazo**

***Complete Dentures and Diabetes Correlation***

**Faculty Mentor:** Professor Avis Smith

**Department:** Restorative Dentistry

Diabetes is one of the most frequent pathologies that dentists encounter, due to its high prevalence worldwide. The aim of this study is to present the correlation between diabetes and complete dentures wear, intending to emphasize the importance of proper control and denture adaptation to oral environment for this type of patients. Within the sphere of the dental office, one of the main complications to consider in this type of patient is periodontal disease, which is their most frequent complication. Other important oral manifestations considered in the research are fungal infections, xerostomia, and burning mouth syndrome. It is common for dentist to recommend wear removable dentures for this type of patient when it comes to their oral rehabilitation. However, their functional and qualitative limitations can still lead to oral lesions. This is important because it is known that diabetic patients suffer from delayed wound healing, and have major susceptibility to infections. A good manufacturing and hygiene of a denture is of great importance in order to avoid compromising the oral mucosa. Also, repeated use can cause denture lesions; leading to mastication inefficiency and patient's decreasing nutritional capacity. These lesions are more common when there is a poor oral hygiene. The dental treatment the type of diabetes suffered, the treatment given for the disease, and the glycemic control status factors should be known. In addition, the health professional's instructions are of great importance as well as removable dentures and patient's oral health monitoring and periodic assessments.

**Taranjit Kaur**

***Comparing SQL and NoSQL Database***

**Faculty Mentor:** Professor Elizabeth Milonas

**Department:** Computer Systems Technology

This research project presents the difference between a relational database management system (Oracle) and a non-relational (NoSQL) document-oriented database management system (MongoDB). The following features were compared for both the relational and non-relational database systems: importing data, creating tables, analyzing data integrity and restrictions, inserting values, and querying. The comparison included the importing of data from a text file into each of the database management systems. This task included the cleansing of the raw data file before importing the file. The raw data file included information related to computer books found in the City Tech library such as; library call numbers, author's name, book title, subtitle, publisher name, place, publishing date, and format. Once the data was imported into each database system, business reports were created for both systems. The tasks of importing, creating, inserting and querying were compared for both relational and non-relational database systems. The following is a comparison of these tasks.

**Eudes Lelaj**

***A Data Collection and Visualization System for Wireless Sensor Network Using Thingsboard***

**Faculty Mentor:** Professor Xinzhou Wei

**Department:** Electrical & Telecommunications Engineering Technology

Wireless sensor network (WSN) is a very important part of the Internet of Things (IoT). It is composed of several thousands of sensor nodes which are capable of sensing, actuating and relaying the collected information. The primary function of WSN is to obtain information from sensors and monitor environments. In recent years, many WSN applications have been developed. Particularly, in smart home or smart building applications, all sensors connected to WSN will collect data and subsequently forward them to a central device referred as WSN hub or gateway. These data could be saved locally and finally uploaded on cloud storage server like Blink or Arlo home security system. In this project, I will utilize the data collected by the current WSN system designed by mentor and create software components in an open source IoT platform, the Thingsboard, to analyze and visualize the data of WSN.

**Joseph Moise**

***Smart Cart Device***

**Faculty Mentor:** Professor Yu Wang

**Department:** Computer Engineering Technology

It is very difficult for a wheelchair user to travel and manage their luggage at the same time. Their hands are too busy maneuver the wheelchair and they are in an uncomfortable position. Therefore, it is important to build and device that can handle the luggage and follow the wheelchair at the same time. The technology we are going to use is the color tracking system by using the PIXY2 camera. In our case, we are going to perform with a small car and an object color. We also have to show that the smart car is able to follow the object.

**Jerry Neira**

***Blueprint for Designers***

**Faculty Mentor:** Professor Eli Neugeboren

**Department:** Communication Design

The goal of this project was to create a scientific method or blueprint guideline for beginning designers and creators to be able to work with their clients. From what I understand we as designers have rules: the, “do’s and don’ts” we learned to steer us in the right direction. There is not a standard method or workflow to start us off right. I wanted to create a guideline that will help creators in their work and work through obstacles many faces in this competitive field. Giving them a plan to follow, to help them succeed. Using the scientific method as a reference to build the process for designers. This process was built to find a way to help designers to be able to produce effective and successful work. Researching important characteristics of design such as color theory, communication, type, digital, traditional, functional and originality. My mentor and I completed the blueprint with success. Now with a experienced professional designer and illustrator with myself a beginning designer running our works through the new blueprint the experiment began. I used two pieces of work for the experiment to test out the blueprint. A booklet I designed and a project my mentor designed to compare the process and outcomes of both design works using the new guideline I made. After going through the checklist, double-checking and running each other’s work through the experiment. I believe this blueprint will help benefit young designers to work well with clients and their designs.

**Ololade T. Owolabi & Siobhan Smith**

***Rockaway vs. Badore: Comparison of Building Designs Near Oceans***

**Faculty Mentor:** Professor Kenneth Conzelmann

**Department:** Architectural Technology

Throughout the world there are many cities located near ocean waters. Whether it is one of Japan's many islands, New Zealand's Mainland, the Netherlands, Alaska, the Caribbean or even the coast of Florida. These locations have one environmental issue in common: coastal Flooding. As a result, communities, city planners and designers are being forced to accept that, with the rising of sea levels, comes the need to reconsider and modify our approach and philosophy about building near ocean waters. For this research project, we've analyzed two locations, in two different parts of the world, impacted by ocean water: Rockaway, Queens and Lagos, Nigeria. We have attempted to address the problem of coastal flooding due to climate change and the rising of seawater levels by merging the knowledge we've obtained during our architectural studies with the research information that we've gathered here. Using the internet as our main source of information, we've collected data on past and current construction conventions and methods in both Rockaway and Lagos to help us prepare useful and effective strategies that can be incorporated into future development plans. With gathered research and formulated design strategies we aim to ultimately answer the question: Do we keep fighting back mother nature with resiliency, or do we accept it, retreat, and stop building in these areas? Or an educated bit of both?

**Erik Peregrina**

***Custom Made Low Cost Robot***

**Faculty Mentor:** Professor Andy Zhang

**Department:** Mechanical Engineering Technology

Robots were once the object of fantasy and science fiction. They were portrayed in literature and films as great marvels of technology that only the most advanced civilizations would have. The reality is that robots have been invented since the 1950's when the first manufacturing robot was created and used. Today robots come in all shapes and sizes and ranging in complexity. A design process of a robot is a combination of mechanical, electrical and computer engineering. Research was conducted to create a first-generation model of RC robot that would eventually be developed to the point of having a basic artificial intelligence. As a first model, the robot would have a sonar sensor that would act as a pair of eyes, and the program would have the robot move around in straight lines and avoid colliding with objects or walls by using a sonar sensor. When the robot is at a certain

distance, it would stop, check its surroundings with the help of a small servo motor that rotates between 0 and 180 degree angles, and go in the direction where it does not detect any obstructions.

**Youshmanie Sukraj, Alexandra Suero-Perez & Taline Ingram**

***Effect of Copper on Tetrahymena thermophile***

**Faculty Mentor:** Professor Ralph Alcendor

**Department:** Biological Sciences

Oxidative stress (OS) is induced by the presence of unstable molecules such as reactive oxygen species (ROS). High concentrations of these molecules have been shown to be involved in aging and many diseases. Tetrahymena thermophila are ciliated protozoans which are connected evolutionarily to other eukaryotes. They have been used to investigate the toxicity of several heavy metals, however; the effect of copper on OS genes has not been fully examined. Therefore, the purpose of this project was to examine the effect of copper on ROS regulation. We hypothesize that copper will induce OS and therefore induce OS genes. T. thermophila was exposed to various concentrations of copper (0.2 – 4 mM) followed by cell death, OS levels, and mRNA analysis. Results show a concentration- and time-dependent induction of cell death and OS. qPCR reaction showed mRNA levels of genes like glutathione (GSH), manganese superoxide dismutase (MnSOD), glutathione peroxidase 1 (GPX1) and thioredoxin 1 (TRX1) increased from 0.5 mM. Other genes like superoxide dismutase (SOD) and Cytochrome C(CYCS) mRNAs increased from 0.2 mM. These results suggest copper induction of OS may be responsible for the cell death pattern observed. Furthermore, OS genes may be involved in the regulation of ROS activity in these cells. The results also show how valuable studies using T. thermophila can be in the quest for completely understanding how best to combat toxic effect of ROS. This study can be potentially utilized to create supplements which may combat the production of free radicals.

**Luc Telemaque**

***Weather Resistant Media Player Looper***

**Faculty Mentor:** Professor Xiaohai Li

**Department:** Computer Engineering Technology

Digital signage provide vibrant eye-catching displays which can be seen by thousands of individuals at a time. These conditions are ideal for advertisers or government officials to get a message to civilians effectively. Virtual



advertisement reduce the need for hardcopies so they are more environmentally friendly. Furthermore they can provide sound, animation and can be read by more than one person at a time. The study engages in recreating such technology similar to those already being implemented in a fashion where they are able to withstand high temperatures and have new advertisements uploaded to them without prolonged interludes. This allows the marketer to deliver relevant information based on current events, season or weather. The ability to be updated in real-time and withstand harsh weather is detrimental for a media player to be effective and profitable

**Cheryl Thomas**

***Restorative Justice: Impacting Communities***

**Faculty Mentor:** Professor Joy Alessi

**Department:** Law And Paralegal Studies

Almost three million Americans are imprisoned in the United States., 724 per 100,000, at a cost of 80 billion dollars annually. Prison population is comprised largely of criminals between the age of 15 — 35, the age at which citizens are most productive. The economic cost alone is incentive enough to explore another viable option in the form of Restorative Justice. This paradigm seeks to bring perpetrators, victims and communities together with a view to repairing the harm caused by criminal behavior. Restorative Justice is only viable if all concerned are mutually willing to participate in the process. The impact of Restorative Justice is felt in the satisfaction that victims experience once they speak with the perpetrator; the impact on the community experienced in a greater sense of safety, increased number of productive citizens and whole families. The perpetrator benefits through forgiveness, acceptance and an opportunity to reenter the society which results in decreased recidivism. This research will explore the impact of Restorative Justice and the viability of replacing the current Retributive Justice paradigm which results in mass incarceration.