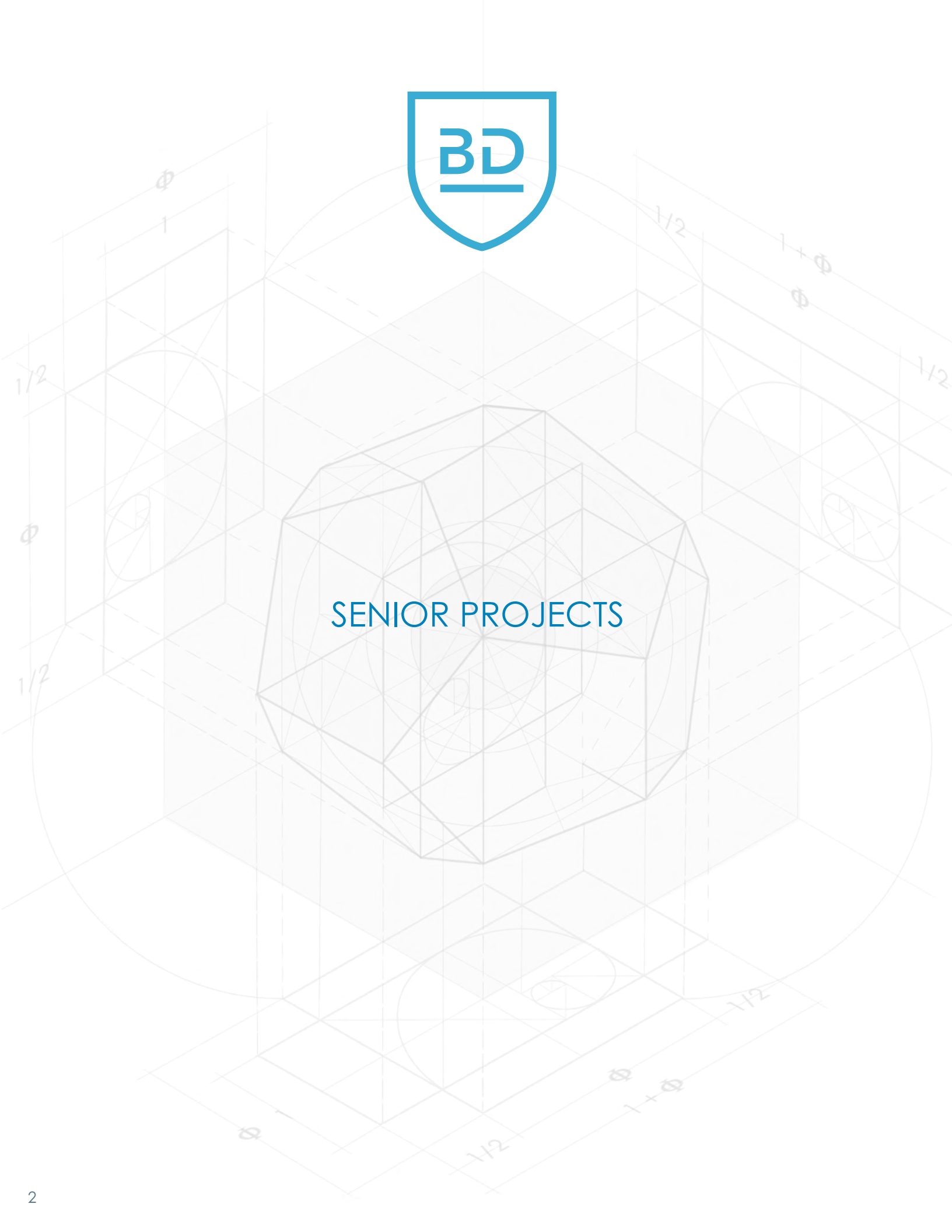
Senior Projects
2023–2024

BASIS SAN ANTONIO – SHAVANO CAMPUS



SENIOR PROJECTS

At this point in their senior year, BASIS Charter School students have completed a set of four BASIS Capstone classes to earn their BASIS Honors Diploma. In addition, many students are in the process of completing the College Board's AP Capstone Diploma™, a challenging, two-year sequence of AP Seminar™ and AP Research™, plus four other AP® Exams—all of which require extensive research, writing, and oral defense. The BASIS Diploma Senior Project marks the culmination of this hard work and perseverance.

Completed in the third trimester of a student's senior year, the Senior Project is unique, self-designed, and reflective of each student's varied academic interests and passions. Regardless of the discipline—business, art, humanities, science, engineering, social work, medicine, or law—each senior must develop and explore a research question. Creating an abstract that sets the tone of the research, participating seniors must submit a project proposal, and later, orally defend their methodologies.

Under the guidance of an external advisor who is a professional in their field, as well as a faculty advisor from their school, students dedicate 10–15 hours per week to the completion of their Senior Project. To document their journey, students post weekly blog entries about their experiences, successes, and challenges as they explore their guiding question. This journaling provides a unique viewpoint on the students' activities and adds a reflective layer to their research process.

Throughout the development of the Senior Project, BASIS Charter Schools support their seniors every step of the way. The project summaries in this publication clearly illustrate each senior's ability to apply the knowledge and intellectual curiosity they have acquired in the classroom to professional research methods. At the successful conclusion of this project, students are eligible for a BASIS Diploma with High Honors, the most distinguished accolade offered by BASIS Charter Schools.

Each member of the BASIS Charter Schools network commends our seniors for their dedication and motivation—not only for completing this Senior Project, but for their commitment to the BASIS Charter School Curriculum. Congratulations to them on this powerful achievement, and our best wishes as they move forward on their educational journey.

Carolyn McGarvey
Chief Executive Officer
BASIS Ed AZ, DC, LA

David Hubalik
Chief Executive Officer
BASIS Ed Texas

BASIS® CHARTER SCHOOLS

San Antonio SENIOR PROJECTS

Shavano Campus™

AVALON A.

ANALYZING HEALTH CAREER PATHWAYS AND EDUCATIONAL OPPORTUNITIES

SUMMARY: My project focuses on the process of becoming a healthcare provider/professional. Significant factors affecting these career pathways include ease of access to education as well as previous exposure to the subject. As an intern at Choezen Careers and Healthcare Training, I observed the possible educational pathways available to future healthcare professionals. I learned about entry level jobs that students can access after completing the programs offered at Choezen Careers. By learning about these pathways, as well as the vast array of careers in the healthcare field, I compiled into an educational brochure, making it easier for introduction to potentially interested students. In addition to first hand observations of the classroom environment, I learned from studies done on students outside of Choezen Careers in order to analyze educational requirements for different careers, as well as any potential barriers to accessing this education. It is important to know about the necessary steps it takes to achieve the career you want, as well as the requirements placed by the states for such an essential position. By analyzing educational requirements and barriers to such education, and creating and organizing information on available career opportunities, introduction to the healthcare field will be made easier.

• **BASIS ADVISOR:** Rajeswari Mani • **ON-SITE MENTOR:** LaKesha Hairston, MSN, BSN, RN
• **LOCATION:** Choezen Careers and Healthcare Training

FREDERIC A.

THE EXPLORATION OF COMPUTER SCIENCE THROUGH PYTHON

SUMMARY: Computer science is the study of computers and computing technologies. It encompasses a wide range of topics, including algorithms, programming languages, data structures, artificial intelligence, and more. Computer science stands as a multifaceted discipline at the forefront of technological advancements, with Python emerging as a versatile programming language widely employed in various applications. The internship will partake in Austin within my uncle's business ASM Logic LLC. The focus of my project was working on certain texts of code where I ensure that none of these errors occur, and if they do occur, hastily addressing them. I collaborated closely with ASM Logic LLC, where we closely worked with various other companies to digitally transform any transaction made with the company. In doing so, the CEO of said company will have access to any particular transaction at his or her fingertip. My focus enhanced database solutions using Python. I optimized various code segments to improve program execution speed, ultimately ensuring a quicker product turnaround for the company. My role particularly was to analyze the texts of code my uncle developed and scan them for any mistakes and discrepancies and correct them to ensure the website runs at maximum capacity. I don't plan on pursuing the field in the future, however I understand that computer science is at the base of any field in the workforce and I can use these skills in my future profession as an engineer.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Yves Zouzouambe • **LOCATION:** Asm Logic LLC

MITHUN B.

BEHAVIORAL IMPACT ON PHISHING

SUMMARY: In contemporary society, everything is digitalized. From ordering food to inter-account transfers of funds, everything can be done through technology. This has made people's lives much easier because possessing access to a lot of information and communication has become more expansive, with society as the beneficiary. However, beneath this shimmering exterior lies a rotten and parasitic core, overwhelmingly encompassed by hacking, as personal information is wealth, and thus criminals seek to extract our information and maliciously weaponize it against us. My senior project focused on phishing, which is a method cyber criminals use to obtain sensitive information such as credit card numbers, bank account credentials, etc from ordinary people. The research was conducted in person and virtually with William Pugh, Dr.B.A., an Associate Professor of Practice within the Information Systems and Cyber Security Department at UTSA. His expertise in the cybersecurity field and the precious resources I have at UTSA, as it is the best college in Texas for the cybersecurity field, allowed for a successful research project. In my project, I researched whether or not age plays a factor in phishing by surveying two groups (young adults and experienced teachers) through creating a survey and asking surveyors to rate the authenticity level of the provided emails. I used previous research studies to model my survey and analyze the theoretical models they used to interpret their data. The young adults were students around the age of 18–25, and I acquired this data set specifically from UTSA. The experienced teachers those over the age of 40, and I collected this data set from a BASIS school. The main goal of this research project was to figure out which age group is most likely to fall for phishing and what could be the potential cause for it.

• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Professor William Pugh, Dr.B.A • **LOCATION:** University of Texas at San Antonio - Department of Cyber Security

RYAN B.

BACKYARD BUTTERFLY GARDEN AND MONARCHS

SUMMARY: I made a garden in my backyard for my project, with the garden itself being both a major focus of my project and a means of encountering the other major focus of my project, that being the monarch butterfly. The monarch butterfly, Danaus plexippus, which is notably the only butterfly species known to perform long-distance two-way migrations that we know of. As for the garden itself, it includes a variety of flowering plants, including multiple milkweed species, with many of the plant species in the garden being native and all of the plant species in the garden being tolerant of both heat and drought. These plants have managed to attract bees, beetles, flies, moths, and butterflies, including monarch butterflies, to the garden. I also visited various nearby butterfly gardens and spent time both taking volunteer classes and volunteering at the San Antonio Zoo, which was one of the two main locations where my project took place, with the other one naturally being my backyard garden. To record data collected for the project, I took photographs and wrote my observations on paper. This project served as an opportunity to observe various species of plants and animals directly, which both can be enjoyable for its own sake and provides information about the species observed. One thing observed for the project is the growth of monarch caterpillars, including their metamorphosis into adult butterflies.

• **BASIS ADVISOR:** Julia Cottle • **ON-SITE MENTOR:** Evan Jew • **LOCATION:** San Antonio Zoo

OLIVIA B.

ENVIRONMENTAL CONSIDERATIONS FOR DISPROPORTIONATE COLLAPSE DESIGN

SUMMARY: Disproportionate collapse is when there is a building failure that is not proportionate to the cause. This project will focus on two ways to mitigate disproportionate collapse: alternate path analysis and local hardening. alternate path (AP) analysis is redistributing loads after the failure of a load-bearing element, and it typically requires hardening of the entire structural system. Local hardening is hardening only specific vulnerable load-bearing elements in the structure. The analysis will focus on which one is more environmentally sustainable. This research is important because not only do our buildings need to be protected from disproportionate collapse, but this practice should be done sustainably to prevent negative effects on the environment. Protection Engineering Consultants design structurally sound buildings for the government that can withstand attacks to the structure. The company is shifting focus on making their buildings not only safe from disproportionate collapse but being environmentally conscious. Specifically, I am looking at a baseline building's cubic yard of concrete and calculating the number of cubic yards of concrete used. Then I am analyzing which method of mitigating disproportionate collapse is more environmentally friendly. I identified an appropriate metric to measure the environmental impact would be pounds of carbon dioxide released into the environment. I discovered that on average to produce one cubic yard of concrete releases around 400 lb of carbon dioxide. This is one of the major findings that I am using throughout my research.

• **BASIS ADVISOR:** Debby Hermann • **ON-SITE MENTOR:** Aldo E. McKay, PE, PMP
• **LOCATION:** Protection Engineering Consultants

MATEO C.

WOODWORKING

SUMMARY: In an era overshadowed by mass production, my mission is to revive appreciation for artisanal skills. Through hands-on experience, I aim to immerse myself in a woodshop and learn quality craftsmanship that is both practical and aesthetic. By contributing to the overall ethos of the woodshop, I not only enhance my practical skills but also actively participate in the revival of artisanal practices. My end goal is to create a few tangible items like a keepsake box and a few pens that I can take home with me. This internship offers more than just a chance to hone woodworking skills; it is an opportunity to gain real-world experience. As my site advisor, Mr. Balfour will guide me through tasks that contribute to his cabinetry business's success, providing invaluable insights into the industry. Additionally, I'll have the chance to assist in charity events organized by Mr. Balfour, positively impacting the community. Beyond the workshop, the goal is not just personal growth but contributing to a societal shift valuing attention to detail. As I navigate this experience, I am not just acquiring skills; I am shaping my future in a landscape that increasingly esteems the nuanced and the masterfully crafted. Each moment in the woodshop propels me toward a future where craftsmanship takes center stage in a world hungry for the authentic and the well-crafted. A project I am working on is the construction of a box. This is one of those things that might seem simple to do until you start and continuously find new problems to solve until you are 50 hours into this project that initially might have been a 10 hour project. That is the beauty of woodworking, problem solving. A job well done takes time, effort, and thought. Another thing I will be working on throughout the course of this internship is making a video about the construction of the box. This will allow me to see exactly how many hours, minutes, and seconds it took me to make this box and the step by step process I took. The video could potentially serve as a guide to anyone who wants to make this type of box in the future.

• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Robert Balfour • **LOCATION:** Old School Makerspace

CHRISTINA C.

FEELING RATTY: INVESTIGATING THE ROLE OF STRESS IN MENTAL HEALTH DISORDERS USING RATS

SUMMARY: The early 2000s technological boom revolutionized global networking, yet the pervasive influence of social media played a role in exacerbating negative emotions among younger generations. Unsupervised internet access, in combination with politics, social prejudice, a declining economy, and a global pandemic, led to unprecedented records of depression and anxiety in Generation Z. An underlying factor for these disorders is chronic stress, which is the focus of my senior project. The overarching goal of my senior project is to advance psychiatric disorder treatments by researching new behavioral therapies, devices, and drugs that can reverse stress-related illnesses seen in people. I worked closely with my graduate student mentor Kate Tuite in the Department of Pharmacology at UT Health to approach this. Since the beginning of my internship, I've received compliance training, attended seminars, and gained technical and content-based knowledge. The combination of these have prepared me to participate in Kate's current experiment, which is currently focused on the brain pathway between the paraventricular nucleus of the thalamus (PVT) brain region, a subregion highly reactive in response to stress, and the orbitofrontal cortex (OFC), which is hyperactive in psychiatric disorders. After chemically altering this brain pathway, we measured different rat behaviors in response to a series of brief stressors in order to observe changes in the brain regions tasked with regulating these mechanisms. By using rats as a model for stress, we can learn what parts of the brain might be most affected by stress, and ultimately, this basic research will allow prospective experiments to research ways to alleviate the effects in the future.

- **BASIS ADVISOR:** JennaLynn Hunnicutt • **ON-SITE MENTOR:** Dr. David Morilak, Ph.D.
- **LOCATION:** UT Health San Antonio - Department of Pharmacology

JOSHUA C.

CANCER AND COVID: ONCOVIRAL-INDUCED MITOCHONDRIAL TUMORIGENESIS DERIVED FROM THE SARSCOV2 VIRUS

SUMMARY: Cancer, the second leading cause of death in the United States, affects nearly 1.7 million people annually, with UV exposure, smoking, and alcoholism being cited as the primary causes (CDC, 2022). However, Infectious Agents, a less recognized cause, contributed to 15.4% of the nearly 14 million new cancer cases in 2012 (Plummer et al., 2016). Of the ten Infectious Agents classified by the International Agency for Research on Cancer as carcinogenic to humans, six are viral and are collectively known as oncoviruses (IARC, 2023). These oncoviruses can instigate tumorigenesis through a variety of pathways, several of which involve the mitochondria. In 2019, SARS-CoV-2, which causes COVID-19, emerged as another potential oncovirus, participating in many of the same cellular and mitochondrial pathways as other oncoviruses. Understanding the potential carcinogenic effects of COVID-19 is crucial to prevent it from developing like other oncoviruses, like Hepatitis C which can cause severe liver cancer. Collaborating with Dr. Yidong Bai and Ms. Jessie Thomas in UTHSCSA's Department of Cell Systems and Anatomy, I aim to investigate the effect of the SARS-CoV-2 genome on the cellular environment of brain, lung, and liver cancers. Ultimately, my goal is to examine the mitochondrial response and subsequent apoptotic impacts of SARS-CoV-2 infection, putting us one step closer to answering the question "Can COVID cause cancer?". Dr. Bai's lab has already published research on Oncoviral-Induced Mitochondrial Tumorigenesis and possesses SARS-CoV-2 genome samples, making it an ideal site to conduct my research and prepare me for a career in molecular biology and immunology.

- **BASIS ADVISOR:** JennaLynn Hunnicutt • **ON-SITE MENTOR:** Dr. Yidong Bai, M.D./Ph.D.
- **LOCATION:** UT Health San Antonio - Department of Cell Systems and Anatomy

HUNTER C.

DECRYPTING CRYPTO: UNVEILING THE CHALLENGES AND OPPORTUNITIES IN A DIGITIZED WORLD

SUMMARY: Forget the days of waiting for wire transfers to come in or limits being placed on your account. A popular development in recent years is cryptocurrency, a digital currency that enables instant transfers internationally with no limits and little delay. Moreover, cryptocurrency is designed to be decentralized by nature. Unlike other traditional monetary systems, cryptocurrencies offer an additional level of privacy as others are not able to publicly see your assets unless your wallet address is linked to your name. Unfortunately, this is a topic the public struggles with due to the lack of general knowledge surrounding confusing terms and understanding of how the blockchain ecosystem works. Recent changes in the evolving financial environment, the creation of the internet, and the increase in the digitization of money means it is more important than ever to analyze its impact on the greater, more mature, monetary systems. With an approach from various angles including an academic perspective and a financial industry perspective, I analyzed both the positive and negative effects of cryptocurrency. This analysis delved into specific environmental concerns (e.g., high energy consumption for mining), price volatility, and its potential use for illicit activities. With this project, I examined "behind the curtain" on this complicated topic and described my findings in general terms.

- **BASIS ADVISOR:** Sierra McNary • **ON-SITE MENTOR:** Dr. Keith Phillips, Ph.D.
- **LOCATION:** University of Texas at San Antonio - Department of Economics

STEVEN C.

DELVING IN – ANTHROPOGENIC EFFECTS ON CAVES

SUMMARY: According to the National Speleological Society estimate, less than 5% of caves in the USA and less than 10% of the world's caves have been explored. Additionally, these numbers don't include the amount of research done on caves. Many of the unexplored caves likely contain biological specimens endemic (or unique) to them. These species may seem disconnected, or irrelevant to our day-to-day life, but they are important. Coming from a purely economic perspective, cave life that we have discovered to this point show promise in novel antibiotic and antifungal medication, advances in bio cementation (for use in construction), and potential ways to remove radioactive materials from water. Ecologically, these caves are not isolated. Anything from garbage and waste contamination to the amount of rain can drastically impact life in caves, which must be highly specialized to survive in their unique climate. With the help of TAMUSA's Department of Life Sciences, this research project aims to shed light on the currently obscure matter of cave conservation, by organizing data from an ongoing research project into a clear, easy to read poster that will draw connections between all the species. To carry out this project, I worked on an Excel document with all the specimens collected over the course of three years containing all the pertinent information on them.

- **BASIS ADVISOR:** Rosemary Everts • **ON-SITE MENTOR:** Dr. Elizabeth Borda, Ph.D.
- **LOCATION:** Texas A&M University - San Antonio

BENJAMIN D.

DEBT OR DOUGH

SUMMARY: With student loan debt growing to over $1.77 trillion, according to the Education Data Initiative (EDI), it grows increasingly important for students to understand financial literacy as they face taking on student loans and using credit cards. Additionally, data from the EDI shows that for the average student borrower, it takes 20 years to repay their student loans. This poses an issue, as student loan debt is linked to increased stress and anxiety, and can impede on one's ability to achieve their financial goals. I am interning with Dr. Mauro Oliveira, PH.D., an assistant professor of finance and investing at Trinity University. His experience, education, and research in finance and decision science will ensure accuracy and a strong starting point to understanding student financial decisions. My internship directly seeks to address student loan debt. While working with Dr. Oliveira I have engaged in his research on corporate finance, particularly mergers and spinoffs. Analyzing these complex transactions sheds light on how companies weigh risk and reward, a crucial skill applicable to examining student loan data. Understanding risk tolerance and long-term financial implications are fundamental factors influencing student borrowing behavior. Additionally, I'm actively researching financial literacy through books and research papers like John Bogle's "A Little Book of Common Sense Investing," which emphasizes long-term investing principles directly related to responsible borrowing, a key challenge in student loan repayment. Robert Shiller's "Irrational Exuberance" also informs my research by exploring market bubbles and potential factors that might lead students to overborrow for education. This combined approach equips me to critically analyze student loan data and formulate potential solutions to address the root causes of high student debt, to ultimately promote financial well-being among students.

- **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Dr. Mauro Oliveira, Ph.D.
- **LOCATION:** Trinity University - Michael Neidorff School of Business

LUKE F.

UNVEILING BLACK HOLES: FROM CODE TO COSMOS

SUMMARY: In 1783, the concept of celestial objects so massive that not even light could escape their gravity was first published. These ideas laid the groundwork for our understanding of black holes. Today as new technology blossoms, the study of black holes has shifted, at least in part, to the computational realm. Using computer simulations, scientists can see how the universe would look with different parameters or initial states. This allows them to compare it to our actual observation and see what parameters/initial states create what we can observe in reality. For my senior project, I worked with Dr. Ananatua at the UTSA department of Physics and Astronomy. My main focus was learning IPOLE, a code used to make computer simulations of black holes, and I helped Dr. Anantua's research group by running the simulations for their studies. Beyond just assisting with IPOLE, I tackled three important tasks: 1) assisting future students by creating a user guide for IPOLE, alongside gaining expertise in its codebase to ensure its effectiveness. 2) Assisted with writing manuscripts using LaTeX, a tool for formatting academic papers. 3) Dove into a research project investigating the most likely electron-positron temperature models for supermassive black holes, aiming to solve a recurring question within our research group. This involved synthesizing theory with real-world data to explore different models and their implications for our simulations. By the end of this experience, I contributed to the research done by Dr. Anatua's group, and I expanded my knowledge base in math and physics. Mastering IPOLE broadened my technical skill set and set myself up for my future in physics research.

- **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Dr. Richard Anantua, Ph.D.
- **LOCATION:** University of Texas at San Antonio - Department of Physics and Astronomy

NATALIA G.

FROM WASTE TO SAFE: RECOGNIZING WHICH TREATMENT FACTORS PROVIDE THE SAFEST AND MOST COST-EFFECTIVE METHOD IN WASTEWATER MANAGEMENT

SUMMARY: Only less than 1 percent of water is available for human use. As our demand for water increases, our supply remains constant, slowly tainted by pollutants that build up from the release of sewage from factories, urban industries, and rural households. Our ability to replenish fresh water depends on our ability to treat wastewater through physical, chemical, or biological treatments. Pollution affects many of our ecosystems including but not limited to public parks, lakes and rivers, hiking trails within forested areas, and our main waterways. It's the job of wastewater treatment to control the pollution released by sewages into our waterways, to provide cleaner water, and to provide aid for the environment by speeding up the natural processes of water purification. Wastewater treatment plants use multiple steps to purify contaminates in water, so understanding the pros and cons of each wastewater treatment method becomes crucial for discovering the most sustainable and efficient method. By comparing and contrasting the strengths and weaknesses of each process through long-term and short-term effects, concluding the most efficient wastewater treatment plan becomes possible. More than ever has the depletion of water been becoming dire worldwide, and providing a solution to protect the environment and quickly and cheaply release safe water.

- **BASIS ADVISOR:** Rajeswari Mani • **ON-SITE MENTOR:** Bob Thornber, PE, LEED AP
- **LOCATION:** Parsons

CHRISTOPHER G.

YOUR THEME AND MY SIX VARIATIONS

SUMMARY: When we listen to many classical pieces, there are some that sound so similar that you can almost put your finger on it, but oftentimes we find ourselves puzzled. However, as many people who pursue classical composers like Beethoven and Bach, it can be seen that these composers create variations of their own written pieces, or themes, and fellow or former composers. In doing so, they pay homage to these traditional classic pieces by creating variations of them. Yet, that doesn't answer the question of how they do this, which is what I aim to explore for this project. For example, I took a theme, in this case, it will be a traditional song from Lebanon by Fairuz, called Kan Enna Tahoun(Romanized); when I mastered this theme, I created six total variations on it by using different forms of variation, like switching from minor to major, or vice versa, or also progressing up or down, or even changing the style of the song, like from a ballad to a waltz. My end goal of this project was to learn, with the help of my music teacher, how composers 300 years ago and more created these variations, as well as help those who aren't in tune with the theory behind classical music to understand why many pieces are written the way they are written. Through my research, I learned that writing music, regardless of it being variation or original, is challenging but rewarding. This experience allowed me to express my creativity in ways other than drawing or writing. I also learned how chords really work and why it's important to progress through specific chords when you're in a specific key. As well, this project has helped me with playing the piano more smoothly and actually being able to read notation.

- **BASIS ADVISOR:** Chris Jordan • **ON-SITE MENTOR:** Judy Gorrell • **LOCATION:** Arpeggio Music Academy

CHARLOTTE G.

VOICES UNHEARD: EXPLORING MENTAL HEALTH IN FOSTER CARE YOUTH

SUMMARY: Foster care provides children with a temporary living arrangement when they cannot live with their biological families. Children entering foster care frequently experience various forms of trauma, resulting in long-lasting effects on their emotional, psychological, and social well-being. The resulting trauma is frequently overlooked due to factors such as lack of awareness, stigma, and limited resources. With the help of Erin Finley, a medical anthropologist and investigator specializing in mental health treatment availability, I explored how being in the foster care system impacts children's mental health. Her expertise aligned well with my research topic, making it a perfect site to conduct my research. My project also explored the accessibility of mental health care for foster care children and investigated therapeutic approaches to address resulting trauma. I completed a literature review, summarizing and analyzing existing research studies to help me examine the intricate relationship between foster care experiences. As well as children's mental health outcomes, I explored different ways therapists and caregivers can help these children heal from their trauma. More than 250,000 children and adolescents enter the system annually. After entering a foster home, many children are put in unstable foster care placements which causes the child to be two times as likely to develop behavior problems. This causes a cycle of being placed in a home and having continuous placement alterations due to behavioral issues that go unaddressed. Then a child begins to have feelings of guilt and shame which causes further psychological trauma. The trauma has very long-lasting effects that continue through adulthood. Some examples include brain impairments, variations in gene expression, difficulty forming attachments, and the development of mental health challenges. By doing this review, I hope to find ways to improve mental health support for kids in foster care and ensure they get the help they need.

• **BASIS ADVISOR:** Sierra McNary • **ON-SITE MENTOR:** Erin P Finley, PhD MPH • **LOCATION:** UT Health San Antonio

HENRY G.

HARMONIZING MINDS: THE SYMPHONY OF BENEFITS IN MUSIC EDUCATION FOR YOUNG LEARNERS

SUMMARY: Living in a world where people's attention spans are getting shorter, kids are having more trouble focusing in school and developing life skills. But a great option for parents is sending their kids to music lessons. Learning a musical instrument is a great way to develop memory, reasoning, and discipline. Studies show that music training has been associated with improved executive function, time management, self-control, and creativity. By interning at the Musical Arts Center in San Antonio (MACSA), I was introduced to many students and developing artists and help them on their journey. Some tasks I worked on involve gathering contacts for people interested in starting lessons, creating a modern video presentation for students' achievements, and helping organize recitals and events. The potential students' inquiries are the first step to getting a new student at our Music Center, so it is important to organize and contact them quickly. The video bulletin board showcases our students' achievements and hopefully inspires the people who see it. And the recitals are a place for students to show everyone what they've learned over that time. I've had the opportunity to shadow teacher's lessons and have conversations with them, and it's eye-opening to see their different teaching styles and studios. Most of my time is spent working with the Chief Officers on the back-end of the company, and I have learned a lot about productivity, team building, and the behind-the-scenes of a business. I have no doubt that these skills will propel me in my career, but I hope they will benefit me in all aspects of life.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Evelyn Escobedo
• **LOCATION:** Musical Arts Center of San Antonio, Inc.

JORDAN H.

SPORTS SPOKEN: THE METEORIC RISE OF THE SPORTS PODCAST

SUMMARY: Core to the idea of Nonprofits is mission-success. International Nonprofits with records of great success like [Susan G. Komen Foundation, Cleveland Clinic, Saddleback Church,Stanley Medical Research Institute, Success for All Foundation, and Trust for Public Land] are exemplars of this drive and methodology to be explored in the structure of organizations. Beyond a great support and moral valuation and effort of the general people and philanthropists propping up and maintaining this social good is the systemic operation and management of organizations which can like building blocks be arranged- Is the study and consideration of the "best shapes" that can be arranged and consequently supplement the ineffective organization of resources and operations that cause Nonprofits to yet arrive at their best potential- Organization theory. Through my efforts at a newly established literacy NPO teaching Afghan refugees conversational English, I will make use of the many theoretical and practical knowledge available from predecessor research and success to incorporate specific models of operation in order to expand and outreach our mission motto. At the same time I will contribute as a volunteer and development team member observing and attempting structural changes through commonly identified structural variables and potentially uniquely applicable ones, and provide my final insights in a paper to be presented.

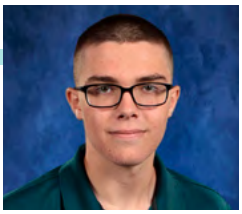
• **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Alex Ratcliff • **LOCATION:** H-E-B

MARS H.

BURDENS OF PERSECUTION: EFFECTIVENESS OF U.S. POLICY IN MITIGATING GBV AMONG REFUGEE POPULATIONS

SUMMARY: With rising international conflict and the looming threat of climate change, gender-based violence (GBV) continues to worsen and the refugee population swells. Refugees are an already extremely vulnerable population, making them more susceptible to becoming victims of GBV. The struggles of women and gender minority refugees not only occur in their country of origin, where they can be victims of systemic GBV under corrupt governments, but also in refugee camps, where they can face mistreatment by employees and can be put in close proximity with their abusers. Further, once in the U.S., they lack resources and support to seek justice. Under the mentorship of Professor J.C. Salyer, the director of Barnard College's Human Rights Program, who has long worked in helping the refugee and asylum seekers arriving in New York, I am examining United States' policies regarding GBV among refugee populations through a multifaceted approach to determine if these policies have been effective in mitigation. Through self-directed research, I am reviewing reports and academic articles, which largely focus on refugees, and examining precedent-setting court cases of asylum claims. Another component of my research is one-on-one interviews and survey responses with lawyers, advocates, and organizations who have worked closely with the refugee and asylee communities, which will be impacted by the recent granting of 12,000 Special Immigrant Visas by Congress as they face an increased workload. The anticipated conclusion of this research is a greater understanding of the United States' protection of this exceedingly vulnerable and ever-growing population, with the findings being able to reveal flaws in the current system that urgently ought to be addressed. My final paper will be distinct in its approach, as many of the academic papers have relied solely on policy or first-hand accounts.

• **BASIS ADVISOR:** Kim Kinne • **ON-SITE MENTOR:** Professor J.C. Salyer, J.D, Ph.D.
• **LOCATION:** Barnard College - Anthropology Department, Human Rights



NOAH H.

ANALYZING THE EFFECTS OF STRATEGIES ON THE OUTPUT OF COMPETITIVE ADOLESCENT TEAMS

SUMMARY: Competitive robotics is a cornerstone in a successful education not only in engineering, but also in team management and rigor. Throughout the competition season, teams are placed under stress and deadlines to produce a functioning robot in two months while also demonstrating an outward promotion of STEM and teamwork to their community. Often this ability to present a cohesive team is what holds rookie teams behind well-established programs. In my two year experience with FIRST Robotics, the teams who perform well in judged awards and competition far outstrip those who don't perform at a similar level. When my team was going into this season, our main goal was to improve upon what we had done in our rookie season by adapting our strategies in conjunction with methods adopted from other teams. My project aims to explore the different approaches that those teams employ in the pursuit of the goals outlined each season. Through a combined effort of surveying participants and coaches of these teams, anecdotal experiences with the team I am a part of, and coordinating with a successful entrepreneur in the human resources industry, I plan to create a comprehensive representation of the uses of strategies and how they affect those teams' performance and environment, identifying those strategies that most impacted the success of those teams. By taking these strategies, I plan to determine where newer teams are struggling and how they can improve their performance. Looking at the end result of the changes my team made, I'm certain that I have identified areas where simple changes can drastically improve a team's performance.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Ms. Melissa Griffin • **LOCATION:** HR Mom

LYDIA I.

CRIMINAL JUSTICE: VICTIMS & THE ACCUSED

SUMMARY: The focus of my project revolved around the criminal justice system and how law enforcement works together especially in relation to forensic art and anthropology. Forensic artists identify and catch criminal suspects, recreating them by drawing, psychology, anatomy, aging progression and digital imagery. Forensic anthropologists reconstruct a person's life and death and often help recover and ID unidentified human remains. The mindset overall is to relate the expertise of criminal justice guidelines for criminal behavior and how everything comes together to make a grand depiction of how law enforcement works in cooperation with each other as it is crucial to be flexible for different casework and jurisdiction. There is something special about imperfect humans and the individualistic behavioristic side of them are captivating which has led me to actively self-study anatomy and psychology to reference. By observing these different concepts during my internship I hope to be able to apply these techniques as my own skill set. The confirmed site that I worked at is the criminal law firm, "Goldstein & Orr" with my on-site advisor, Ms. Cynthia Orr. With a reputable person such as her who has attained national prominence I have been able to achieve memorable opportunities such as being able to participate in witness investigations, testimonies, reading secondary writs of habeaus corpus, going to the federal courtroom to observe trials and meeting other distinguished individuals such as the Texas U.S. Marshall. Getting placed into this position in person, I have come to fully realize the overwhelming extent of the criminal justice system, however I do believe it is a trait most unique in itself which I hope to portray in my senior project product.

• **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Ms. Cynthia Eva Hujar Orr
• **LOCATION:** Goldstein & Orr Criminal Law Firm

LEISHA J.

AROUND THE BASIS WORLD IN 50 DAYS

SUMMARY: With campuses located in Arizona, Texas, Washington D.C, Louisiana, and China, and more set to open in the future, the BASIS Charter School system is rapidly changing and expanding. As a network grows, it expands its leadership systems as well. It becomes crucial to maintain a standard of leadership within the network, and this can be assisted by creating defined, clear roles for the leaders. The administrative system of BASIS schools involves multiple leaders with shared responsibilities–including deans, directors, the head of school, and the head of operations. In a system with multiple leaders, it is important that the leaders have defined roles and clearly separated responsibilities. By standardizing a set of responsibilities for each role, it becomes easier to scale pre-existing structures to a larger network, which minimizes confusion and assists leaders as they take on new responsibilities. I documented the specific responsibilities of various positions and created a set of general guidelines for each position, and I collected data by shadowing the deans and directors at various BASIS campuses and recording what kinds of responsibilities they share. I started off by researching the preexisting job descriptions for various positions, to give myself a baseline for what to expect when I began shadowing the admin. Having this background information helped me draw parallels between the written expectations of administrative roles and the reality of their daily functions. For example, I observed how DSAs and Deans interact with students and with each other, and I separated the tasks between the two roles. With this project, I gained an understanding of each position within the administrative system, and found a way to clearly define these roles in order to positively impact the staff's ability to assist students.

• **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** David King • **LOCATION:** BASIS Ed Texas

BENNETT J.

THE IMPORTANCE OF CONTINUED EDUCATION WITHIN CYBERSECURITY

SUMMARY: Since the first home computer in 1974, there has been constant innovation in the world of technology. Computers have become faster, smaller, and more widely used. From toothbrushes to oil pipelines, networked computers are everywhere. Innovation is everywhere in computer science, and cybersecurity, a subset of computer science, is no different. Exploits are constantly being found, attacks become more sophisticated, and defenses are left trying to keep up. For governments and large companies, falling victim to a cyberattack could have disastrous consequences for the brand; people may lose trust, there may be liability lawsuits, and there may be a loss of productivity. It is therefore imperative that companies put efforts into preventing and mitigating cyberattacks. This is the incentive that drives companies, such as Walmart, to have a team of hackers, known as a "red team," and a team of defenders, known as a "blue team." Often, the red team assesses the security of a product by diligently hunting for flaws. All while the blue team will try to detect any compromise, subsequently fixing the security flaw once they are made aware of it. Smaller companies may not have the resources to dedicate to a team of cybersecurity specialists. For those companies, a cybersecurity consulting firm may enable them to keep up with changing times. SandTech Solutions is a firm that provides that exact service to a number of clients. At SandTech, I had the opportunity to assist with our red team as they assess clients, as well as develop defensive solutions in the form of products and policies. My firsthand experience was invaluable as I assessed practices that can improve security while also being easy to understand.

• **BASIS ADVISOR:** Lyle Koonce • **ON-SITE MENTOR:** Timothy Avram • **LOCATION:** SandTech Solutions

NOAH K.

A HISTORY OF RIGHT-WING RADICALIZATION ON THE INTERNET AND THE RESULTING EXTREMIST PRESENCE

SUMMARY: Without communication, the human species never would've escaped the stone age. By sharing ideas and beliefs, we've communicated through intellectual consultation where we developed new technologies or worked toward solving the material issues of our societies. Unfortunately, the radio, the television, and the internet entered the fray as a sort of double-edged sword for communication in the last century. On one hand, more people than ever have access to news and technology and therefore greater access to the political system which is absolutely a positive outcome of communication technologies. On the other hand, the new age of communication, particularly in the age of the internet, has devolved toward one of the most volatile times in our history as radical far-right ideas spread globally and are actively endorsed by some of the most powerful people on the planet. This development in communication and its ties to capital and the profit quota need to be studied lest we find ourselves excusing the violence that has resulted from it. This research aimed to develop a concise history of right-wing radicalization on the internet, its causes, and its detrimental impacts as a means to educate others on media literacy and what the pitfalls to avoid through a 15-page essay and a 10-15 minute video essay to cover the same topics in a more concise, casual format. To complete this Herculean task, I worked with Trinity University Communications Professor, Althea Delwiche.

- **BASIS ADVISOR:** Kim Kinne • **ON-SITE MENTOR:** Dr. Althea Delwiche, Ph.D.
- **LOCATION:** Trinity University - Department of Communication

AYAAN K.

CONTRASTING ENGLISH TEACHING FOR NOVICE AND PROFICIENT LEARNERS

SUMMARY: The journey of my senior project with "Pages of Promise" has been an enriching exploration into the complexities of language acquisition and teaching methodologies. Initially entering the organization, my primary concern revolved around overcoming potential language barriers inherent in teaching English to refugees. Little did I anticipate the intricate nuances of lesson planning, testing, and student placement within such a diverse educational landscape. Through dedicated volunteering, I've acclimated myself to the dynamic teaching methods employed by the organization. One of the most profound realizations has been the paramount importance of understanding each student individually. I've learned to tailor my approach, sometimes needing to slow down for certain students, while challenging others who grasp concepts more swiftly. An integral aspect of the organization's teaching framework is the creation of custom worksheets and tests. While drawing inspiration from online resources and leveraging platforms like Quizlet, the predominant challenge arises from the scarcity of materials tailored to the specific needs of Afghan refugees, primarily fluent in Pashto. Consequently, I've taken on additional responsibilities beyond direct tutoring, such as researching and modifying basic English tests to suit the students' proficiency levels. Navigating the intricacies of teaching large classes has been particularly illuminating. Recognizing the diverse skill levels within a single cohort underscores the importance of personalized assignments and interventions. At "Pages of Promise," individualized attention is prioritized, emphasizing the significance of comprehensively understanding each student's strengths and weaknesses. The documentation of my observations and insights contributed to the organization's enhanced teaching methodologies and can potentially inform broader pedagogical practices in language acquisition. By embracing the complexities of teaching in diverse contexts, I am committed to fostering inclusive and effective learning environments for all.

- **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Muhammad Sharik Ahmed
- **LOCATION:** Pages of Promise

MINAH K.

SMOKING DAMAGES: CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND ITS RELATION TO SMOKING

SUMMARY: In this day and age, we see warning after warning about smoking. Warnings on cigarette boxes, commercials on the TV, and social media applications share harmful consequences of smoking, such as Chronic Obstructive Pulmonary Disease(COPD). Chronic Obstructive Pulmonary Disease (COPD) is a progressive respiratory condition that causes persistent airflow limitation and of course, smoking is the leading cause of its occurrence. After lots of reconsideration, this project took a deep dive into the danger smoking presents on the severity progression of patients with COPD. A primary goal of this research is to understand smoking's damage to airflow by comparing spirometry tests and symptoms of COPD patients who smoke and don't smoke while also looking at any unique or questionable similarities and differences that pop out when doing this research. As I am doing a retrospective study, I used data on patients with COPD. This data was provided by my site sponsor at his Pulmonology Clinic. I went through every individual patient for the year 2023 to find those with COPD that have more than one Pulmonary Function Test to compare airflow from one exam to another. In these ten weeks, I went through each patient to pick out those that would satisfy the needs of my study, took down the data I required to explain my comparisons, organized the data, and then analyzed and reported my data with the hope of making a final paper to publish and present.

- **BASIS ADVISOR:** Veronica Vicencio • **ON-SITE MENTOR:** Dr. Chinthaka Bulathsinghala, M.D.
- **LOCATION:** Northeast Baptist Hospital - Pulmonology Medical Office of Dr. Bulathsinghala

AINSLEY K.

UNDERSTANDING RIPARIAN VEGETATION CAPACITY

SUMMARY: Learning more about the environment around us can give us the necessary tools to understand global phenomena such as climate change and o-zone degradation. These issues are important to consider for the conservation and safety of our environments. Riparian zones and ecosystems are crucial areas for learning as they are considerably important in relation to carbon sequestration, the process by which carbon is absorbed and stored within biotic environmental components such as the flora and abiotic components such as soil. This project examined one specific riparian zone in the Medina River Natural Area. By looking at a respective sample with appropriate consideration for biodiversity, we determined river morphology, flood risk, and optimized stem density management planning to promote healthy vegetation capacity, sustainability, and levels of carbon sequestered. While on the field, I used tools and developing methodology in Laub labs with Dr. Brian Laub, Associate Professor in Department of Integrative Biology at University of Texas at San Antonio. We used incredible equipment such as the theodolite in order to measure flood risk by measuring elevation levels. This project advanced so quickly and I gained so much new knowledge and data from analyzing the Medina River Natural Area's riparian zones compartmentally. I hope to use the information gained throughout this research project to contribute to the field of environmental science and make advances in conservational efforts as well as giving new insight into stem density.

- **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Dr. Brian Laub, Ph.D.
- **LOCATION:** University of Texas at San Antonio - Department of Integrative Biology

CLARISA M.

SPREADING THE WORD: TRAINING GUIDES & SOCIAL MEDIA

SUMMARY: Involvement in the church and outreach are integral for the growth of a congregation. The problem I wish to focus on is church participation, more specifically in my church. At my church North Central Fellowship, the majority of the church team is comprised of young students. With these young students getting older and going off to college, a role needs to be filled both musically for the band and technically for setting up the slideshows. Through this project, it is my goal to make participation in the church more accessible and inviting to all ages and to increase our outreach efforts, improving our church attendance numbers, and spreading the gospel. My internship responsibilities include creating an easy-to-read training manual outlining the responsibilities and inner workings of participating on the worship team or sound team while creating a social media presence for my church. The training guides would make it easier for volunteers to get into the roles and would also make it less daunting for people to be willing to participate. The social media presence would help get the word out to people in the area who want to get more involved in a church but don't know where to start and would bring more people to faith. I originally thought that this would be the easy part, but I was quickly proven wrong. I have learned much about graphic design, the social media algorithm, and just how difficult it is to reach people. I need to be constantly diligent in making posts every day, experimenting with different types of posts, researching bible verses/quotes, and taking and editing photos/videos of my church. The biggest thing I've learned is that a social media platform needs to be consistent and under constant management if it is to be successful in reaching new people. However, in doing all of this, I plan to use these training, development, and technical skills to further my knowledge and experience of management and outreach which I can later apply to my career as a business owner.

• **BASIS ADVISOR:** Elise Gerard • **ON-SITE MENTOR:** Mr. Michael Harris • **LOCATION:** North Central Fellowship

NICOLAS M.

WRITING A MEMOIR: FROM THE PAST TO THE PAGE

SUMMARY: Many writers begin their writing while in school, and use it as a creative outlet for writing stories, whether fictional or not. This project investigates the process of writing a memoir, and the focus is the high school experience from 10th grade to 12th. The writing process, editing process, and final draft are investigated during this project as I also create and lead a seminar teaching others how to write a memoir, based on my experiences during this project. This project is conducted at the San Antonio Schaefer Branch Library, as it is an environment of learning and discovery, also providing the space to create this memoir while guided by professionals in the world of literature. This is a project about personal growth and sharing one's experience with the world. The day-to-day of it involves writing the memoir itself as well as writing a lesson plan to teach the skills that develop throughout the process. With this internship, I hoped to gain the skills to write a complete book and to teach a seminar. Learning time management and choosing which tasks to focus on has proven a valuable challenge to work through. The most interesting fact I learned about memoir writing is that it truly is open to anyone with a story to tell. Many writers write memoirs simply as a way to tell of their experiences in the world, and to bring life to the mundane. It's quite reassuring and I'm confident the seminar will go smoothly. Through this project, I developed a stronger work ethic and tenacity for working on a large, tedious project, which will be useful for giving me the stamina to be successful in college and not exhaust myself during that time, while also learning the ins and outs of the professional world.

• **BASIS ADVISOR:** Julia Villarreal • **ON-SITE MENTOR:** Mr. Dan Garcia
• **LOCATION:** San Antonio Schaefer Branch Public Library

JORDAN M.

STRUCTURAL VARIABLES IN THE OPERATION OF NONPROFITS

SUMMARY: The essential attributes of a thriving nonprofit organization are intricately woven into the fabric of both its people and operational frameworks. Successfully managing and steering a nonprofit to operate smoothly requires a delicate balance of dedication, strategic planning, and effective execution. Pages of Promise, a nonprofit organization committed to providing free English education to refugees with limited or no proficiency in the language, presents a unique opportunity for me. In this immersive experience, I will be collaborating with the dedicated tutors and leaders who drive the educational initiatives. This hands-on involvement will afford me insights into the intricacies of running a nonprofit organization with a focus on delivering impactful English education to those in need. By actively participating in the day-to-day operations, I aim to grasp the logistics and intricacies involved in managing a nonprofit efficiently. This internship will be a transformative learning experience, providing me with a firsthand understanding of the challenges and rewards associated with running a nonprofit dedicated to a noble cause. I anticipate gaining valuable insights into the importance of mission alignment, effective leadership, and the operational intricacies that drive the success of Pages of Promise in its mission to offer free English education to refugees.

- **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Muhammed Sharique Ahmed
- **LOCATION:** Pages of Promise

DANIEL M.

THE MIND OF A CHAMPION: UNLOCKING THE SECRETS OF SPORTING EXCELLENCE

SUMMARY: Sports competitions were made to be fair, right? Well, every competitor is given an equal chance to win in a competition. Yet, in professional sports, some athletes have won repeatedly, signifying that the winner is not just determined by pure chance. Athletes like Novak Djokovic in Men's Tennis, Stephen Curry in the National Basketball Association (NBA), Tom Brady in the National Football League (NFL), and Tiger Woods on the Professional Golf Association Tour (PGA Tour) have had athletic careers defined by winning and success. Despite a level playing field, these elite athletes utilize psychological and physiological techniques to their advantage, both inside and outside competition, to win and succeed consistently. As Vince Lombardi said, "Winning is a habit. Unfortunately, so is losing." Under the guidance of a PGA Professional at the Dominion Country Club, I surveyed and interviewed athletes, coaches, trainers, and relatives of athletes to understand the training methods, lifestyles, mindsets, and habits of athletes at varying levels of performance and competition. While survey data was collected, I dived into various sport and human behavior-related academic journals and books, referencing the discoveries of others to assist my research. With this data, I aim to highlight the factors of peak performance, offering valuable insights on how to optimize and elevate the capabilities of athletes, contributing to the pool of knowledge within sports psychology and peak athletic performance.

- **BASIS ADVISOR:** Andrew Lomas • **ON-SITE MENTOR:** Mr. Nathan Camacho
- **LOCATION:** The Dominion Country Club

MARY M.

HOW SHOULD CARDIO HEAVY ATHLETES TRAIN IN THE GYM AND AT HOME?

SUMMARY: Performing at your best is the most important thing for an athlete and to do that at a high level is very challenging. In my Senior Project, I wanted to understand how to train your hardest, stay healthy, and recover properly. Plenty of times athletes will focus on the wrong side of their sport and not see improvements, so I wanted to educate cardio athletes the best way to stay at their peak performance, including myself in swimming. Not only is improving in sports just practicing but also eating right, sleeping enough, and building muscle on your own. I used my access to a personal trainer and other scientific research to help me dig deeper. Phil Janzen, Gym Owner and Athlete Personal Trainer, helped me each day approach questions athletes have about themselves and the health of their body. Through the start of my project I dived into the importance of eating the right foods daily and under the pressure of competition. I learned about the negative impacts eating carbs and gluten can have on the body and to stray away from processed foods. As well as making sure the message of getting a consistent amount of sleep is vital to performance. I informed athletes on the process of weight training and over time learning behind the scenes of a gym owner. These details can lead to major improvements in your sport and during my 10 weeks, I journaled my own developments on my body, using my research and education from Phil to see if my swim event time improved.

• **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Phil Janzen • **LOCATION:** Train SA

CODY M.

BUILDING ENGAGING CURRICULUM

SUMMARY: During my weeks at BASIS San Antonio Primary Medical Center, I worked on creating a curriculum for the upcoming STAAR exam and helping teachers create and grade assignments. Developing a good and engaging curriculum is very important for creating a good foundation for mathematics in the future. This strong foundation is what helps students be able to understand more complex topics and learn at a higher level. To do this, I observed methods being used by the teachers and methods the students used to learn and retain the information. I applied those methods that work to other topics to further enforce these lessons and to retain the information. Reading textbooks on the subject gave me a lot of inspiration for techniques for learning and for teaching topics in a way these students would understand. However, due to a lack of topics that help students excel on the STAAR exam, I found looking at previous STAAR exams for the class much more helpful in creating these assignments and finding where students are struggling. Having these topics be repeated ingrains this material into their heads to create a solid understanding of the topic is very important for every student before building on the topic. So repetition of the material for a period of time is important before building upon it. This Idea results in an importance in ordering lessons giving the topics enough time to be understood. In total, I helped the teachers create a better learning system to help the students improve understanding of the topics.

• **BASIS ADVISOR:** Nelly Rovira • **ON-SITE MENTOR:** Mrs. Gabriela Kimball
• **LOCATION:** BASIS San Antonio Primary - Medical Center

ISAAC N.

DEVELOPING AI TOOLS FOR CHILDREN

SUMMARY: With free, commonly accessible tools like ChatGPT and DALL-E, and intelligent software in almost every massive application like Google, the field of artificial intelligence is one of the most prominent and fastest growing in our society. The promulgation of awareness about artificial intelligence among the youngest generations may not be at the forefront of this massive technical advance, but it is certainly necessary, as current children will become adults in a professional world dominated by AI technology. Our research group, a group of UTSA students led by Dr. Fred Martin, sought to gauge childrens' understanding of AI tools by developing an interactive app or tool utilizing AI, and then recording their reactions to the software and collecting responses from a questionnaire, offered after the interaction concludes, asking participants about their thoughts regarding AI's capabilities, applications, and most importantly, ethical impact. I developed a tool that demonstrates a reinforcement learning algorithm, the genetic algorithm, to students not as proficient in the field of AI. In the process of developing this tool, I gained a better understanding of the process of software development in a real work environment, as many short deadlines need to be met in a bureaucratic world. We gained important insight regarding approaches that interactive AI software developers should take in the near future to aid children in becoming proficient in AI terminology and familiar with its ethics.

• **BASIS ADVISOR:** Lyle Koonce • **ON-SITE MENTOR:** Dr. Fred Martin, Ph.D.
• **LOCATION:** University of Texas at San Antonio - Department of Computer Science

ARIADNE O.

EVOLVING FAST FOOD: BEHIND THE SCENES OF THE FOOD TRUCK PHENOMENON

SUMMARY: Businesses are constantly popping up or shutting down. But what does it take to start and sustain a business or, in this case, a food truck? A company attempts to have set goals, like selling its product to a specific audience, expanding its market, and increasing efficiency. During the 10 weeks of my senior project, I interned at Tláloc Mexican Food and conducted my research on entrepreneurship, food truck operations, and business marketing. I learned how the truck operates, helped out with marketing ideas, gave my opinion on the dishes and presentation, and inspired future menu options. When I first started, I had no idea what to expect. I didn't think there would be much variation, but I had so much fun learning about the whole operation, looking up quotes for orders, trying new foods, and scheduling. No two weeks have been the same. I always looked forward to my next day working on this project. Through this experience, I gained knowledge on how to start a business and the steps needed to take to be successful at running a business. The experience and knowledge gained tied into my future career by giving me business experience and allowing me to have a more focused and hands-on experience on topics that business courses cover for me to experience the full breadth of the business and see which aspects I like most.

• **BASIS ADVISOR:** Veronica Vicencio • **ON-SITE MENTOR:** Mr. Jesús Millán • **LOCATION:** Tláloc Mexican Food

TIZIANO P.

BRINGING THE CHAIR TO THE TABLE: HOW TO BECOME A SENATOR

SUMMARY: Within our increasingly polarized and divided society, there is often a large disconnect between a citizen and their respective representative along with a misunderstanding of our government's organization. Aiming to ameliorate this issue, one must research and be immersed within the political environment of representation to improve their own understanding of the political system, which can then be shared with others in a more digestible manner. The district office of Senator Roland Gutierrez provides an ideal workplace to anchor my internship as I function within the office while also being exposed to other resources and events that build upon my experience. During my internship, I have been tasked with maintaining a healthy connection with our constituents by adequately answering constituent phone calls and emails through research into their specific issues with our office's available resources. Additionally, I have been tasked with supporting the Senator in projects, such as forming a list of graduating seniors to provide congratulatory certificates and researching gun legislation passed within red states. Furthermore, I have had the opportunity to attend local events to be directly involved with the grassroots political process from attending a city council commission charter public comments meeting to witnessing a political watch party on the night of the Texas primaries. These varied experiences have informed my own perspective on the field of politics, grounding my thoughts on the process through the interaction with the system. The internship has only solidified my desire to become a representative like Senator Gutierrez one day.

- **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Ms. Katie Farias
- **LOCATION:** State Senator Roland Gutierrez's District Office

ALEC P.

EXPLORING THE DYNAMICS OF PHYSICAL THERAPY

SUMMARY: Physical therapy, often referred to as physiotherapy, is a specialized healthcare discipline dedicated to optimizing and restoring physical function, mobility, and relief of pain. It encompasses a broad range of therapeutic interventions aimed at preventing, alleviating, and rehabilitating conditions that affect the musculoskeletal, neuromuscular, cardiovascular, and respiratory systems. Physical therapy is highly specialized to each patient as each patient's case of issues differ from one another. My project explored the many duties of a physical therapist and the different healthcare professionals that physical therapy interacts within the hospital dynamic. It also further dove into the mindset of these workers, exploring how they collaborate with their patients to specialize in treatment to address their issues. During my first few weeks at Audie L. Murphy Memorial VA Hospital, I immediately noticed the large extent of specialization in physical therapy; I observed some of the different branches such as CLC rehab, outpatient therapy, prosthetics, assistive technology, and neuro-muscular neurology. Through this my work, I obtained experience in creating insights on these key professions to a patient's wellness and rehabilitation to properly inform about these healthcare workers that are involved in a patient's rehabilitation through my project. In the future, I hope that my senior project will be able to educate and encourage future students who want to pursue a career in the medical field by giving them a resource to help them visualize the different environments that these healthcare workers are in.

- **BASIS ADVISOR:** Debby Hermann • **ON-SITE MENTOR:** Nancy Richter, PT
- **LOCATION:** Methodist Hospital/VA Hospital

NIRVAN P.

LAB TO DINNER TABLE: THE FUTURE OF LAB GROWN MEAT

SUMMARY: The consumption of meat from animals contributes to several problems, such as climate change, inhumane conditions for livestock, and deforestation. However, many still eat meat while knowing this because of its taste and nutritional benefits. Recent developments in lab grown meat could mean that there is a solution that solves these problems with the animal agricultural industry while providing people with meat. Lab grown meat requires a cell sample from an animal, rather than killing the animal. Thus, less animals are needed to supply the same amount of meat. However, lab grown meat may not be a viable replacement for animal meat, since the public may not accept lab grown meat, or the meat might taste differently. My senior project seeks to answer: Should lab grown meat replace regular meat? I began to try answering this question by first finding specific issues caused by the meat industry. I also found a large list of issues with cultivated meat, including the usage of FBS and its cost, and looked into articles discussing the public perception of cultivated meat. Cultivated meat companies continue to grow and develop their technologies, so it would be best to try to ask people from these companies questions about their production methods, carbon footprint, and production costs to get the full picture. I also conducted a survey to gauge the public's perception of cultivated meat, and create a research paper fully discussing my position in this debate. The final paper of this project could either show cultivated meat as a solution that must be looked into and developed further, or it could show that cultivated meat should be abandoned in favor of traditional meat.

• **BASIS ADVISOR:** Rosemary Everts • **ON-SITE MENTOR:** Dr. Desh B. Sharma, M.D. • **LOCATION:** Gastro Star

ADITYA P.

THE RELATIONSHIP BETWEEN SUCCESSFUL CYBERCRIME AND TIME

SUMMARY: Hacking is an issue which is one of the leading problems for both the present and the future. Hacking for financial, political, or damaging reputations is a common motive in cybersecurity. Successful cyberattacks require detailed planning, including identifying vulnerabilities and gathering information. Gaining access to networks, clouds, or software is time-consuming, and hackers must choose the optimal moment for action, increasing their chances of success. Time is a hacker's best friend as it gives them an advantage over cybersecurity analysts when trying to complete their goal. However, this begs the question, how much longer do successful cyber crimes take than the ones that fail? Surely, the hackers in the Equifax Breach, which caused $1.7 billion in damages, took longer to reach their goal than your average hacktivist (meaning a person who hacks for political reasons) trying to hack governments and industries. The project sought to answer the question: how much longer do successful cybercrimes take than unsuccessful ones? I researched documented attacks at the UTSA Main Campus. I completed log analysis with snort logs and used Wireshark to analyze these logs further. I learned how time pressure affects cybersecurity teams and found out how long it takes hackers to gain access to systems.

• **BASIS ADVISOR:** Debby Hermann • **ON-SITE MENTOR:** Dr. Rajendra Boppana, Ph.D.
• **LOCATION:** University of Texas at San Antonio - College of Sciences

TIMOTHY R.

THE AIRWAY PROJECT: COMBATING FIBROSIS

SUMMARY: My Senior Project involved research on the throat, specifically the problem of fibrosis in the larynx. Fibrosis in the larynx is caused by damage or injury to the vocal folds usually from scarring. This scarring can build up over time due to an increase in collagen causing the tissues to thicken and that's when fibrosis sets in. For my senior project, I was under the supervision of Dr. Teja Guda and Gabriella Gonzales assisting with their biomedical engineering research. Specifically, I assisted with the editing process of 3D scanned images from burn CT scans, and observing irregularities in the Endotracheal Tubes of animal models. Our lab hopes to develop new medical devices to keep the upper airway open in the throat, such as better ventilators for people who have a hard time breathing. Additionally, I assisted with a project focusing on how to control the inflammation-bacterial interactions in the airway to improve respiratory health. With this experience, I worked with animal models, specifically pig models, to find the best solution to combat fibrosis in the larynx. As humans and animals share many similar traits or commonalities in structures, we will be able to examine the animals first before they move on to human testing. Furthermore, I gained an understanding of the biomedical field and how engineers work together to create innovations that can save lives.

• **BASIS ADVISOR:** Jonathan Guerra • **ON-SITE MENTOR:** Dr. Teja Guda, Ph.D., BME and Dr. Alisa Isaac, Ph.D. • **LOCATION:** University of Texas at San Antonio - Department of Biomedical Engineering

MAHMOUD R.

UNDERSTANDING ECT'S EFFECT ON MEMORY

SUMMARY: Electroconvulsive Therapy (ECT) is a treatment that involves sending an electric current to the brain, causing the patient to undergo a seizure. The goal of ECT is to relieve severe mental illnesses, like depression and schizophrenia by "resetting" the brain with the shock sent to the patient. Through an internship with Phoenix Mental Health Clinic, I learned the process of setting up an ECT treatment, a long and challenging process for the psychiatrists. I observed how a psychiatrist connected the leads to the patient, calculated the dosage of Ketamine, and even how they set up the correct voltage to deliver the seizure in order to understand how the procedure works. Furthermore, I learned that psychiatrists must consider the side effects that come with the treatment, figuring out what the patient might get affected by, as well as the extent to which they will get affected. Memory loss seems to be the debatable ramification that is discussed between psychiatrists, with many wondering if a patient will see a deterioration or a development in their memory. My project focused on observing my advisor and the process he goes through when working on an ECT treatment, as well as his ongoing research of ECT's effect on memory loss, figuring out the true effect of ECT on memory.

• **BASIS ADVISOR:** JennaLynn Hunnicutt • **ON-SITE MENTOR:** Dr. Nathan Johnston, D.O., M.S. • **LOCATION:** Phoenix Mental Health

GOHITH R.

IS AI REVOLUTIONARY FOR SMALL BUSINESSES?

SUMMARY: AI has been making waves recently within all fields. ChatGPT has been used by many students to give schools a difficult time catching plagiarism, and companies have been using it to automate many things like chatbots. Stable Diffusion and Midjourney have let companies make images without the cost and time of artists, causing controversy. Nevertheless, there are apparent advantages of AI like ChatGPT. However, implementing these tools can be expensive. Through this internship, I aimed to answer how cost-effective developing an AI tool for a small business would be. My internship will take place at an IT company that mainly focuses on solving tickets, a report of a technological problem. I focused on training AI that's going to be used by our technicians. The three projects I was assigned are estimating the time it takes to complete a ticket, assigning a ticket to the predicted fastest technician, and retrieving all documents relevant to a certain ticket. The document retrieval project, in particular, seemed to be the most difficult to be because the documents and tickets are very different from what is assumed when making an information retrieval system, a system that tells whether a document is relevant to a certain query. There's multiple ways to do this, including using statistics as well as machine learning, but it seems like machine learning will be able to do it more accurately. I also compared the effectiveness and the cost of developing traditional, non-AI automation tools compared to AI. With this internship, I furthered my understanding of AI as well as how small businesses prioritize the development of technologies.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Ryan Valdez • **LOCATION:** Straight Edge Technology, Inc.

IAN R.

GROWING SEASON

SUMMARY: One of the beginning signs of a government's decline is the plummet of the standard of living amongst its citizens, where poverty runs rampant, and addiction follows suit. In this manner, Bolivia has proven to be the pinnacle of the phenomenon where government instability following government divide, foreign intervention, and a lack of political efficacy has led to high poverty within its population, resulting in increased drug consumption among those in poverty, which has disproportionately affected the youth. To combat these issues, the Bolivian government, like most other governments, has grown a reliance on non-profits to find respite in these dire times, which has led to the question of whether these entities are the most productive solution. This project will tackle this inquiry where I will analyze the practices of the renowned rehabilitation non-profits within Bolivia such as Wiñay Pacha. Through my time within Wiñay Pacha I will have the opportunity to discuss the practices and the effects with the organization's directors, workers, and patients to analyze the impact's significance. In doing so, I will gain greater nuance within the appropriate combative and preventative measures regarding poverty and addiction and, in turn, be able to utilize this understanding as background when implementing policies into the U.S. system.

• **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Lic. María de Pilar Ponce Leon
• **LOCATION:** Sacaba Bolivia

YASH S.

EXPLORING GENERATIVE ARTIFICIAL INTELLIGENCE IN RADIOLOGY

SUMMARY: Research in generative artificial intelligence (AI) in radiology has exploded over the past five years. By interning under the mentorship of a radiologist/informatics expert and medical students at University of Texas Health San Antonio, I will develop a stronger understanding of the use of generative AI in radiology. Specifically, I will have the responsibilities of contributing to two AI projects. The first project is XLay, where I helped to compare the ability of two large language models to simplify radiology reports into patient-accessible language. I have completed the data collection and mostly completed the statistical analysis of the results. I am currently finishing the statistical analysis and writing these results into a final manuscript. My second task is to develop a web application that will showcase the performance of an artificial intelligence model that can generate radiology reports of chest radiographs. I am currently developing a prototype of this application and expect to complete it within the coming weeks. In the long run, I hope to implement this application into UT Health San Antonio for a trial study to investigate the impact of this AI application on radiologist workflow and diagnostic accuracy.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Dr. Kal L. Clark, M.D.
• **LOCATION:** UT Health San Antonio - Department of Radiology

JUDE S.

STOCK MARKET BOT: PREDICTING STOCK MARKET TRENDS THROUGH TIME SERIES FORECASTING

SUMMARY: AI over time has shown its strength in being able to predict data. The machine learning task in predicting the future of a historical dataset of values is called time series analysis, where the dataset that lists values over time is called a time series. This task can be applied to predict stock market trends, however multiple problems arise, the stock market has complex patterns, and it can be unpredictable as it can be affected by external factors. This project will find the best approach to predicting stock market trends using a variety of methods and time series strategies as well as sentiment analysis, which will evaluate the sentiment of news articles to provide a source of external data in which the model will determine its relationship to the prices. Through programming different models, data collection of performance and losses, analysis, and improvement, this will be conducted research. While difficult, my goal is for my model to have an accuracy rating of 50% or higher in terms of predicting if the stock prices will go up or down. My work on this project will help prepare me for doing research or work in fields such as machine learning, data science, and statistics. As of now, I have implemented time series forecasting and my current objective is to test and experiment. I will be soon adding natural language processing.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Ashwin Raja Shanmuga Raja • **LOCATION:** Virtual

RAHUL S.

POLICY GRADIENT METHODS TO IDENTIFY POWER FLOW EQUATIONS WITH MANY REAL SOLUTIONS

SUMMARY: Electricity is an essential part of the modern world. Every day, there is electricity being wasted due to inefficient power flow. This could be due to multiple reasons, from transformer losses to inefficiencies in grid operations. As a result of the population growing and more technology being dependent on electricity, it is important to make the transportation of electricity more efficient. In order to find efficient ways of transporting current, it is important to look at power flow equations. Power flow equations are a collection of quadratic constraints with an "n" number of variables that model the number of steady states in a power-flow network. Systems with many states—that is, power flow equations with many real solutions—are of interest for stability analysis of power-flow networks. The non-linear nature of the power-flow equations makes it hard to count their number of solutions and find the systems with many zeros. Currently, the practical systems have thousands of variables whereas the theoretically analyzed equations are about the order of 30 variables. This project aims to develop a reinforcement scheme that will implement an approximate reward function to search for systems with many solutions in the space of power-flow equations. Currently, I am programming a rough approximator. By employing advanced computational techniques, such as reinforcement learning, the project seeks to enhance the understanding of power flow dynamics and discover more efficient ways to transport electricity. This project will be pursued at the University of Texas at San Antonio School of Data Science, with the help of a team with previous experience in electrical engineering.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Dr. Ergur, Ph.D. • **LOCATION:** University of Texas at San Antonio - School of Data Science

RILEY S.

ASSESSMENT OF MISREPORTING RATES IN SELF-REPORTED FLOSSING FREQUENCY AMONG PATIENTS

SUMMARY: Flossing is a hallmark of good oral hygiene. Not only does it remove plaque and food particles, but it also prevents cavities and gum diseases such as gingivitis or periodontitis. Nonetheless, some do not floss, and some lie about flossing. However, a patient's oral cavity reveals the truth. My project took place at Jones & Associates, DDS, a dentist practice that sees a wide variety of demographics, making this location optimal to pursue my topic of inquiry: the misreporting rates of flossing in patients. To assess the misreporting rates in self-reported flossing in this project, the patients are asked if they floss and how often. Then, a dental hygienist assesses the patient's oral cavity to determine their flossing effectiveness. Throughout the project, I analyzed data on the misreporting of patients and how their flossing habits affect the degree to which they lie. The results surprised me with only around 20% of patients lying about their flossing habits. I expected more patients to misreport their flossing habits, but many patients choose to deflect from the questions with nondescript answers instead of reporting inaccurate information. This research can potentially be used to determine new ways to combat patients lying to their doctors about health information and gain a new perspective on doctor-patient interactions.

• **BASIS ADVISOR:** Elise Gerard • **ON-SITE MENTOR:** Dr. Jones, DDS • **LOCATION:** Jones & Associates, DDS

BENJAMIN S.

THE GROWING EPIDEMIC

SUMMARY: The Growing Epidemic attempts to explain the need for further research and advancement in the realm of cancer therapies. As cancer cases and cancer-related deaths continue to soar, it is the job of researchers to advance technical knowledge towards the cure of cancer. Early detection and understanding of factors that can predispose an individual to cancer is an essential method to its prevention and successful treatment. Conducting my senior project at UT Health San Antonio with top researchers in the world and eager PhD students, the environment supports new development and effective research of existing treatment methods. Working specifically with Dr. Jae-Hoon, a renowned scientist, I gain a unique advantage in working towards the creation of treatments. Dr. Jae-Hoon uses his background in cellular imaging to help express his results from each experiment and their significance. It is crucial to not only be able to conduct an experiment on the cellular level, but also express those results in a way that scientists can collaborate on. I was specifically tasked with introductory experiments that are crucial to later work in cell biology. Learning to culture cells, pass cells, and conduct Western Blotting experiments were three key focuses of my internship. In essence, I hope that my mastery of the introductory skills and procedures will allow me to thrive in my undergraduate laboratory work. As I build my foundation, it is my goal that I will be able to make links between known experimental results and the pathways that achieve those results.

• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Dr. Patrick Sung, M.D., Ph.D. • **LOCATION:** UT Health San Antonio - Department of Biochemistry & Structural Biology

RIYA S.

HOCUS POCUS: A COMPARISON OF HANDHELD ULTRASOUND DEVICES

SUMMARY: Point-of-care ultrasound (POCUS) is rapidly becoming a prevalent tool across various healthcare specialties to guide clinical decision-making. POCUS has been shown to reduce procedural complications, improve bedside diagnostic accuracy, reduce diagnostic testing, and improve patient satisfaction. Despite these benefits, accessibility to portable ultrasound machines has consistently been a significant barrier to the expansion of the use of POCUS. In 2012, the World Health Organization estimated that nearly two-thirds of the world does not have access to basic diagnostic imaging services. However, in recent years, the growth of handheld ultrasound devices ("handhelds") has increased the use of POCUS technology for many clinicians, at only a fraction of the cost. This project will be conducted primarily at Audie L. Murphy Memorial Veterans' Hospital where extensive research and advocacy are already occurring to better implement the use of POCUS in clinical practice. This is a prospective observational study comparing six handhelds readily available in the United States (Butterfly iQ+™ by Butterfly Network Inc.; Clarius™ by Clarius Mobile Health; Kosmos™ by EchoNous; TE Air™ by Mindray; Vscan Air™ by General Electric; and Lumify™ by Philips Healthcare). A multidisciplinary group of 35 physician POCUS experts compared the performance of the handhelds by first acquiring three specific views (right upper quadrant, cardiac apical 4-chamber, and superficial neck and lung views). Afterward, experts rated the individual image quality, overall ease of use, overall image quality, and overall satisfaction of each device, and ranked the devices against each other. We will report a comprehensive analyzation of the findings observed, and most importantly, will be answering the big question, asked by many healthcare professionals, which device should I buy?

• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Ariadna Perez-Sanchez
• **LOCATION:** Audie L. Murphy Memorial Veterans' Hospital

ANONA T.

BEATING HEARTS: A JOURNEY THROUGH MEDICINE

SUMMARY: Communication is the heart of every field, but its pulse is felt the strongest in medicine as it bridges the chasms between physicians and their patients. In my aspiring journey to become a compassionate physician, I hope to immerse myself in the poignant narratives of sacrifice and healing from physicians and medical experiences, entwining them together to culminate in a novella—one that reveals the unshared stories left at the hospital. The landscape of medical literature, predominantly non-fiction, usually reflects physicians' viewpoints, even when describing patient experiences. This project seeks to introduce a new perspective—that of a high school student aspiring to enter medicine—while also incorporating firsthand accounts from physicians and their patient experiences. The project will result in a novella consisting of three components: patient experiences, physician reflections, and my journey of self-reflection and growth as an aspiring physician. Throughout my time shadowing at the May's Cancer Center, I have come to understand the multifaceted nature of medicine and the increasingly capitalistic overtaking pharmaceutical companies have over this field. Despite the disadvantages associated with entering medicine, this experience has proved truly rewarding after seeing the world of difference a physician can make in a patient's life. The relief on a patient's face after hearing that the surgeon has removed the entirety of the tumor, or observing a family grasp a well-defined treatment plan, offering the best possible outcome, reaffirms the invaluable difference physicians can make. Ultimately, the conclusion of this project and the novella underscores my hope in entering medicine, the emotional journey behind becoming a physician, and the views of patients to uncover a broad spectrum of perspectives in medicine.

• **BASIS ADVISOR:** Robin Martin • **ON-SITE MENTOR:** Dr. Ismail Jatoi, M.D.
• **LOCATION:** UT Health San Antonio, Mays Cancer Center

HUDSON T.

THE DIRT ON CLIMATE PAST

SUMMARY: The subject of climate change has become an increasingly pressing issue in recent decades. Dubbed "Global Warming," this crisis is often framed as the undue heating of the Earth. In actuality, the real crisis lies in the unnatural speed at which the change is occurring. During my internship at UT Austin's Jackson School of Geosciences, I researched the natural fluctuations of Earth's climate. I analyzed paleosols, deposits of ancient carbon from the atmosphere that have formed in the soil for thousands or even millions of years. These carbons have the ability to reveal the land surface temperature at which they were captured in the soil, which can be used to model climate over a vast period of time. I worked under Professor Daniel Breecker, who has already conducted years of study on paleosols. The purpose of his research and the purpose of my project is to search our climate past for clues to solve climate change as it's affecting us now. My initial intention with this internship was to construct temperature maps spanning thousands of years from one specific region, China's Loess Plateau. Over time I expanded this goal to include the development of the method of construction itself. Though this isn't a completely new process, during my internship we developed our own unique means of executing it. Additionally, I gained an understanding about how climate research is conducted, as well as proper university laboratory procedures. This knowledge will prepare me for a long-term career in researching a solution to the modern climate crisis.

• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Dr. Daniel Breecker, Ph.D. • **LOCATION:** University of Texas at Austin - Department of Earth and Planetary Sciences, Jackson School of Geosciences

SEBASTIAN T.

WORKING UNDER A LEAD REGIONAL SYSTEMS CONSULTANT

SUMMARY: The Senior Project, titled "Working under a Lead Regional Systems Consultant," delves into the intricate dynamics of Information Technology (IT) within the healthcare sector. Over the course of this project, I engaged in providing technical support to medical professionals, addressed their technological challenges, and streamlined healthcare delivery processes. One of the key tasks I undertook was managing email correspondence, which provided insights into the importance of clear communication and attention to detail in the professional world. Despite its apparent simplicity, this task proved to be crucial in maintaining the smooth functioning of IT operations. Additionally, I had the opportunity to shadow a medical professional overseeing multiple clinics, gaining firsthand experience in the integration of technology into healthcare workflows. This exposure has deepened my understanding of the critical role IT plays in enhancing patient care and optimizing healthcare management. Through my experiences, I learned the significance of resilience, adaptability, and effective time management in navigating the challenges of the IT field, particularly in healthcare settings. Each obstacle faced, whether mundane or overwhelming, contributed to my professional growth and prepared me for the dynamic nature of the industry. Overall, this project provided valuable insights into the intersection of IT and healthcare, equipping me with the skills and knowledge necessary to contribute meaningfully to the advancement of healthcare practices through innovative IT solutions.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** James Perry • **LOCATION:** WellMed

MACKENZIE V.L.

"WORK, WORK, WORK, WORK, WORK, WORK" — MAINTAINING EFFICIENCY AND SUSTAINABILITY OF AIRCRAFT MAINTENANCE COMPANIES

SUMMARY: "Green Aviation" is a worldwide movement aimed toward eliminating carbon emissions from the aeronautics industry by 2050. Companies such as NASA, Boeing, and Rolls-Royce are studying sustainable forms of aircraft travel to preserve the atmosphere from harmful greenhouse gasses. However, to achieve complete sustainability within the aviation industry, every aspect of the aircraft manufacturing process must be addressed, including aircraft maintenance and repair processes. Maintenance companies such as Textron Aviation frequently struggle with maintaining efficient and standardized practices within their day-to-day protocols. To blend my passion for mechanics and sustainability, my project is aimed toward implementing sustainable, yet continuously efficient maintenance practices for the company. Because I aspire to obtain an aircraft and powerplant mechanics certification in college, I spent the first five weeks on the floor gaining experience as an aviation mechanic and observing potential issues/problems that can be addressed in the last five weeks of the project. After my time on the floor, I worked on formulating a SWOTS (Strengths, Weaknesses, Opportunities, Threats, Sustainability) team for the company, exploring the possibility of implementing renewable maintenance practices throughout the aviation industry, and further studied its effect on the company's productivity and resource availability. This project served as my initial steps toward studying sustainable engineering and obtaining my mechanic's license in college. Ultimately, placing me milestones closer to commercializing the aerospace industry toward a carbon-free future.

• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Mr. Chad White • **LOCATION:** TEXTron Aviation - San Antonio

MARCO V.

CENTS AND SENSIBILITY: THE JOURNEY TO FINANCIAL FREEDOM

SUMMARY: In the current landscape, despite the wealth of information available, financial literacy remains a skill that many individuals still lack. Rather than taking the initiative to understand and manage their finances, a common trend is to rely on the expertise of financial advisors or tossing their money into a savings account yielding barely any interest. Choosing a less conventional path, I am determined to break away from this prevalent reliance on external professionals and arm myself with the knowledge and skills necessary to independently and strategically trade my own assets. This involves not only becoming proficient in navigating trading platforms but also developing pattern recognition and a keen understanding of market dynamics. This project goes beyond showcasing the potential of self-managing assets; it emphasizes the importance of empowering oneself to navigate the intricate world of finance confidently. Under the guise of a professional day trader, I learned the true difficulty of day trading and determined whether an average person could confidently undertake this endeavor. I can confidently say that trading effectively does not come as easily as it looks and is not a linear path toward success. With bumps along the way and my taking of profits while cutting my losses, I learned so much about market trends and reading charts. I underestimated the difficulty of managing one's own assets, but I can't wait to learn more of this entrancing endeavor and the mental state needed to be successful.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Mr. Kingston • **LOCATION:** Virtual

ABEL V.

NUMBERS, NUMBERS, NUMBERS, BUSINESS, BUSINESS, BUSINESS

SUMMARY: The Eighth Wonder of the World is the lifelong question: "What do accountants do?". Like most people, I grew up idolizing accountants, but I was unsure how someone pursued this career pathway and what the responsibilities of this profession entailed. This Senior Project will be focused on the skills and knowledge necessary to become an accountant and how to survive during the tax season. During my accounting internship at FSC Consulting, I had hoped to develop the skills necessary to become a full-time accountant like how to use QuickBooks and Microsoft Excel and how to do data entry and reconciling credit card statements. So far I have managed to learn a majority of these skills. Over these last four weeks, I have learned how to do Quickbooks desktop, data entry, and reconciliation. Although I expected to learn how to do these activities during my internship, I have also had to learn plenty more tasks that I didn't even know existed. For example, I learned what a check registry was for the first time. As we approach April, I managed to get a first-hand look at the stress caused by the impending tax season. Deadlines are getting met, and clients will come in unannounced with an entire year's worth of documents for us to file their taxes last minute. Overall, these last four weeks have served as a wonderful crash course on accounting and will provide me with the basis I need for my final product paper and my future career.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Laura Khan • **LOCATION:** FSC Consulting

ISABELLA V.

PEEP IN THE DEEP: A JOURNEY INTO BAT CONSERVATION

SUMMARY: This Senior Project is an exploration toward professional growth in the bat conservation field. The goal of this project is to assist Bracken Cave Preserve in bat conservation efforts in order to gain improved field skills as well as greater technical knowledge of Texas bat species, their conservation issues, and continued conservation efforts. During this project, I've had the opportunity to develop field experience while combating bat conservation issues through surveying various Texas caves for white-nose syndrome, a fungal disease that inhibits bat survival, and surveying culverts for the presence of roosting bats. These projects are utilized to gauge the impact and range of white-nose syndrome within Texas cave systems and assess how and when bats utilize urban structures like culverts as roosts. With each outing, I learned more about bat species identification, roosting behavior, bat life history, and the data collection process. Additionally, my fieldwork has expanded beyond bat conservation to include focuses on avian species like the Black-Crested Titmouse through nest surveying and native Texas trees through legacy tree surveys. Undertaking a broader range of work allows me to develop more holistic field knowledge that expands to both plant and animal species. Accompanying fieldwork, I've also engaged in science communication through public outreach which allows me to advocate for the preservation of bat habitat and address some of the inaccuracies and stigma surrounding bats. Together, these ventures create a multidimensional approach to bat conservation that enhances the scope of the knowledge and skills I gain during this internship.

• **BASIS ADVISOR:** Rosemary Everts • **ON-SITE MENTOR:** Krystie Miner • **LOCATION:** Bracken Cave Preserve

ORPEN Y.

MAXILLOFACIAL RADIOLOGY: A HISTORY FROM ITS CREATION TO ITS FUTURE

SUMMARY: Often, the trip to the dentist can be nerve-racking for many people. However, arguably the most invasive procedure are the x-rays, which make you bite on plastic holders. While X-rays are typically easy, maxillofacial ones are even easier due to only needing the patient to bite something at an angle. Initially, radiology started as a way to diagnose any kind of problem, and instead of specialized doctors who took years of classes in order to do what they do, it would be general practitioners who diagnosed, and what they diagnosed was based on norms at the time, which never really accounted for an internal look into the body but rather an external one. This was initially discovered by Wilhelm Conrad Roentgen in 1895 while testing out cathode rays. Recently, however, the traditional way of doing radiology has changed with the rise of AI, which analyzes many forms of radiology almost immediately and diagnoses them almost as fast with barely any error, including maxillofacial radiology. One of the key topics I focused on was the growth of AI. While extremely controversial, it has reached monumental heights with the amount of investment it has made. I worked with Dr. Geha to uncover and analyze the history of maxillofacial radiology, including its uses with and without AI. I also tackled the industry's strengths and weaknesses and created a cohesive paper where I analyzed AI's benefits to the industry.

• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Dr. Hassem Geha, D.D.S., M.D.S.
• **LOCATION:** UT Health San Antonio - Department of Comprehensive Dentistry

HAILEY Y.

WOMEN IN THE BUSINESS WORLD

SUMMARY: In my project, I created a podcast to shed light on problems women face in the business world, and how they overcome them. I created a series of podcast episodes that feature a few female entrepreneurs throughout the series. Each episode featured a different interview with a female business owner or entrepreneur. In these episodes, I interviewed various female business owners, and discussed challenges they faced while starting and operating their businesses. I did an in depth dive into the entrepreneurs, and focused on their backgrounds and business achievements. I wanted to see how they created their business and how they ran them successfully. Everyone's business owning experience is different, which is why I wanted to feature a wide variety of business owners. Women have been disadvantaged throughout history, especially in the business world, but many have overcome these challenges by doubling their efforts. In my project, my interviews have taught me how catering to your business needs is important, because every business needs to be run differently. I also learned that websites and social media can play a vital part in advertising and communication, and being passionate about your business and enjoying what you do, is also important to success. My off-site advisor is Anna Robinson, an Austin-based interior designer and she advised me during my project, and gave insights into the world of female entrepreneurship. My goal is for individuals to use my podcast as a guide to help share the knowledge and supply new business owners with some helpful techniques.

- **BASIS ADVISOR:** Jonathan Guerra • **ON-SITE MENTOR:** Mrs. Anna Robinson
- **LOCATION:** Anna Robinson Interior Design

LAUREN Y.

RUNNING WITH INTENT

SUMMARY: Running means different things to different people; to some, it can be a form of therapy, and to others a way of getting physical activity in. To me, it's always been a means of self-improvement, whether mental or physical. With every run, I make sure I have direction. When I trained for my first marathon, my training was all done for the final goal of simply crossing the finish line. This next time around I'm taking a more analytical and studied approach to marathon training but adding in a different variable: improvement. To measure my progress and improvement, I will be trying to beat my previous marathon PR, personal record, and analyzing my oxygen intake rate (which means an athlete's efficiency) is also on the table for progress measurements. On top of running, I will add strength training, nutrition, and recovery periods to my study. With the help of my experienced advisor, Gaby Medina, a multiple time major marathon participant, together we will create a training regimen and nutrition foundation for improvement. My final goal throughout my running-based project is to cut time off of my previous marathon time, being 5:38:26. I'm hoping to cut at least 10 minutes off of my time, for a final goal of 5:28:26. My methods will be analyzed and improved throughout the process, and data will be taken to increase the improvement rate during the ten-week project.

- **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Gaby Medina
- **LOCATION:** Gold's Gym & Phil Hardberger Park

ERIC Z.

FINDING PERFECT WATERMELONS: NON-DESTRUCTIVE RIPENESS DETECTION VIA PHOTOACOUSTICS

SUMMARY: Watermelon is universally recognized for its distinctive appearance and taste. However, it is notoriously difficult to determine a watermelon's ripeness and quality. Many testing methods like "knocking the watermelon" fail because they are indirect and rely on specific testing conditions. Photoacoustics is an emerging imaging technique that determines properties of biological tissues by detecting ultrasound generated by pulsed light. This technique is currently being investigated for applications in diagnosing and treating burn wounds and cancers, and it has potential to solve the watermelon ripeness question. This is significant because it offers a solution to a significant source of food waste, and similar technology may be used to assess the quality of other foods. The project was conducted at Texas A&M under the guidance of Dr. Cheng Fang, who has extensive experience with photoacoustics and sensor research. It was completed through construction of prototypes of a photoacoustic sensor, coding of feature extraction algorithms for data processing, and testing and iteration. By the end of the project, a functional, compact, and cost-effective photoacoustic probe that can accurately predict the relative ripeness of watermelons was developed. Although the road from idea to final project was not without difficulties, I learned many things about the engineering design process and surmounting challenges. Moreover, I mastered the calibration of instruments and became accustomed to the tools of various Python libraries that are useful for data analysis. If I were to change any part of my project, I would have started with working on the physical prototype rather than the code, as it would become the most difficult part of developing the photoacoustic probe. Overall, I'm glad to have had this opportunity to learn about sensors and engineering design.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Cheng Fang • **LOCATION:** Texas A&M University - NetBot Lab

DRAGONS

The teachers, administrators, staff, and executive leadership of the BASIS Charter Schools network **commend all of our seniors for their perseverance** in their research, and for their hard work throughout their BASIS Charter School journey. We give **our most heartfelt congratulations** to them for their achievements thus far, and these projects are only the beginning!

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