Senior Projects
2022–2023

BASIS SAN ANTONIO – SHAVANO CAMPUS

SENIOR PROJECTS

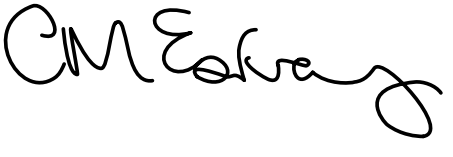
At this point in their senior year, BASIS Charter School students have completed a set of four BASIS Capstone classes to earn their BASIS Honors Diploma. In addition, many students are in the process of completing the prestigious College Board's AP Capstone Diploma™, a challenging, two-year sequence 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 the students' 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.

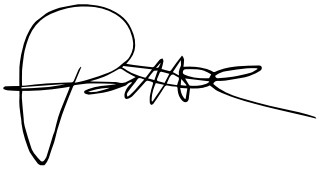
Under the guidance of an external advisor who is a professional in their field, as well as a faculty advisor from their school, students dedicate 10–15 hours per week to the completion of their Senior Project. To document their journey, students post weekly blog entries about their experiences, successes, and challenges as they explore their guiding question. This journaling provides a unique viewpoint on the student 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 as they develop investigative skills and their own individual scholarly pursuits. 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 and learning. 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+



Patti Bezanson
Chief Executive Officer
BASIS Ed Texas


BASIS®
CHARTER SCHOOLS
San Antonio SENIOR PROJECTS
Shavano Campus™

AARUSH A.

ADVERSARIAL ROBUSTNESS OF A NEURAL NETWORK

SUMMARY: Currently, there is a problem with machine learning and neural networks because there are significant safety risks that still need to be addressed. It comes down to the adversarial robustness of a network, which is how resilient a network is to adversaries and black swan events. In the near future, AI and neural networks will be everywhere, making use of machine learning in order to advance society. For example, AI is used today to help diagnose melanoma in patients. However, if the neural network analyzes an unusual scan of a patient and the network identifies it incorrectly, it could cause death. Examples such as these demonstrate that adversarial robustness is crucial to a neural network. The project will be completed virtually with a UTSA Ph.D. student who has experience researching adversarial robustness. It will be completed through writing and testing code, data collection of the neural network accuracy, and analysis of collected data. This will allow me to develop conclusions on the effectiveness of the solution. I expect the undefended network to fail completely against an attack, while the defended neural network will be able to stave off attacks and still be able to function against usual inputs.

- **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Suraj Singireddy
- **LOCATION:** University of Texas at San Antonio

JULIE A.

INFORMATIONAL AWARENESS OF CHILDREN'S MOTOR SKILLS DEVELOPMENT

SUMMARY: At each age there are developmental milestones that need to be met. These milestones can include crawling, holding a pencil, and even walking. It's important that children are given every resource they can to help them achieve each goal. Affording specialized facilities, such as Teddy Bear Pedi Care, isn't always an option. Not only can it be unaffordable, it can also be inconvenient. These facilities have numerous appointments weekly, and for some parents, it's not realistic for their schedule. To combat this problem, this project will be conducted hand in hand with Teddy Bear Pedi Care, a facility that works specifically on motor development for children. Through this site's own employees, their experiences, and informational resources, I will create a website. This website will have a comprehensive page on each stage of motor development and activities that can be used to encourage their child to reach these important milestones. Through this website, lower-income parents will be able access vital information about their child with no extra costs and be able to complete these activities from the comfort of their own home.

- **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Connie Martinez • **LOCATION:** Teddy Bear Pedi Care

KINSEY A.

DEVELOPING A BINGE EATING SYNDROME TREATMENT FOR OLDER WOMEN (60+)

SUMMARY: The epidemic of eating disorders has only grown exponentially in modern society. Many stigmas still exist towards those who struggle with eating disorders and other mental health issues. Older women are consistently overshadowed in the medical community, and there is a lack of treatments for binge eating disorder (BED) that target the older female population. It is estimated that about 13% of women over the age of 50 struggle with an eating disorder. Many of these women never seek help due to stigmas of eating disorders being considered "teenage diseases." This project aims to not only destigmatize eating disorders for older populations, but also to create a novel treatment for binge eating disorder that is tailored to women aged 60 and over. I am following the current BESTOW project at UT Health Science Center San Antonio and observing this study as my senior project. Groups of 3–5 women will undergo weekly cognitive behavioral therapy and will be asked to fill out surveys and write reviews of their treatment in order to better improve and tailor the therapy for future participants. I will observe these sessions and review the surveys, recording the process of developing this treatment. Ideally, this study would add another, more targeted treatment for elderly women who suffer from BED, and when the study is complete, the treatment will be published and produced for use in older women across the country.

- **BASIS ADVISOR:** Staci Connolly • **ON-SITE MENTOR:** Dr. Lisa Smith Kilpela
- **LOCATION:** UT Health San Antonio

VALENTINA A.

A DEEP DIVE INTO THE OBESITY EPIDEMIC IN THE U.S.

SUMMARY: Obesity in the U.S. has been on an upward trend for some time now. As of today, around 40% of adults and around 20% of children are obese in the U.S. Obesity increases one's risk for serious health issues such as cancer, diabetes, and cardiovascular diseases, as well as decreases one's life span. Not only is obesity a health issue, it's also an economical issue as obesity's direct costs cost the U.S. around $173 billion dollars annually, not including the indirect costs caused by things such as lack of productivity. While many things have been tried to decrease the obesity rate, not many have worked. In my research I will be looking into what the different solutions have been and observing how effective they have been. The solutions I look into will not be limited to the U.S. if I can find countries that have successfully decreased their obesity rate or that have a significantly lower obesity rate, I can hopefully use those as inspiration for solutions that could be implemented in the U.S. I will be also looking into what seems to be the different causes of obesity in the U.S., as I think it's important to address the root of the issue in order to successfully decrease the obesity rate.

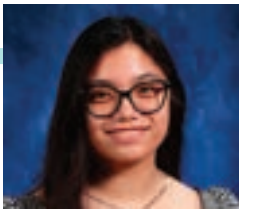
- **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Gemma Fuentes Góngora, Director
- **LOCATION:** Centro de Medicina Integrativa y Alimentación Consciente del hospital Ángeles Puebla

WARDAH A.

THE COST OF AMERICAN HEALTHCARE AND HOW IT AFFECTS POPULATION HEALTH

SUMMARY: If we compare America to other high-income countries, we find that despite our high health expenditures, Americans still live shorter lives and have more illnesses and injuries. To explore this correlation between health and cost, I will conduct research to see if low-income Americans have worse health than high-income Americans. Many people in the U.S. are affected by the high cost of healthcare. According to America's Health Rankings, it was reported that 27.4 million adults in 2020 needed a doctor's care, but couldn't receive it due to the cost. Researching the relationship between healthcare cost and population health in low- versus high-income adults is significant in increasing awareness of high health costs in the U.S., which can lead to reforms in America's healthcare system to reduce financial barriers or burdens. My research will be done independently under the guidance of Dr. Rozmin Jiwani, an associate professor and nurse-scientist at UT Health San Antonio and South Texas Veterans Health Care System. Her experience in research, especially on chronic conditions, and her experience with the VA, which covers many expenses for veterans, will ensure my project's accuracy. This research will be conducted via secondary data analysis, where I will analyze statistics on healthcare cost and population health in order to find a correlation, as well as a comparison between high-income and low-income individuals. I expect to find that low-income individuals have a statistically worse population health than high-income individuals as a direct result of the high costs of healthcare.

- **BASIS ADVISOR:** Julia Villarreal • **ON-SITE MENTOR:** Dr. Rozmin Jiwani, R.N.
- **LOCATION:** Virtual, University of Texas Health Science Center at San Antonio



NICOLE B.

H_2O_2NEY: PEROXIDE ACTIVITY OF DIFFERENT HONEYS AND ITS ANTIMICROBIAL PROPERTIES

SUMMARY: Honey is a popular food used in natural medicine, commonly used for stress and allergy relief or as a dietary alternative for sugar. However, it is a little-known fact that honey can be used in wound dressing. Although not a common treatment for wound dressing, honey patches are used by the military as an alternative for harsher remedies. This is due to the antimicrobial properties of hydrogen peroxide that is produced when honey is exposed to a solvent. The production of hydrogen peroxide is a useful characteristic in wound dressing to prevent infection and to kill harmful microbes. I intend on researching the efficacy of honey's antimicrobial properties through measuring the hydrogen peroxide levels of various types of honey. I will also be measuring glucose and ascorbic acid levels in the samples on account of those components being a source of peroxide production. In order to do so, I will be using test strips to qualitatively measure the aforementioned components, which will allow me to determine the efficacy of honey's antimicrobial properties. This research will be conducted in the Flawn Sciences Building at UTSA as part of ongoing research by Dr. Ozturk. Working in his lab will give me the opportunity to work with researchers who will guide me throughout my research. At the end of my research, I hope to contribute to Dr. Ozturk's research on determining the efficacy of honey's antimicrobial properties through the analysis of hydrogen peroxide levels.

- **BASIS ADVISOR:** Rajeswari Mani • **ON-SITE MENTOR:** Dr. Ferhat Ozturk
- **LOCATION:** University of Texas at San Antonio, Integrative Biology Department

SAHANA B.

UNDERSTANDING FACTORS OF DEMENTIA IN HISPANIC VS. NON-HISPANIC PATIENTS

SUMMARY: Alzheimer's disease and related dementias (ADRD) are neurodegenerative diseases that can negatively impact a patients' memory, movement and overall ability to function. While often attributed to aging, these diseases can also be found disproportionally within minority populations like the Black and Hispanic communities. While an aging mind is a factor to disease progression, healthcare disparities that limit accessibility of resources for minority communities are emerging as cofactors as well. However, overall information on minority populations is limited. Even large, nationwide organizations, such as the National Alzheimer's Coordinating Center (NACC), report only 8% of enrolled participants being of Hispanic/Latino descent. The Glenn Bigg's Institute for Alzheimer's and Neurodegenerative Diseases is unique, bringing in patients from all over South Texas to receive clinical care and participate in studies dedicated to identifying novel factors and markers of ADRDs. Given their patient pool, this allows a greater focus on the Hispanic population. This project will document my time at the Glenn Bigg's Institute, where I will analyze factors self-reported out of the Hispanic community via ongoing social determinants of health studies and surveys at the institute. I intend to identify links between Alzheimer's disease progression and the Hispanic community and to address potential solutions that could close up identified disparities, bringing awareness to the disparities and issues surrounding ADRDs.

• **BASIS ADVISOR:** JennaLynn Hunnicutt • **ON-SITE MENTOR:** Ms. Ashley LaRoche
• **LOCATION:** Glenn Biggs Institute for Alzheimer's and Neurodegenerative Diseases

BIANCA C.

COMPARING THE AMERICAN AND MEXICAN HEALTHCARE SYSTEMS

SUMMARY: In recent years, many Americans have been heading to Mexico to receive their medical care. One of the primary reasons many Americans choose to travel south of the border for medical treatments is the price difference, but is that the whole picture? The main objective of this project will be to observe the contrasting healthcare systems of the United States and Mexico, and will evaluate which system holds more value: quality vs. quantity. This project seeks to address certain doubts and frustrations with the American healthcare system by comparing it to that of a neighboring country. Though there is already plenty of research comparing global healthcare systems, these studies tend to lean more towards comparing the United States to more efficient universal healthcare systems seen in Canada or Europe, not countries that take a different approach on the issue. In comparing the U.S. to Mexico, this project adds a different perspective to how we view American healthcare on the global level by not quickly dismissing it as being ineffective compared to more established systems. Additionally, having an immersive experience in one of each country's clinics would help make the comparison more trustworthy and valuable.

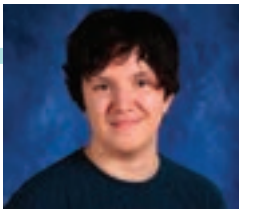
• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Dr. Jose Esquilin • **LOCATION:** Methodist Children's Hospital

EMILY C.

CREATING, PRODUCING, AND RELEASING AN ALBUM

SUMMARY: Music is an inconsistent field. I know lots of talented people who love music, but they are too afraid to go into it because they don't know if they will be able to establish themselves. I am an amateur musician, and for my senior project, I am going to release an original album and see how much popularity I can gain over the span of 10 weeks in order to give other musicians an idea of how an unestablished, unsigned, independent artist will do in the current music industry. I am going to be writing about 40 minutes of original material, working with a producer to produce it, getting rights to my music, releasing my work on Spotify, and having a concert-style performance. At the same time, I am going to try to promote my album like more established artists do in order to gain as much of a following as I can. I'm going to release my album in the 8th week, and at the end of the 10th week, I'm going to count the number of Spotify streams and see how that number compares to other artists. I will be working exclusively with my producer in order to simulate a "worst case scenario" situation where that artist has to work almost completely independently. My purpose is to show other musicians where they would stand if they entered the music industry and hopefully give them the confidence to do so.

• **BASIS ADVISOR:** Maria-Elena Rodriguez • **ON-SITE MENTOR:** Kerry Neubauer
• **LOCATION:** Kerry Neubauer's Home Studio



JOHN C.

MUSIC AND STANDARDIZATION: AUDIO ENGINEERING

SUMMARY: Songwriters and sound engineers have propagated their own curricula with music theory and audio engineering to share an objective and standardized understanding of the music creation pipeline. Though these models can work effectively to create great new music, their understanding is never required to do so and may instead be thought to depersonalize music. I intend to independently analyze the mathematical patterns within music I enjoy to truly understand the utility of music theory as a tool. I intend to conduct my research at the Audio EnginEARing Institute because their Grammy award-winning staff is immensely knowledgeable and passionate about music. As someone seriously considering a career in music, conducting this research could better my future work or allow me to spread my findings to others interested in music. The centralized information that I'm hoping to collect on music creation systems should answer many of the frequently asked questions of those entering the field, including whether or not much of the knowledge itself is worth knowing in a field as open ended as music. As a starting point for my research, I'll search the blog entries of—if not speak directly to—respectable songwriters and audio engineers to see what patterns they try to incorporate within their music. After recreating their compositions to better understand them visually, I will search for math-linked patterns to show how an understanding of math can help you understand music and how an understanding of music can help you understand math.

• **BASIS ADVISOR:** Chris Jordan • **ON-SITE MENTOR:** Marius Perron • **LOCATION:** Audio EnginEARing Institute

JULIETTE C.

MANAGING BUDGET IN REAL ESTATE AND CONSTRUCTION

SUMMARY: Designing a house is overwhelming. Realistic displays of integrating architectural and interior design are not evident. This often stems from a lack of transparency in what being an architect entails. I seek to expose the process and highlight the interactions between architecture and interior design. Going forward in my career as a residential architect, I will incorporate interior design with my education in architecture. There is a common understanding of how comforting the feeling of home is. People can have difficulty articulating what it is they want, but they know how it needs to function and the feeling they want it to bring. My research will consolidate expenses and help others better understand how to balance practicality and design. The data will be collected at TwoTen Communities, a development company. They will supply a rudimentary understanding of how different elements in a home should function together and be a guide to what is sought after in the market. For my design, I will choose a neighborhood, abide by their housing requirements, and adhere to housing codes. The first step is to flush out an idea for the major budget costs. Then, I will create a 2D rendering online by self-teaching how to utilize architecture design websites. Created as though designed for a client, the final product will be a 3D model of the house based on the drawings. I intend to demonstrate how structures are transformed from 2D to 3D and to provide inspiration for combining architecture and design.

• **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Steve Louis • **LOCATION:** TwoTen Communities

SOPHIA C.

FOODUCATION, PUT SIMPLY

SUMMARY: Currently, in the US, 41.9% of adults and 19.3% of children suffer from obesity. The significance of this number has only increased over the years, and the most natural method to combat this growth is through the encouragement of healthy eating and active lifestyles. With concerning dietary patterns often beginning at a young age, more effective food education should be implemented in schools starting as early as elementary and middle school. It is important to stop throwing terms such as "carbohydrates", "grains", and "proteins" at kids, hoping they will understand and immediately be convinced to change their diets. The reality is that most children don't consciously understand or care about what they are eating, and long lectures with confusing words won't change this. I hope to create a website, one that is interactive, captivating, and understandable for children, that will communicate essential nutritional advice in a way that will stick in their brains. The goal is for this website to be entertaining for kids, and less of a chore. It will serve as a useful tool for parents as well, with information on how to handle the eating patterns of stubborn, growing kids. It is important to begin implementing nutrition education into our population at young ages, to hopefully begin a subconscious combat against future obesity and health concerns. With the aid and expertise of local nutritionists, dietitians, and diabetes clinics, I hope to categorize and determine the most fundamental aspects of nutrition to include in a simplified, yet engaging platform for children. I expect that although immediate effects may not be explicit, there could be underlying long-term changes in the dietary knowledge and habits of the U.S. population.

• **BASIS ADVISOR:** Celine Vanweydeveld • **ON-SITE MENTOR:** Dawn Olynyk
• **LOCATION:** Heart and Rhythm Institute of South Texas

BRIGID E.

JUDGING A BOOK BY ITS COVER: AN ANTHROPODERMIC BIBLIOPEGY STUDY

SUMMARY: Anthropodermic bibliopegy is the phrase used for the practice of binding books in human skin. It is a combination of Greek words: human (anthropos), skin (derma), book (biblion), and fasten (pegia). The history of human skin books has always been widely speculated, from human tanneries in France during the revolution, to doctors covering their prized books in the skin of their patients, and prisoners becoming the binding of their trial transcript. It wasn't until 2014 that the library at Harvard University was able to confirm through scientific testing that a book in their collection was bound in human skin. This discovery prompted many libraries to test books in their collection that had been long rumored to be bound in human skin. However, these tests have always been based around single books in a collection. In my project, I seek to conduct the first systematic review of a historic medical library collection to search for evidence of anthropodermic bibliopegy. My site is the P.I. Nixon Historical Library, which houses approximately 6,000 rare texts in medical disciplines dating from the 15th to the early 20th century. Through the protein identification process of peptide mass fingerprinting, I will determine the origin of collagen-based book bindings in the collection. My goal is to educate the community on the history of anthropodermic bibliopegy as well as the process of peptide mass fingerprinting.

- **BASIS ADVISOR:** James Spencer • **ON-SITE MENTOR:** Diane Fotinos
- **LOCATION:** P.I. Nixon Medical Historical Library

ALISON F.

THE NORTHWEST PASSAGE AND ITS NATIVE COMMUNITIES: THE COMPLEXITY OF GLOBAL ADVANCES AND INTERNATIONAL PARTICIPATION

SUMMARY: The Northwest Passage is Canada's most crucial water crossing in navigating between the Atlantic and Pacific. As climate change continues to increase the global average temperature, the navigation of the passage is becoming more accessible and available for longer. This is causing an increase in trade movement and the presence of other countries looking to benefit from the new trade routes and exposed resources. This newfound movement's main issue is the effects it is having on the Native communities that inhabit the Canadian Arctic. Many of the effects that increased shipping has caused, in particular, targets Indigenous livelihoods and safety. Internationally, the Northwest Passage is seen as international waters, meaning there is little regulation as to who goes through, when and where they dock, and what ice they break and without the proper precautions this can cause issues to local communities. The Canadian Government and the Arctic Council have provided platforms for Indigenous leaders to have a voice in the matters of the Arctic, but to what extent do they have authority over the situation? What I want to ask is in what way can these issues be averted through increased participation of indigenous peoples within the Arctic Council and other governmental bodies such as the IMO and the Canadian government. I will be examining how these organizations operate, how Indigenous peoples organize within these communicative platforms, Native perspectives on the issue, and what can be done to greater ensure autonomy and authority to the Native communities through increased and more powerful participation.

- **BASIS ADVISOR:** Ray Lopez • **ON-SITE MENTOR:** Dr. Matthias Hofferberth, Ph.D.
- **LOCATION:** University of Texas at San Antonio

CHRISTINA F.

HYDROGEN ENERGY IN SAN ANTONIO

SUMMARY: With climate change becoming acknowledged as an enormous global issue, the world has turned to the development of clean energy sources. Hydrogen power is a new form of clean energy that relies on the combustion of hydrogen to produce energy, with its only byproduct being water. While solar, wind, and hydroelectric energy production methods are well established, hydrogen power is still on the rise. The purpose of this project is to determine the feasibility of integrating hydrogen energy in San Antonio. More specifically, it will explore the costs of implementation, the effects on carbon emissions, and the infrastructure and technology needed to make it possible. The project will take place at the Southwest Research Institute, which already runs research on hydrogen energy and its applications to the automobile industry. At the Southwest Research Institute, I hope to research the current capabilities of hydrogen production and usage, as well as the possible demand for it in San Antonio industries. The goal for this project is to complete a techno economic analysis of the application of hydrogen power in San Antonio and provide a recommendation for how it could be implemented in one San Antonio business or industry.

- **BASIS ADVISOR:** Rosemary Everts • **ON-SITE MENTOR:** Angel Wileman
- **LOCATION:** Southwest Research Institute (Virtual)

FRANCESCA F.

DESIGNING AND PROTOTYPING THE BATTLEFIELD READY INNOVATIVE SUCTION KIT

SUMMARY: First responders and combat medics use suction devices when the airway is blocked by blood, vomit, or bone fragments, outside of a hospital setting, to clear the airway. The suction devices provided are either hand-powered and inefficient or battery-powered but heavy and bulky. New research is being conducted to create a significantly smaller, lighter, and more powerful suction device that is easier to use in such traumatic situations. In partnership with Dr. Hood at The University of Texas at San Antonio, I intend to address this problem by assisting in the experimental process to further develop the prototype. I will work with the design team for the device and contribute to the designing and 3D-printing of specific parts for the prototype. I hope to add to the research in creating a more efficient and usable suction device for first responders and combat medics.

- **BASIS ADVISOR:** Rajeswari Mani • **ON-SITE MENTOR:** Dr. Lyle Hood
- **LOCATION:** University of Texas at San Antonio

OLUWATONI F.

HOW MUCH HAVE FASHION AND TEXTILES CHANGED OVER TIME?

SUMMARY: Over the many years that sewing has been developed, as a society we have grown from only needle and thread to automatic sewing machines that can do most of the work. From sewing in the 1800s to now, sewing is a personal craft that has been adapted and shared throughout the years. The objective of this project is to explore the amount of change in fashion and the importance of hand-sewing. How have textiles and sewing techniques changed over time and what could be learned from analyzing them? This project hopes to address the importance of sewing, specifically hand-sewing as a craft. It will be addressed by the overall studying of sewing as a craft. An artifact will be used and analyzed to understand how much sewing has changed and where and how these techniques were created. This project will be conducted at Texas State University. It is fitting because in the resources of the school there is an old artifact that has been studied to analyze the older techniques of sewing. Through this project, I hope to learn how much sewing has changed and how important hand-sewing is.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Gwendolyn Hustvedt • **LOCATION:** Texas State University

SHIWIN F.

THE CONNECTION BETWEEN THE EVOLUTION OF COMPUTER SCIENCE TECHNOLOGY AND ITS IMPACT ON MODERN SOCIETY

SUMMARY: In the early days, when computers were a breakthrough, people were excited about this innovation or maybe some disliked this development. Computers have proven to be helpful in society, maybe changing the perspectives of those who were in disagreement. Over the years, this technology has evolved. There have been positive impacts, but there may have been negative impacts on society as well. Perhaps, perspectives have changed over time. For my research, we will see the connection between the evolution of computer science technology and its impact on modern society. We will also see the public opinion on this evolution and what they think the future of computer technology will lead to. This project will be conducted at San Antonio Museum of Science and Technology (SAMSAT). This location is good for my research because the museum contains hundreds of artifacts of computer technology from different ages. With the people who visit the museum, I am able to conduct a survey which asks people regarding their opinion on the evolution of technology, the impact on society, and the future of this technology.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Michael Thoennes
• **LOCATION:** San Antonio Museum of Science and Technology

ZHINO F.

FILM AND CREW: A LOOK AT THE COMMUNITY WITHIN FILM CREWS

SUMMARY: The importance of film varies among individuals, with many believing that film is important in different ways, mainly due to its influence on culture. However, many consider film to be unimportant as it can be seen as mindless entertainment, especially with many of the recent popular films. Film is overall integral to society as a whole as it can bring different communities together, which can be best demonstrated by an overlooked aspect of film—the film crews. My research will be conducted at the University of the Incarnate Word, which gives me the opportunity to work with film students and film club members, giving me the perspective of amateur film crew members as well as knowledge from professional filmmaker and professor, Theresa Coronado. While on-site, I will be interviewing the film students and film club members on their past experiences and current experiences from making a film as well as working on-set with the film club members who will be making a film in order to get personal experience while working on a film crew. While off-site, I will do independent research on information that already exists on communities within film crews, such as personal anecdotes from film crew members, as well as interview professional film crew members. Ideally, by the end of this project, it can be demonstrated that a community can be made within a film crew through the production of a film which, in turn, could demonstrate how films can bring communities together.

• **BASIS ADVISOR:** Robin Martin • **ON-SITE MENTOR:** Professor Theresa Coronado
• **LOCATION:** University of The Incarnate Word

ANGEL G.

THE VIABILITY OF COMBINING PHYSICAL AND VR MEDICAL TRAINING OF REBOA

SUMMARY: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is the medical practice in which a catheter is inserted into the femoral artery and pushed in to reach the aorta region to obstruct the flow of blood by inflating a balloon in order to prevent blood loss due to serious injuries in the lower half of the body. This medical procedure requires specialized training for medical professionals to properly place the catheter without hurting the patient. There is an existing physical model that is being used to practice this procedure and involves using a mannequin that simulates the human aorta region, including blood flow. Besides physical models as a method of medical training, in recent years there have been advancements in the medical field by using Virtual Reality (VR) as a way to train people. The use of VR has shown to be very successful in allowing medical professionals to practice a procedure before performing it in a human. By combining VR training and in-person training, doctors could be able to achieve better results in the medical field. At Prytime Medical, they focus on creating and designing the REBOA catheters and making improvements to the procedure while using a mannequin to test out the product. This project will determine if it would be a viable option to implement REBOA training into a VR field and potentially combine them to see if it would be an effective method.

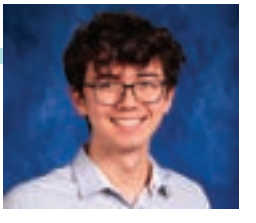
• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Julie Burgett • **LOCATION:** Prytime Medical

HANNAH G.

MULTI-DIMENSIONAL INTERPRETABLE INTERACTION NETWORK (MDIIN) FOR MODELING AGING HEALTH AND MORTALITY

SUMMARY: Aging is the most critical risk factor associated with many diseases, such as cardiovascular disease, cancer, type 2 diabetes, and Alzheimer's disease. In a graying society, aging poses a significant threat, as elders around the world become afflicted with disease, yet preventative measures have been largely unsuccessful. There have been many models that address patients' concerns based on current symptoms, but few exist to consider the patient's longitudinal health history when diagnosing. For this project, a math modeling algorithm will be developed to predict an individual's health trajectories and mortality rate. An interaction network will be used to study how various health variables, like blood pressure and BMI, are connected. The bulk of this model will consist of a Stochastic Differential Equation (SDE) to approximate the change in health variables over time. To supplement the SDE, a Recurrent Neural Network (RNN) will also be used to factor an individual's previous health history into their mortality predictions. This project will be done at Trinity University, where current research on machine interpretability is being done. The ideal outcome of this project is to create a model based on easy-to-access lab measures that doctors can use to predict the onset of age-related diseases like Alzheimer's and cardiovascular disease in their patients, leading to increased quality and longevity of life across the grid. Further investigation into the neural network's inner processes would also enable a study on the root causes of the aging process, and eventually, anti-aging medication and cures for different age-related diseases.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Dr. Sheng Tan • **LOCATION:** Trinity University



LOUIS G.

THE GENERATION OF MUSICAL THEMES USING AI

SUMMARY: Artificial intelligence (AI) models have been applied to many different fields, and are getting increasingly more complex within art fields. However, AI has not been extensively applied to music or sound yet, which presents a large opportunity. A musical AI model can assist music producers by creating samples or example melodies, and has the power to increase the efficiency of music production by brewing creativity or inspiration. The University of Texas at San Antonio's music department is a great place for my Senior Project due to their experienced faculty. Since my project is largely digital, lab facilities are not needed. To test the strengths and limitations of a musical AI model, a rudimentary model can be created and trained to generate harmonies and melodies. Songs will be generated and the best ones can be chosen to further train the AI. By conducting this research, we can learn how complex a musical AI is to create and learn about any of its strengths or limitations. Furthermore, any code created during the research can also be used by others in the future to suit their own needs or create their own adaptations.

• **BASIS ADVISOR:** Lyle Koonce • **ON-SITE MENTOR:** Dr. Jack W. Stamps
• **LOCATION:** University of Texas at San Antonio

STEPHEN G.

CONSTANT VIGIL: THE EFFECT OF THE PRO-LIFE MOVEMENT AND RECENT LEGISLATION ON THE ABORTION INDUSTRY IN SAN ANTONIO

SUMMARY: How have pro-life efforts and recent legislation affected the abortion industry here in San Antonio? The purpose of this research project is to determine the effects that the San Antonio pro-life movement and recent legislation have had on the business of Planned Parenthood South Texas. There is a vast gap in information on this topic. This question is worth considering because it is about an issue that is important to millions of Americans, both pro-life and pro-choice. I will be conducting my research at the office of The San Antonio Coalition for Life, the leading pro-life organization in San Antonio. The Sidewalk Intern program of The San Antonio Coalition for Life was founded in February 2020 and focused on giving bags to clients at Planned Parenthood. Since then, they have on file every car that has entered the parking lot of Planned Parenthood. I will be analyzing this data, examining the traffic trends during pro-life events such as 40 Days for Life and looking for any long-term trends after anti-abortion legislation is passed. I am captivated by this controversial topic. In light of recent legislation restricting access to abortion, I wondered how this legislation aligned with the efforts of the pro-life movement and affected the business and traffic of Planned Parenthood. This question has been virtually unanswered with regards to San Antonio, and I will be researching to find an answer. I hope that, regardless of where anyone stands on the issue of abortion, my findings will be appreciated.

- **BASIS ADVISOR:** Sarah French-Kirchner • **ON-SITE MENTOR:** Dr. Catherine Nix
- **LOCATION:** San Antonio Coalition for Life

BREANNA H.

STUDY OF AMNESIA

SUMMARY: Amnesia is a dramatic form of memory loss. If you have amnesia, you may be unable to recall past information (retrograde amnesia) and/or be unable to hold onto new information (anterograde amnesia). There's no specific treatment for amnesia, but techniques for enhancing memory and psychological support can help people with amnesia and their families cope. Amnesia is also a significant symptom of Alzheimer's disease. Amnesia may be an extreme part of memory loss, but the ability to forget is actually essential to how the brain works. What purpose does forgetfulness serve in our everyday lives? How does the brain decide what is important? Which parts of the brain are integral in this process? Can we better control what memories our brain chooses to keep or throw away? When we think of "amnesia," we think of the classic soap opera example. A character endures some emotionally traumatizing situation or blows to the head. Critical details about the character's entire life are forgotten, but total recall usually occurs at a crucial moment for maximal dramatic tension. The character retains all the necessary skills to survive—they don't forget how to talk, eat, get dressed, do math, use an ATM, drive a car, etc. However, the amnesiac can't recall any details whatsoever of their childhood. They don't recognize friends and family. They don't remember what they did for a living. Occasionally, a skill or memory may come to them in a disjointed flash. We have done so much clinical research and created a lot of new technology to extend the quantity of life. It's time to start focusing on the quality of life, and a better understanding of the brain will do that. New IDEAS is trying to find out if your PET scan results help guide your doctor in diagnosing and treating your memory condition. We want to see if this leads to better health for you.

- **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Dr. Jenny Hsieh, Ph.D.
- **LOCATION:** University of Texas at San Antonio

BRENNA H.

GI STASIS IN RABBITS

SUMMARY: GI stasis is a common yet serious issue seen in rabbits where the gut slows down and bacteria becomes imbalanced. This issue is often caused by an inadequate diet that lacks a source of fiber. Many new rabbit owners are unaware and often uneducated about this issue. Working at the Ark Pet Hospital, I will be researching GI stasis and interviewing an exotic veterinarian to demonstrate the importance of fiber in a rabbit's diet to prevent GI stasis. The end goal of this research project is to create a scientific research poster showing the data I collect to show the importance of fiber in a rabbit's diet.

• **BASIS ADVISOR:** Rosemary Everts • **ON-SITE MENTOR:** Dr. Darren Hubenak • **LOCATION:** The Ark Pet Hospital

AMAL K.

A COMPARATIVE DEEP DIVE INTO SCHOOL FUNDING

SUMMARY: Whether in the form of a massive, beautiful high school in North Austin or a short-staffed, run-down high school in South San Antonio, the effects of an unequal school funding system can be seen throughout Texas. Our country so proudly boasts of equality of opportunity, but that ideal rests in the hands of our public school system. Studies of the correlation between school funding and test scores consistently conclude that more money for a school is associated with a boost in test scores and an increase in college enrollment. If money is the solution to a fair chance at success, it's imperative that governments recognize the issue and develop methods of equitable school funding. With the guidance of Dr. Toni Templeton, a research scientist at the University of Houston with a Ph.D. in Higher Education Leadership and Policy Studies, I will be identifying inequities in funding between school districts in Texas and examining the causes for those inequities. I will also perform the same procedure on a state known to have the most equitable funding approach and use that information to determine ways in which Texas can improve its model. Most of the data and models that will be used to conduct the research are publicly available on the internet. I will be referencing a few papers on similar studies to help structure my research methods. Ideally, my research may provide some insight into developing a more equitable school funding method in Texas.

• **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Dr. Toni Templeton
• **LOCATION:** University of Houston (Virtual)

SHANZE K.

THE PREVENTION OF INFECTIONS IN PATIENTS WITH CENTRAL LINES

SUMMARY: More than 700,000 central line infections are estimated to occur annually in U.S. hospitals, causing difficulties and occasionally even patient death. Central lines are intravenous tubes that go straight into the veins to give medicines, fluids, blood products, and nutrition, so they must stay clean and infection free. Because it's an open wound, these tubes can cause the bacteria to travel into the patient. One of the most significant risks related to central lines is infections because they can lead to sepsis, shock, and death, so doctors must take measures to prevent them. Through observing the Infection Prevention team, executive meetings, and analyzing data collected by the hospital, I'll discover what the Infection Prevention team does when an infection has occurred and the preventative methods they can take with patients that have central lines.

• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Caitlin Welch • **LOCATION:** Methodist Hospital San Antonio

NOAH L.

ASSESSING DIABETES IN THE HISPANIC POPULATION OF SAN ANTONIO

SUMMARY: In recent years, diabetes has become a growing problem in the United States. Bexar County has one of the higher rates of diabetes in the U.S. today. Between 13% and 15% of our population has been diagnosed with the disease within the past three years. To combat this growing epidemic, the City of San Antonio has started the Diabetes Prevention and Control Program, which has been established under the City of San Antonio Metropolitan Health District and has been endorsed by the American Diabetes Association. I will be working with the Diabetes Prevention and Control department to help spread awareness for diabetes, including bringing attention to the free programs established by the city. I am planning to focus my research on the Hispanic population, as they make up a majority (60.9%) of Bexar County's population. Along with making up a large portion of our population, many people of the Hispanic community have a higher genetic predisposition for developing diabetes. I am planning to interview people in Bexar County through the Metropolitan Health District's diabetes prevention workshops. My interview questions are geared towards participants' experience with diabetes and methods of preventing the disease that they have incorporated into their lives. Through my interview questions, I will be able to gather meaningful data to provide a correlation between diabetes risk and specific diabetes prevention tactics. My research will allow me to objectively add to existing information on diabetes and present on lesser-known opportunities available to combat the spread of the disease.

• **BASIS ADVISOR:** Sarah Chavez • **ON-SITE MENTOR:** Julius Hunter
• **LOCATION:** Diabetes Prevention and Control, City of San Antonio Metropolitan Health District

TANYA L.

IMPROVEMENT OF AUTONOMOUS VEHICLE MOVEMENT THROUGH IMPLEMENTATION OF CONTROLS

SUMMARY: Autonomous vehicles (AV) provide the potential to make driving safer, more efficient, and more environmentally friendly. However, the human brain provides a complexity with which technology has yet to be able to mimic for completely controlled driving, and much of it relies on the human ability to recognize scenes and react to them instantly and efficiently. This creates a need for controls to smoothen and stabilize movement of the vehicle when reacting to different scenarios and environments. Controls—specifically control loop mechanisms—refer to the sensors and programmed mathematical functions that work together to automatically adjust an input variable. In this way, error is detected and corrected automatically and autonomously. This project will focus on the implementation of a variety of controls to an AV, analyzing the best control and control combinations needed to improve the vehicle's movement in path-planning and following. The goal of the project is to program the AV to be capable of moving smoothly along paths autonomously planned based on an ever-changing environment. The project will take place at the University of the Incarnate Word's Autonomous Vehicle Systems Labs, due to this project's alignment to the lab's goal of creating a fully autonomous vehicle and the mentorship and resources that the lab will provide.

• **BASIS ADVISOR:** Debby Hermann • **ON-SITE MENTOR:** Stephanie Weiss-Lopez
• **LOCATION:** Autonomous Vehicles Systems Laboratories at the University of the Incarnate Word

VIJETHA L.

DECODING THE MYSTERY BEHIND THE ORIGINS OF THE SPERMATOGONIAL STEM CELLS

SUMMARY: Spermatogenesis is an important part of the mammalian male reproductive system for it produces the sperm cells that mammalian males have and use to reproduce. Continuous and elaborate spermatogonial stem cells (SSCs) biology research has led to the creation of novel biotechnological solutions to contemporary human problems. However, there is still much research to be done on how spermatogenesis occurs and its stages. Research on this topic would reveal new insights on molecular and cellular mechanisms of SSCs and unfold opportunities for future research on the novel underlying causes of human male infertility, which affects 11% of the reproductive-age population in the United States. This research could also aid in the development of treatment plans for male infertility. The Hermann Lab is part of the group of stem cell and developmental biologists at the University of Texas at San Antonio. They study the stem cell system underlying spermatogenesis, and one of their primary interests is to understand the fundamental biology of the SSCs. My Senior Project objective is to differentiate the progenitor spermatogonia stage of the spermatogenesis cycle using the transgene SOX3-eCFP from other stages of the cycle so that further research can be done on progenitor spermatogonia cells, which are important in the creation of sperm cells. As my research exploring the stages of spermatogenesis parallels the objective of the Hermann Lab, I will be working with them during my Senior Project weeks. My hypothesis is that the transgene SOX3-eCFP will be expressed in the progenitor spermatogonia.

• **BASIS ADVISOR:** Debby Hermann • **ON-SITE MENTOR:** Dr. Brian Hermann, Ph.D. • **LOCATION:** University of Texas at San Antonio, Department of Neuroscience, Developmental and Regenerative Biology

ZACHARY L.

THE EFFECT OF IMPLANT-DERIVED TITANIUM PARTICLES ON MAMMALIAN AND BACTERIAL CELLS

SUMMARY: Peri-implantitis is a disease that affects around 1 in 6 patients who have undergone an implant. According to NCBI, around 15% of patients in implant-related cases reported inflammation around the implant. Over the last few decades, scientists have been making key advancements in the prevention of peri-implantitis, beginning with the discovery of titanium implants, and its rigid structure and its ability to integrate with the bone. But what properties allow titanium to do this, and how do these properties interact with the bacterial and host cells? To discover this, I will work with Dr. Kotsakis at the UT Health Science Center to conduct a series of experiments over 10 weeks. During these 10 weeks, the lab looks to produce the titanium particles through a simulation of an implant in an oral environment, and then test the effect of these particles upon the bacterial and mammalian cells that reside within a typical oral cavity. The ideal outcome would be that the dissolution titanium particles would have significantly affected the viability of the mammalian cells and the bacterial cells, with exceptions to the pathogenic species that reside in an oral environment.

- **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Dr. Georgios Kotsakis, Dr. Cathy Tsai
- **LOCATION:** UT Health San Antonio

CLARISSA M.

DNA AND RAD51 INTERACTION MAPPING

SUMMARY: The Sung lab of UT Health is currently researching RAD51, a DNA recombinase enzyme, and its effects on BRCA1-BARD1, a tumor suppressor complex. The lab is studying how RAD51 could be used to prevent BRCA1-mutated breast cancer, which is why I have chosen to do my project at this location. This study is significant because it researches one of the biggest modern diseases: cancer. Women with a BRCA1 mutation have an 80% risk of developing breast cancer, and 1 in 400 women carry such a mutation. Due to these high risks, it's imperative that the causes and prevention methods be studied. Furthermore, the mechanistic function of BRCA1 is currently unknown. This makes the Sung lab's research even more significant and revolutionary. This project involves a multitude of complicated steps. The experiment starts with transforming bacteria by introducing a new plasmid that codes for RAD51 and then using an antibiotic the plasmid is resistant to in order to only select cells that received the plasmid. The next step is to lyse the remaining cells to retrieve the new proteins and use various methods to purify them, including affinity chromatography, ion exchange chromatography, and size exclusion chromatography. Ultimately, the proteins' functionality is tested using assays. The expectation of this project is to gain an understanding of how RAD51 and the BRCA1-BARD1 complex functions and how the study can be used to prevent breast cancer. The experiments will culminate in a research paper and presentation that should have an impactful contribution to humanity.

- **BASIS ADVISOR:** Loren Morris • **ON-SITE MENTOR:** Angela Jasper
- **LOCATION:** UT Health San Antonio

GILIANE M.

HEALTHCARE ACCESS DISPARITIES IN SAN ANTONIO

SUMMARY: Different parts of San Antonio seem completely different from each other, from the way houses look to how many street lights they have. There is a balance between the city's funding in certain areas of San Antonio, and these amounts of funding can be traced back to redlining. My goal is to draw particular attention to groups that have experienced major obstacles to healthcare by researching socioeconomic disadvantages and historical and contemporary injustices. I would like to find more details on the root cause of social differences in the factors that cause healthcare access. It is significant for the community to have equitable access to healthcare, as this can lead to economic stability by balancing out the funds of hospitals and safety throughout the community and its people. My research will be done independently under the guidance of Delvina Ford, the Nurse Manager for Infection Prevention for South Texas Veterans Healthcare System. Her experience researching public health access will guide me on this project. This research will be conducted by secondary data analysis, where I will analyze demographic statistics on areas in San Antonios. After finding a demographic correlation, I plan to make my own map of San Antonio to emphasize inequity in our community. I expect to find multiple factors for why these populations in San Antonio have more of a restriction in accessing healthcare compared to other individuals.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Delvina Ford • **LOCATION:** Virtual

JACK M.

HEALTH AND FITNESS EXPLORATION

SUMMARY: The ideas behind the health and science of athletic performance are very complex, being anything from nutrition to sleep schedules. I myself have experimented and experienced in the past some of its complexities and find them very intriguing. It is quite difficult to find and obtain information concerning athletic performance no matter where someone looks. In my 2023 Senior Project, I am conducting research from various sources, diving deep into the realm of athletic performance and condensing my findings into a presentable form. My research takes place in books, blogs, articles, interviews with a personal athletic trainer, and any opinions I come across. My research consists of topics such as recovery methods, nutritional optimization, exercise programs, along with other ideas in relation to athletic performance. When it comes to researching exercise programs, I am finding opinions from various sources as to what is the optimum program for athletic performance. I am then working through these programs myself and recording my personal opinion of said exercises. I am conducting my research at a local workout gym while being advised by a personal trainer.

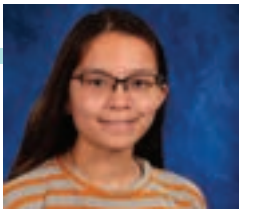
• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Phil Janzen • **LOCATION:** Primal Strength and Fitness

JOAQUIN M.

THE INNER WORKINGS OF AN ACCELEROMETER IN A PHONE

SUMMARY: Have you wondered why things work? Like how does your phone sense touch, or how does a computer allocate memory to perform its tasks? Well, usually some people go about their day never wondering about that and have no curiosity about how the technology that they use daily works. This project could ignite a curiosity in people who will see it, showing a glimpse of the complicated functions that a phone carries out which may seem simple on the outside. This function is whenever your phone flips its screen to landscape or portrait mode when you turn around your phone. This function's main component is the accelerometer, which senses the acceleration of the object. This project will be conducted at the University of Texas at San Antonio with the help of a professor. With the labs and literature provided, I will be able to observe the ways an accelerometer works and the information that is gathered and sent to the other parts of the phone. I hope this project will make people more curious about what happens internally in technology.

• **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Dr. Ruyan Guo • **LOCATION:** University of Texas at San Antonio



MIA M.

USING THE OPPORTUNITY ATLAS TO DETERMINE HOW RACIAL SEGREGATION HAS IMPACTED HOUSING IN SAN ANTONIO

SUMMARY: San Antonio, like many Southern cities, has a long history of racial segregation that dates centuries back. However, unlike other cities, the effects of San Antonio's racial segregation and redlining still heavily impact communities to this day. Several parts of the city are vastly underdeveloped because of chronic neglect by the city, and as a result, generations of people remain impoverished because they can't move out. A solution thought up originally by the Seattle Housing Authority could be the remedy to this issue, however. By locating places that are poor yet full of resources, referred to as Opportunity Benefit areas, people who are impoverished can be relocated into these spaces. The idea is that these people can use these resources to enrich themselves and their children so that they can make more money and move out of poverty. By working with Opportunity Home San Antonio, the local housing authority, I'll have an inside perspective on how exactly the housing system works, and what it would take to move from an impoverished area to one with more resources and benefits. The Opportunity Atlas will be a key resource as well, since that will be my main tool in identifying Opportunity Benefit areas, and how race has impacted many of these areas.

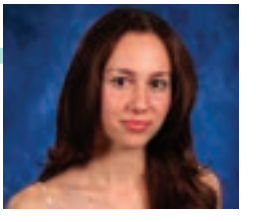
• **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Richard Milk • **LOCATION:** Opportunity Home San Antonio

PARIZ M.

THE NEUROLOGICAL SIDE EFFECTS OF COVID-19

SUMMARY: I will conduct internet research about long COVID, brain fog, PASC, and current treatment plans or studies used to combat cognitive regressions or memory loss, as well as different brain exercises which have been proven to increase memory retention. Using my research, I will observe current patients recovering at the UT Health Center for 10 weeks, and engage in a variety of tasks and assignments weekly, evaluating the information from each week to create an evaluation that could be used to assess patients based on what I have observed. At the end of a five-week observation period, my mentor and I will invite current participants in the study to participate in the use of the treatment program I cultivated, which will gauge their current memory retention. This will be assessed via interviews with the participants given by me and my on-site advisor, which will accumulate in a set of data that analyzes how much progress each participant has made since joining the study. This will be cultivated in multiple surveys and standardized examinations that will be evaluated to determine the most effective cognitive exercises for patients in recovery, which will be the final product of the research.

• **BASIS ADVISOR:** JennaLynn Hunnicutt • **ON-SITE MENTOR:** Robin E. Tragus, MSN, RN
• **LOCATION:** UT Health San Antonio



JIMENA O.

IMMIGRATION REFORMS RESULT IN LAW FIRMS AND CASES

SUMMARY: The U.S. immigration system is rumored to be one of the most outdated systems within developed countries. As a result, law firms might have to drastically adapt to new reforms due the country's relatively new administration and the more flexible traits of the immigration system. By residing at OSGC Law, I can educate others of the process the staff undergoes, what they change, how long it takes them to abide by the new laws implemented, and the effect of these laws in court. I will also provide an overview on immigrant's cases in a more intimate perspective to raise awareness of their difficulties and show its relation to factors such as political polarization, new presidential administrations, and the economy. By juxtaposing immigration reforms to society's political stance, it enhances the understanding we have of it as the immigration system is interconnected to the majority of other U.S. systems and processes but deemed to be less complex than it actually is. By portraying its complexity, I will bring the U.S. immigration system one step closer to stop being underrepresented, and perhaps the government might focus on developing it to also develop the rest of the U.S.

• **BASIS ADVISOR:** Kim Kinne • **ON-SITE MENTOR:** Mr. Curiel • **LOCATION:** OSGC Law

AANIKA P.

ALTERNATIVE CANCER TREATMENT THERAPIES

SUMMARY: When a person gets diagnosed with cancer, there are three main treatments they will likely undergo: chemotherapy, radiation, and surgery. However, these come with many side effects, such as hair loss, fatigue, nausea, loss of appetite, infections, anemia, memory problems, diarrhea, and loss of fertility. Many individuals also seek alternative therapies, such as acupuncture, aromatherapy, supplements, and cognitive behavioral therapy. While these treatments do alleviate cancer symptoms such as fatigue, pain, and nausea, and help cancer patients live longer, they do not directly kill the cancer cells. Some of the more pseudoscientific therapies can even potentially be dangerous. For example, supplement pills could contain substances that are harmful to the body. In my project, I will be researching photodynamic therapy, a minimally invasive procedure currently used to treat types of skin and respiratory cancer along with other infections, and its potential applications for breast cancer treatment. I will be conducting my research virtually. My off-site advisor runs an acupuncture clinic, one of the alternative treatments sought by individuals suffering with cancer. Through this project, I hope to educate more people and shed more light about alternative cancer treatments.

- **BASIS ADVISOR:** Jessica Pitzek • **ON-SITE MENTOR:** Steve H. Liu
- **LOCATION:** HanLing Acupuncture Healing Center, Inc. (Virtual)

JAYNA P.

INCORPORATING A NONPROFIT INTO A SMALL BUSINESS

SUMMARY: Have you ever wondered how small businesses can impact their local communities through charitable giving? Small businesses have the potential to make a significant impact on their local communities through charitable giving. This project aims to examine the ways in which small businesses can contribute to their communities through philanthropic efforts and charitable donations. Additionally, I will explore the potential benefits and challenges associated with small business charitable giving for both the company and the community. Through research and collaboration with the Curtain Up Cancer Foundation, a Texas-based nonprofit organization that uses the creative arts to alleviate the effects of cancer, I will create a small business where I will sell bracelets. I will then collect data and conduct surveys, interviews, and case studies to gather information and gain a comprehensive understanding of the topic. The ultimate goal of this project is to provide valuable insights and recommendations for small businesses looking to make a positive impact on their local communities.

- **BASIS ADVISOR:** Ray Lopez • **ON-SITE MENTOR:** Amy Ritthaler Gilmour
- **LOCATION:** Curtain Up Cancer Foundation

ANDREW R.

REAL ESTATE RANDOMNESS

SUMMARY: What effect has COVID had on the real estate market and the jobs within the real estate market? We have seen extremely variable and inconsistent trends in the housing market in the past few years due to COVID, and I plan to research these trends and interview professionals to come to conclusions myself. While a lot of research has been done on this subject, there are lots of inaccuracies and inconsistencies. By taking a deeper dive into the real estate market, realizing the possible influencers and stressors to the market, and drawing conclusions, I hope to be able to better predict and plan accordingly to maximize future job security and profits and to see less unemployment and more consistent competition. By obtaining certifications such as Excel and working with the Home Team of America and real estate professionals with real world experience, I am going to take as professional an approach as possible to these databases and research articles before coming to a conclusion and making a presentation based on different databases and articles.

• **BASIS ADVISOR:** Amanda Guido • **ON-SITE MENTOR:** Linda Lipscomb • **LOCATION:** Home Team of America

LUKE R.

THE ENVIRONMENTAL CONSEQUENCE OF CONVENTIONAL FARMING AND THE VIABILITY OF ALTERNATIVE METHODS

SUMMARY: The rise of agricultural methods rivaling conventional farming is happening more often, and the complexities of each agricultural method raise an ever-growing question: Which farming method should we adopt? The growing issue of environmental sustainability has put a lot of pressure on agriculture, leading our society into direct confrontation with the question of using conventional farming. However, unavoidable conversations about lower yields and higher input costs in eco-friendly alternatives leave this question still unanswered. This project was mostly conducted at Patty's Herbs Farm, which provided me with a professional insight into herb farming by organic and conventional means through firsthand observation. Furthermore, their push for organic farming offers a unique perspective that can shape my research on these two methods. This topic is addressed through three main methods: literature research regarding the environmental impact of conventional farming, observational data on-site through hands-on experience and interviews with Patty's Herbs employees on how their farming is conducted and what the financial implications are of different methods, and a plant-growing experiment that aims to make comparisons between the efficiency of different farming methods. Through this project, I hope to make a contribution in moving us closer to answering questions regarding which major farming method is better for our society. Obtaining a satisfactory conclusion that demonstrates higher efficiency in crop production for certain farming methods over others is valuable and can hopefully lead others to make even bigger contributions in this field in the future.

• **BASIS ADVISOR:** Rajeswari Mani • **ON-SITE MENTOR:** Robert Gonzalez • **LOCATION:** Patty's Herbs Farm

MATTHEW R.

HOW CAN YOU MAKE AN EXHIBIT UNTOUCHABLE YET INTERACTIVE?

SUMMARY: Many museums have a problem with engaging younger generations. With attention spans getting shorter, an exhibit needs to draw the attention of young visitors and keep them engaged, but most importantly help them learn. Without more people going into STEM, technology will stop advancing and stop improving the lives of everyone. Many museums find the solution to make the exhibits interactable. While in theory easy, many exhibits struggle to be adapted to be intractable. Museums either fear damage to the exhibit or harm to the visitor. David Monroe, owner of SAMSAT, has tasked me with making a Motoman SIA20D robotic arm interactable. Unlike most exhibits that allow kids to move things around with their hands and see how they change, the arm is not a "cobot" and is unsafe to touch or be close to. The task is to make the robotic arm paint and let the visitors decide what it's painting. I plan on using open source software such as stable diffusion to generate images based on text. This will allow people to generate an image and then watch as the robot paints their picture. There will also be a separate display breaking down what the robot sees and the path that it will paint. In that display, I will plan to have complex robotics topics such as motor PID (Proportional, Integral, Derivative) broken down into much simpler diagrams and descriptions.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Cliff Zintgraff, Ph.D
• **LOCATION:** San Antonio Museum of Science and Technology

ARNUV S.

INFECTIOUS DISEASE: THE ROLE IT PLAYS IN HEALTHCARE

SUMMARY: Infectious disease is one of the most under-pursued specialties one can do, but it is also one of the most important. Most hospitals, especially the one I plan to do my project at, have only a couple of infectious disease doctors rounding the entire building, but have numerous radiologists and cardiologists. My project will attempt to explain and address the lack of infectious disease doctors in hospitals across America. It will explain the importance of the profession and what one would need to do in order to successfully specialize in infectious disease. I will address my topic through physician shadows, research, and conversations with an infectious disease doctor. I feel that the shadows will give me the best possible understanding of what they do on a daily basis, because I will be able to see them actually work and fully grasp what they do on a daily basis. Through my research, I hope to be able to encourage people interested in the medical field to pursue and specialize in infectious disease.

• **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Dr. Kimberly Moran, MD • **LOCATION:** Baptist Medical Center

GARRETT S.

WATER COOLING: DIFFICULTY FOR BEGINNERS

SUMMARY: The computation carried out by computers essentially is just electrons traveling down microscopic channels, creating patterns of ones and zeros interpreted by the system to give us a various array of actions. But like any system, the process is not one hundred percent efficient, releasing a good portion of its power as heat, leading to one of the largest issues in computer engineering—cooling. Many types of cooling have been tried and there are many effective versions: air cooling, using only a heatsink and fans; passive cooling, using only a heat spreader and no moving fans or air circulation; immersion cooling, completely immersing the system in non-electrically conductive fluid to dissipate heat, used mostly in servers and supercomputers; and finally, liquid cooling, using a heat transfer plate often made of copper or plated aluminum and a pump, reservoir, and radiator to dissipate heat with fans. Many of these are open to the consumer market with very few barriers, such as air cooling, and all standard graphics cards come with a pre-installed heat sink and fans which can adequately cool the card. Additionally, aftermarket air coolers like the Hyper 212 are cheap and efficient for most mid-range consumer CPUs. But the issue stands that as CPUs and GPUs get more powerful, the heat they put off increases, leading to a need for alternative modes of cooling such as liquid cooling. So the question stands: Is liquid cooling a viable option for mid- to high-range PC enthusiasts?

- **BASIS ADVISOR:** Heiko Brunken • **ON-SITE MENTOR:** Mr. Kevin Archer
- **LOCATION:** University of Texas at San Antonio

ISAIAH S.

LIGHTING AND CONTROL METHOD EFFICIENCY AND SUSTAINABILITY: ENERGY AND COST

SUMMARY: This research project aims to address the issue of energy consumption in commercial buildings, specifically focusing on lighting control strategies. According to a study by the U.S. Energy Information Administration, lighting accounts for 11% of total energy consumption in commercial buildings in the United States. A study by the Lawrence Berkeley National Laboratory found that lighting retrofits in commercial buildings can result in energy savings of up to 60%. This indicates the potential for significant energy savings through the implementation of effective lighting control strategies. The project will be conducted under the mentorship of Michael Riese, a principal electrical engineer at Aethera Engineers, who is a professional engineer with several certifications: Living Future Accreditation, LEED AP BD+C, and Construction Documents Technology. The project will include an introduction to various topics regarding lighting and control methods, self-study through online resources and textbooks, on-the-job training on LEED methodologies, and the use of industry-standard software such as AutoCAD and Revit. The project will also include the review and study of different building lighting control protocols and building control automation systems, such as Digital Multiplex and BacNet, to compare lighting configurations and requirement standards for maximum lighting and energy efficiencies. Additionally, the project will include internet research to find data that has already been collected to compare it to any findings. The completion of the Six Sigma White Belt certification and LEED general education will be the first requirements for better understanding of process improvement and industry standard knowledge of sustainability frameworks. The final part of the project will be evaluating a midpoint of the control methods and efficiency based on the criteria of cost and energy use.

- **BASIS ADVISOR:** Tim Theis • **ON-SITE MENTOR:** Michael Reise • **LOCATION:** Aethera Engineers

KIRA S.

TICKET TO PARADISE? AN ECONOMIC EQUITY ANALYSIS OF AUSTIN'S PROJECT CONNECT TRANSIT EXPANSION PLAN

SUMMARY: In November 2020, Austin voters did the unprecedented: approve of a 7-billion-dollar public transit expansion plan called Project Connect. Project Connect is one of the most expensive infrastructure projects in Austin's history, and it seeks to roughly triple the size and ridership of Austin's various public transportation options. Essential to the project's political popularity was its commitment to equity — Project Connect pledges to increase accessibility to high-paying jobs for low-income workers and mitigate displacement pressures from gentrification in high-risk neighborhoods. My senior project is a policy analysis that assesses Project Connect's effectiveness in achieving its equity goals. There will be 3 main questions I seek to answer with my analysis: 1. How will Project Connect impact property markets and labor market accessibility in Austin in both the long run and short run? 2. Given its economic impact, can Project Connect achieve its equity goals? 3. How can Project Connect be improved to better accomplish its equity goals? It is a big undertaking, combining economics, urban studies, policy analysis, and geography into a project that is equal parts qualitative and quantitative. Nonetheless, I hope that with the help of Mrs. Scott and Brandon Niday, I can produce a 25–30 page policy analysis paper by the end of the 10 weeks.

• **BASIS ADVISOR:** Denise Scott • **ON-SITE MENTOR:** Dr. John Anders • **LOCATION:** Trinity University

MICHAEL S.

TELESCOPES OF THE FUTURE: EXAMINING THE PROCESS OF CREATING A COST-EFFECTIVE TELESCOPE

SUMMARY: Astronomy is an expensive practice, with quality telescopes ranging in price from hundreds to thousands of dollars. My project will be centered around the creation of a more cost-effective telescope in order to help break down this barrier of entry into astronomy. Aided by the expertise of space science researchers in the UTSA-SwRI Space Physics Graduate Program, I will create a 5-to-8 inch aperture reflecting telescope that can be utilized to observe planets and nebulae. Reflecting telescopes typically function by having a glass, parabolic primary mirror focus incoming light that is then redirected into an eyepiece. It is the manufacturing of this primary mirror that tends to be the biggest inflator of the cost to produce a telescope. In order to reduce cost, nontraditional materials such as repurposed lenses or mirrors will be incorporated into my project, in addition to the examination of ulterior mirror options such as liquid mirror telescopes, which function by spinning a reflective liquid into a parabolic shape. One of the chief inhibitors of the creation of large space-based telescopes, such as the James Webb or Hubble Space Telescope, is their multibillion dollar price tags. Research in cost-effective alternative materials for telescope mirrors, such as liquid mirror telescopes, has the potential to make space-based projects that redefine our place in the cosmos more economically viable and, by extension, more frequently created.

• **BASIS ADVISOR:** Lyle Koonce • **ON-SITE MENTOR:** Mr. Caleb Gimar • **LOCATION:** Southwest Research Institute

DAN T.

INVASIVE SPECIES AND THEIR IMPACT ON BIODIVERSITY AT HEADWATERS SANCTUARY

SUMMARY: The presence of invasive species in an environment can severely decrease an environment's ability to support its native species, thus decreasing its biodiversity. If not taken care of, these invasive species can spread to other areas and cause widespread environmental distress. This project will be a mix of volunteering and research at the UIW Headwaters Sanctuary, a 53-acre riparian forest in the center of San Antonio. The sanctuary currently contains many invasive plants, which are affecting the ability of the native plants to grow and survive. Improving and maintaining the biodiversity of the sanctuary is very important because this riparian forest is a source of the San Antonio River. Because of this, the invasive plants may spread to other areas outside of the sanctuary, harming additional ecosystems and decreasing the quality of the river. The volunteering portion of this project will consist of the removal of invasive plants, debris collection, seed planting, and trail maintenance. The goal of this portion of the project is to remove as many invasive plants as possible to increase the biodiversity of the sanctuary. The research portion of this project will consist of investigating the effects that the invasive species have had on the native plants and on the resilience of the sanctuary. This will be done by comparing how well new plants are able to grow in different zones of the sanctuary where there are different amounts of invasive species present.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Pamela Ball • **LOCATION:** Headwaters Sanctuary

MILIN T.

THE LOVE PROJECT: THE CONSTRUCT AND ASSESSMENT OF INTERPERSONAL LOVE

SUMMARY: With a profound influence in every aspect of societal structure and human history, love is a topic of immense interest among sociologists. However, there is no widely agreed, scientific understanding of its definition or function within society. Previous research on the concept of love has been inflexible and limited to a singular narrow lens, whether it is done as a psychological, neurological, religious, or spiritual interpretation. Systemic issues that plague communities globally are, at their core, rooted in human connections. Many concrete social issues and their real-world consequences are manifestations of an underlying societal or psychological gap in understanding. A positive sociological study of love can prompt more meaningful and tailored ideas of self-improvement. The purpose of this project is to gain a cross-cultural understanding of interpersonal love and to apply these findings to current research on human flourishing. This project will also examine the possibility of providing a universal definition of love. This research endeavor is a sub-project under The Construct and Assessment of Interpersonal Love, a $2 million-funded project granted by Harvard College, a leading social research facility. 15 interviews with a diverse set of adults, each 1 hour long, will be conducted to collect qualitative data on perceptions of love and its relationship to diverse upbringings and cultures. The Love Project will allow me to further my intrigue with genuine human connection and utilize professionally analyzed qualitative data to contribute to human flourishing within myself and my local communities.

• **BASIS ADVISOR:** Alexander Decker • **ON-SITE MENTOR:** Dr. Matthew Lee • **LOCATION:** Baylor University (Virtual)

ARAVIND U.

ARAVINDWARE: MY STRIVE TO REVERSE THE ANTI-CONSUMER AND E-WASTE GENERATING TREND IN PERSONAL COMPUTING

SUMMARY: In the consumer electronics space, one of the main questions people find themselves debating is whether they should invest in a laptop or a desktop. There are significant compromises that come with choosing one or the other, like heat, noise, portability, modularity, repairability, and more. There are "Desktop Replacement" laptops, but they don't offer the same performance and parts availability as desktops. These compromises result in unnecessary spending, e-waste, and general dissatisfaction with personal computers. Utilizing Trinity University's Makerspace, which houses a plethora of advanced equipment such as 3D printers, CNC machines, lathes, wiring, and other general hardware, I seek to solve this problem by inventing an all-in-one computing platform—a laptop made with desktop components. Through rapid prototyping, I will design 3D models of chassis designs that will be compatible with a wide array of desktop parts while providing appropriate ventilation and minimizing depth dimensions. After 3D printing these designs and using them with multiple generations of desktop components, I will redesign the chassis to resolve any potential pitfalls and create a final functioning prototype with some of the fastest as well as oldest parts to demonstrate the versatility of my laptop-desktop. With the modularity of this product as well as my commitment to providing appropriate documentation, users will be able to keep the same hardware regardless of component failure and will be able to upgrade parts as they wish. This will ensure that perfectly usable hardware doesn't end up as e-waste and that users have full control over their devices.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Dr. Kevin Nickels • **LOCATION:** Trinity University

SAI V.

THE ROAD TO 315

SUMMARY: "If you go on a cut you're gonna lose all your strength." This is a common misconception spread in nationwide commercial gyms that I'm here to put an end to. During my 10-week Senior Project, I will be doing the "impossible" by obtaining a 315-pounds or 3-plate squat while cutting body fat percentage and preserving lean body mass. Guided by Mr. Post, a licensed physical therapist and athletic trainer, I will be utilizing proper nutritional techniques, sufficient recovery practices, and a tailored hypertrophy/strength lower-body program to later analyze their effects on lean body mass, body fat percentage, and changes to squat progression. A personal goal of mine has been to achieve the 2/3/4 plate ratio on bench, squat, and deadlift respectively before the end of my senior year. While I primarily focus on hypertrophy training, I have achieved two of the three lifts, and this is the pursuit of my last milestone. This documented journey isn't just an attempt to achieve a personal aspiration, but also to inform and educate the public about safe weight loss and weightlifting practices, appropriate nutrition, and optimal recovery approaches when pursuing their own fitness journeys.

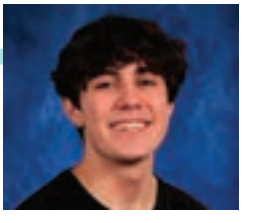
• **BASIS ADVISOR:** Alyssa Fink • **ON-SITE MENTOR:** Michael Post • **LOCATION:** Tom C. Clark High School

SUNNY V.

THE DOCTOR WILL SEE YOU NOW: THE HALO EFFECT AND IMPLICIT BIASES IN HEALTHCARE

SUMMARY: Are patients perceived in particular ways more likely to receive care with greater urgency or attentiveness? Alternatively, are patients more likely to reflect on their doctor positively or negatively based on observed subjective qualities? With millions of Americans in office-based physician visits every year, bias in healthcare is an increasingly critical issue and the topic of various research investigations. However, the subject of these studies thus far have typically explored objective characteristics, such as race or gender—but by targeting the psychological occurrence known as the "halo effect," different characteristics such as attractiveness or friendliness that bias may stem from can be revealed. At Christus Santa Rosa Spine Center, in a clinic setting, investigating through patient surveys that center around these subjective qualities will allow for a broader, perception-based look at how this halo effect takes root in affecting patient-physician relationships. Supplemented with interviews and additional surveys from physicians, this study will take a holistic look at the effects of observable qualities on dynamics within the clinic. This research data will then culminate into a research paper at an intended level publishable by a scientific journal, with the aim of exploring the distinct qualities that affect clinic exchanges and what areas they originate from. The research will also offer a solution to mitigate for bias in healthcare settings.

• **BASIS ADVISOR:** Kim Kinne • **ON-SITE MENTOR:** Dr. Guy Fogel • **LOCATION:** Christus Santa Rosa Spine Center

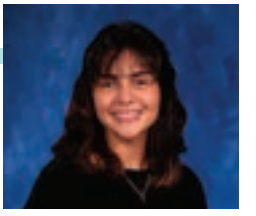


JAMES W.

THE CRIMINAL PROCESS IN SAN ANTONIO

SUMMARY: America has less people than both China and India, yet it has far more people incarcerated than both of those countries. Most Americans believe the reason is the criminal justice system. My Senior Project is an in-depth examination of the criminal justice system on a local level. Through a series of interviews and multi-day shadowings with individuals involved in the criminal justice process, including law enforcement officers, prosecutors, criminal investigators and criminals. This project displays a deeper understanding of the various perspectives and experiences of those involved in the criminal justice system. It will also provide a detailed description of each phase of the criminal justice system, including investigation, arrest, trial, sentencing, and appeals. The goal of my project is to provide a comprehensive and nuanced understanding of the criminal justice system on a local level and the different perspectives and experiences of those involved in it.

• **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Police Officer- James A Wyatt Jr.
• **LOCATION:** San Antonio Police Department- Central Substation



ALEXANDRA Z.

BARISTA WOES: A CASE STUDY ON BIG BUSINESSES

SUMMARY: When teenagers look for jobs, their first option is usually fast food due to manageable employment entry levels. However, these jobs often leave little to no room for employees to use their creativity and have extremely rigorous processes with minimal employee support. By collecting employee feedback from a Starbucks store in San Antonio and using data from other sources on employee satisfaction, I can create a more hospitable and fun working environment starting with the store I chose. The method utilized to collect this data is a standard anonymously reported survey that will be used for 7–9 employees, using questions regarding gender, age, and positive or negative opinions about their employment. After all research has been conducted, it will be compared with existing statistics on fast food and compared with existing demographics for any correlations with my research. For me, the goal of my research is to utilize the feedback at my chosen Starbucks store and observe if the changes were helpful in how the employees viewed their job.

• **BASIS ADVISOR:** Adrian Gallegos • **ON-SITE MENTOR:** Ms. Jasmine Brewer • **LOCATION:** Starbucks

ANGELINA Z.

TRENDS IMPACT ON FASHION

SUMMARY: Clothes are meticulously designed by artists, but how are they brought to market or even sold? Well, designers, or those who chose the designs, have to consider multiple factors, such as what will give them the most profit, what theme they want to convey with their merchandise, and what demographic they hope to reach with their designs. At LeeLee, a local San Antonio boutique shop, all of these questions go into consideration when trying to decide what they want to sell at their store. The designs are chosen from different parts of the world. By working with the owner of LeeLee, I will learn the thought process behind what it means to buy and sell an article of clothing from a behind the scenes perspective. To add to my research at Lee Lee, I will also read multiple books by other big fashion brands, which will help me attain a broader perspective on what it means to sell fashion designs. It is important to look at different perspectives on how a design is considered, because a diverse understanding of what goes behind the scenes will allow for a more informed design and business. With this research, the final product of this project will consist of a design of my own creation along with why I chose the design and what factors I considered when making it.

• **BASIS ADVISOR:** Brooke Privette-Walker • **ON-SITE MENTOR:** Leigh Landreth • **LOCATION:** LeeLee

LUCAS Z.

COMPUTER VS. GAMES, APPLICATIONS OF VARIOUS COMPUTER SCIENCE PRINCIPLES

SUMMARY: Computers are often more capable than humans. This is true for many things, including the games we enjoy. Computer scientists have made programs capable of beating games as old as chess to games as new as Starcraft 2. My project is going to explore the various techniques, issues, and pitfalls around beating various games with computers. I think it's an interesting and more importantly accessible way of understanding various computer science ideas and a real-world application. I hope to make my final project deliverable an accessible video that I can share with the public, providing an interesting, semi-comprehensive summary of useful techniques. Trinity University is a great place for me to do this, because of experienced faculty like Dr. Zhang and potential access to their computing resources. I believe that personally attempting to automate games, even those that have been beaten before, is the ideal way to address my topic, as it will give me useful hands-on experience that I wouldn't be able to share otherwise. It will also make my final deliverable more interesting and accessible to more people, because it will sound more like a personal adventure of a high schooler than a boring summary of various companies' achievements. I expect that statistics and AI will be the most useful methods for completing this project.

• **BASIS ADVISOR:** John Standifird • **ON-SITE MENTOR:** Dr. Yu Zhang, Ph.D. • **LOCATION:** Trinity University

SOFIA Z.

THE EVOLUTION OF ARCHITECTURE AND ITS CULTURAL INFLUENCES

SUMMARY: During times of colonization, many Latin countries were influenced culturally by European explorers and the native architectural traditions became intertwined with European architectural ideas to create the buildings we see today. The type of research that will be collected will consist of three topics and three time periods: the historical significance, the architectural style, and the technical measurements of buildings in the pre-colonial, colonial, and modern times. Architecture is a form of expression of cultures and ideas, and it is one of the most important resources used in order to understand many historical developments. It tells a story of how the human race was able to evolve mathematically, artistically, and culturally all over the world since the beginning of time. Not many people are exposed to the significance of architecture, however, architecture creates the physical environment that people live in and it represents the economy, type of reign, and cultural events in history and in the present day. I plan on making a trip to Mexico City and taking a tour around three structures for each time period—Templo Mayor, Palacio de los Condes, and Palacio Postal. The intention is to come into contact with an expert in Mexico City and ask specific questions that might not have been answered in previous research. I intend to do some sketches of the buildings and will take measurements by scale in order to be able to buy the correct amount of materials. By taking plenty of pictures, there can be a reference for the models that will be built at the site. To guide me through the model building process, I will seek guidance and shadow the architecture department of H-E-B, which has plenty of professionals who have attended architecture school. In conclusion, the aim is to combine the history and the architectural style and decipher which parts of the buildings come from Europe or other cultures and which parts come from Tenochtitlan, or Mexico City itself. I will provide a visual representation of the evolution of architecture, which will help put the change of the structures into perspective.

• **BASIS ADVISOR:** Adrian Gallegos • **ON-SITE MENTOR:** Oscar Peña • **LOCATION:** H-E-B Headquarters


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!

BASIS
CHARTER SCHOOLS

San Antonio
Shavano Campus™

4114 Lockhill-Selma Road | San Antonio, TX 78230