FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE

SLI STEM INTERNSHIPS

VOLUME 2, NUMBER 1, 2022

SUMMER 2022 INTERNSHIPS

ABOUT THE INTERNSHIPS

The Science Learning Institute's mission is to advance equity and diversity in STEM at Foothill College by supporting students from underrepresented groups in their academic and career pathways in STEM. As a way to achieve this mission, SLI provides internship opportunities for students at Foothill in the winter and summer through a structured program - the SLI STEM Internship Program.

Students participating in the SLI STEM Internship program will

- Gain hands-on, job-related skills in the relevant discipline.
- Gain exposure to work that may influence their career paths.
- Be mentored by a work supervisor who can provide support and insight in the working world.
- Have a community of support among the other interns in the program.
- Build their professional network for future employment opportunities.

Upon completion of all program requirements, students receive a stipend ranging from $1000 - $4000 depending on the time commitment.

Foothill students participating in the summer 2022 cohort were paired with mentors from local higher education institutions and tech companies to work on research and industry projects. These projects, ranging from python programming for particle accelerators to tumor segmentation, enabled students to gain insight into the research process and to work closely with mentors to advance academic and professional goals.

For more information about the summer internship program refer to the website: https://foothill.edu/sli/internships/summer.html or contact the SLI Director Sophia Kim (kimsophia@fhda.edu).

Summer 2022
Los Altos Hills, CA

FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE

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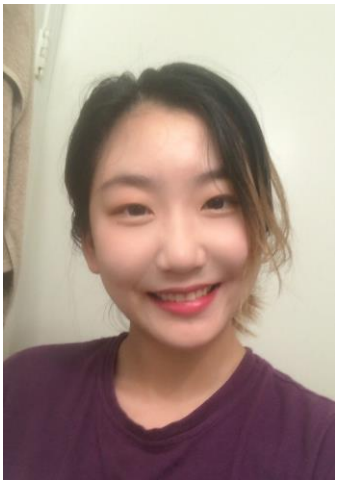
BIOLOGY

Study of structure and function of protein from common mold

Wanting Guo

Summer 2022



ABOUT YOU:

- Hometown: China
- Major/ certificate: Bioengineer & Data Science
- Transfer institution: Undetermined
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Stanford / Chem-H Website: https://chemh.stanford.edu/
Mission (if a company):
Supervisor: Daniel Fernandez

OBJECTIVE:

a) producing the protein of interest (“production”)
b) isolating the protein of interest ("purification")
c) preparing protein crystals (“crystallization")
d) handling crystals under the microscope and obtaining the three-dimensional structure

METHODS:

1. using the well-known E. coli system;
2. using advanced instruments like FPLC and diverse separative columns;
3. by mixing the protein sample with combinations of reagents in microplate format;
4. by X-ray diffraction ("structure solution”).

RESULTS & DISCUSSION:

We were able to successfully finish first 3 objectives. I learned a lot during the process of performing each method. I now can independently plan my weeks in lab, estimate time needed for each procedure and perform basic biology lab tasks. Daniel Fernandez Marissa Yanez Sophia Kim

ACKNOWLEDGEMENTS:

Daniel Fernandez Marissa Yanez Sophia Kim

3D Bioprinting Research Intern at Stanford Heilshorn Biomaterials Group

Kellie Phung

Summer 2022

ABOUT YOU:

- Hometown: San Jose
- Major/ certificate: Biology
- Transfer institution: UC San Diego
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Stanford University Heilshorn Biomaterials Group Website: https://web.stanford.edu/group/heilshorn/
Supervisor: Lucia Brunel

OBJECTIVE:

The goal of this internship was to learn about and partake in biomaterials development, specifically as a bio-ink for 3D bioprinting. In particular, my project focused on the mechanical properties of alginate gel as a part of the post-printing process.

METHODS:

Using 2% alginic acid crosslinked with 10 mM calcium chloride ($CaCl_2$), gels were cast into 24-well plates and incubated in various solutions at 37℃ for five days. These solutions were phosphate buffer solution, cell culture media, water, and solutions of calcium chloride with concentrations ranging from 1-500 mM. The stiffness of these gels were measured after 5 days with a rheometer and reduction in diameter was recorded through images taken at time points of 0 hours, 1 hour, 24 hours, 48 hours, and 120 hours. Additionally, using human corneal mesenchymal stromal cells cultured in varying ion solutions, a Live/Dead™ assay was conducted.

RESULTS & DISCUSSION:

When measured with a rheometer, gels that were incubated in ion solutions had stiffnesses that corresponded to a positive trend between ion concentration and stiffness value (Pa). Additionally, with an increase in ion concentration in these solutions, there was an increase in contraction of these gels as the fraction of the initial diameter would decrease, especially with higher ion concentrations in incubations solutions of 50 mM, 200 mM, and 500 mM $CaCl_2$. Lastly, with an increase in ion concentration in cell culture media, there was in increase in cell death and morphological changes in the cells.

ACKNOWLEDGEMENTS:

Lucia Brunel, Stanford University Chemical Engineering, Ph.D. Candidate Sarah Heilshorn, Stanford University Material Science, Professor
Marissa Yañez, Foothill Science Learning Institute, STEM Workforce Specialist Sophia Kim, Foothill Science Learning Institute, SLI Director

New Materials as Inks for 3D bioprinting

Daniel Ramos Mejia

Summer Quarter 2022

ABOUT YOU:

- Hometown: Union City, CA
- Major/certificate: Biomedical Engineering.
- Transfer institution: San Jose State University
- Year of graduation from Foothill College:2022

PLACEMENT:

Name of company/institution: Stanford University

Website: https://web.stanford.edu/group/heilshorn/

Supervisor: Professor Sarah Heilshorn

OBJECTIVE:

My summer project focused on how first stage crosslinking affects the filament fidelity. Proper bioink printability consists of printing a 3D structure that has good shape fidelity and cell viability. Through image analysis and rheological measurements, we can evaluate the bioink printability. I hypothesized the printability of alginate inks can be optimized by tuning the amount of first-stage crosslinking with calcium ions.

METHODS:

Microextrusion 3D bioprinting is a technique commonly used to print gel bioinks. It uses pneumatic or mechanical forces to dispense a bioink through a syringe and nozzle. If the bioink is a hydrogel then it may have first stage crosslinking. First-stage crosslinking occurs within the syringe before extrusion. A commonly used bioink material is alginate, which is an electrostatically crosslinked biomaterial. Electrostatic interactions with divalent cations let us create alginate hydrogel networks with a wide range of possible stiffnesses. Alginate is a widely used bioink so we are interested in studying it and making it easily printable.

RESULTS & DISCUSSION:

My motivation for this project was to see what amount of crosslinking gives us the best filament. To do this I tested alginate w diff concentrations of CaCl2; from my observations I decided that 35mM CaCl2 best fits an undergelled state and we can see that from the extrusion being in droplet form. Liquid like state. We saw as we increased the concentration that the gels got stiffer. The mechanical properties that correspond with the proper gelled ink is around 200 Pa. we tested the cell viability of human corneal mesenchymal stromal cells (MSCs) after 24 hours. Cell viability was high in 35mM and 65mM concentration and for 75mM we see a decrease in cell viability and cell morphology.

ACKNOWLEDGEMENTS:

Lucia Brunel,Mentor Sarah Heilshorn, PI

Kellie Phung, Mentee partner SLI internship, Foothill College

CHEMISTRY

Target Synthesis in Nuclear Chemistry at SJSU

Stephanie Austin

Summer 2022

ABOUT YOU:

- Hometown: Santa Clara, CA
- Biochemistry A.S, Summer 2022
- Major: Environmental Science, Chemistry concentration, B.S anticipated in 2024
- Transfer institution: UC Santa Barbara
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Esker Lab, Chemistry Department, San Jose State University
Supervisor: Dr. Nicholas Esker and Dr. Melody Esfandiari

OBJECTIVE:

To synthesize the first part of a Barium-Aluminum alloy target made for the potential use for quantum computers as qubits.

METHODS:

The first thing we did was perform a literature search for several weeks on how to develop a reaction series and protocol of isolating barium oxide so that barium-aluminum can be made in a tube furnace in the future. Then we went ahead to test what was feasible in the lab towards isolating barium.

RESULTS & DISCUSSION:

Our goal of isolating barium carbonate was successful, but only at 10mM and with the use of the centrifuge evaporator. The percent yield for the 10mM batch of centrifuge evaporator samples was very high (67.5-432% range) which means there was a possibility of other impurities within the precipitate barium carbonate. Our experimental spectrum obtained from the FT-IR confirmed the presence of barium carbonate and other impurities such as water and ammonium. The next steps for this project would be to learn how to isolate barium carbonate via a solvent extraction -so finding an appropriate organic solvent that can isolate barium carbonate from the other impurities without altering its structure. Additionally, it would be important to learn how to dilute barium carbonate to 1mM from 10mM since the overarching project needs the barium-aluminum alloy near the microscale. Any trapping of radioactive isotopes on the target would also occur outside of the SJSU lab and most likely at a facility that supports the infrastructure for laser ablation or particle accelerator research labs.

ACKNOWLEDGEMENTS:

I want to give a special thank you to the team at Foothill College's SLI: Marissa Elena Yanez the STEM Workforce specialist at the and Engineering Faculty member, Sophia Kim the director of SLI and Steve Silva the SLI Program administrator. I want to extend another thank you to the team at San Jose State University, the site of the research project: Dr. Nicholas Esker, Nuclear and Physical Chemistry tenure professor at SJSU and Dr. Melody Esfandiari. Lastly, I want to give a warm thank you to Maya Vliegen, my fellow lab and internship partner this summer. I wish nothing but the best for Maya and her future endeavors at UC Davis while studying Food Science.

Synthesis and Characterization of Electroactive Polymers

Michelle Cao

Summer 2022

ABOUT YOU:

- Hometown: San Jose
- Major/ certificate: Chemical Engineering
- Transfer institution: Foothill College
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: San Jose State University
Website: https://www.sjsu.edu/science/
Mission: To create knowledge and expand opportunity. Supervisor: Philip Dirlam

OBJECTIVE:

The goal of this internship was to synthesize and characterize polymers that could be used in batteries. Specifically, we made polymers involving hypervalent iodine in the laboratory, then tested their use as oxidizing agents.

METHODS:

We performed experiments to make hypervalent polyiodostyrene, a compound that has very interesting applications as an oxidizing agent. We wanted to A) find a way to make the compound in the most efficient way possible, and B) find as many uses for it as possible. We tried different methods of synthesizing styrene, one of the "building blocks" used to make the final compound, such as changing the concentration of starting material used at certain steps and testing out a simpler way to purify it. In terms of uses, we attempted a "Suzuki Coupling," a type of reaction that allows two different molecules to be combined together, and different types of polymerization such as ATRP (a very controlled type of polymerization).

RESULTS & DISCUSSION:

We were able to find a much more efficient way to purify the compound. Instead of running a column, we could just pour it through silica gel, saving us hours of time. Our different methods of polymerization also worked very well, allowing us to control the rate at which our compound went from a monomer to a polymer. We also realized that changing the concentration of the starting material wouldn't change the rate of reaction very much, so we could use less solvent. All-in-all, we were able to make the synthesis process much more efficient.

ACKNOWLEDGEMENTS:

- Sophia Kim, SLI Director
- Marissa Yanez, SLI STEM Workforce Specialist
- Steve Silva, STEM Workforce Program Assistant
- Melody Esfandiari, SJSU Instructor
- Philip Dirlam, SJSU Researcher

Foothill SLI Summer Micro-Internship

Nhu Dao

Summer 2022

ABOUT YOU:

- Hometown: Saigon, Vietnam
- Major/ certificate: Chemistry
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Stanford University
Supervisor: Kimberly Carter-Fenk

OBJECTIVE:

In my micro-internship, my mentor and I worked on a 10-week long investigative research project titled "Elucidating Intermolecular Interactions of Deep Eutectic Solvents with Quantum Chemistry". Our goals were to quantify the intermolecular interactions that give deep eutectic solvents their unique properties and create a generalized model for predicting and modeling DESs, specifically its intermolecular interactions.

METHODS:

Using a combination of molecular simulation programs Avogardro, Packmol, and VMD (Visual Molecular Dynamics), we were able to simulate how choline chloride and urea based deep eutectic solvent (also called reline) might behave like.

RESULTS & DISCUSSION:

We ran two different experiments. One where we did a box dimensional analysis of how many molecules of choline chloride and urea would there need to be to fix in a box of a particular dimension. For this experiment, we did compared our results to another literature where our results ended up being similar to theirs. Our other experiment involved using a differential scanning calorimeter to analyze and compare the thermophysical properties of a chloride-based deep eutectic solvent to a bromide-based one. In the end, the chloride-based DES had a lower melting point.

ACKNOWLEDGEMENTS:

I would like to thank Kim for being my mentor and giving me this opportunity to explore research. I would also like to thank Sophia and Marissa for supporting this micro-internship and Foothill SLI and Stanford SNF.

Synthesis and Characterization of Electroactive Polymers

Quang Truong
Summer Quarter 2022

About Me:
Hometown: San Jose, CA Major: Chemical Engineering
Certificate: AST in Physics, Mathematics; AS in Chemistry, Physics, Mathematics
Transfer Institution: University of California, Los Angeles Year of Graduation from Foothill College: 2022
Placement:
Name of Institution: San Jose State University
Website: https://www.sjsu.edu/chemistry/about-us/faculty/philip-dirlam.php Supervisor: Dr. Philip Dirlam

Objective:
Going into this internship, I really wanted to reinforce my lab skills because during the school year, lab was not one of my strong suits (and COVID stay-at-home orders didn't really help with that). Additionally, in the future I would like to get into the clean energy industry and I thought that this internship would be a great introduction to learn more about the field and see if it's really something that I would like to pursue.

Methods:
One of the big processes that we followed during this internship is the synthesis procedure of 4-iodostyrene. This procedure involved starting with 4-iodoacetophenone and reducing the ketone into an alcohol with sodium borohydride. Then, the alcohol was reduced into a double bond using para-toluene sulfuric acid, creating 4-iodostyrene. One completely new method that we learned this summer was purging a system of oxygen using a Schlenk Flask. This was done by following a series of putting the system under a vacuum and replacing the air with argon gas.

Results & Discussion:
We discovered that a soluble hypervalent iodine polymer is possible! With this, the next steps that we see for this project is to test and understand the behaviors of this polymer as an electrolyte in a battery system. If this turns out to be successful, that would mean that a new type of battery can be made that will be cheaper to produce and potentially recyclable, which serves to be very valuable in the long-term goal of reaching a green, sustainable future. The only polymer that we have tested the soluble hypervalent iodine with is a polymer combination of iodostyrene and styrene, but we would also like to see if there are other polymers that can adopt this. Different molecule and structural characteristics can influence the efficacy of the result and possibly lead to a more electroactive polymer than the one that we started with. Seeing the compatibility of the hypervalent iodine group with other polymers would involve more complex reactions. One that we were considering is the Suzuki reaction. Other steps that our lab discussed was to possibly find a way to incorporate the two-step reduction synthesis of 4-iodostyrene into an organic chemistry lab classroom.

Acknowledgements:

Marissa Yáñez - SLI

Sophia Kim - SLI

Steve Silva - SLI
Dr. Philip Dirlam - SJSU
Dr. Melody Esfandiari - SJSU

Using noncovalent interactions to control conformation and reactivity

Elias Vlastos

Summer 2022

ABOUT YOU:

- Hometown: Casper, WY
- Major/ certificate: Computer Science
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Bao Research Group, Stanford University
Website: https://baogroup.stanford.edu/ Supervisor: Will Henderson

OBJECTIVE:

Through our research we explored how noncovalent interactions including hydrogen bonding and orbital interactions could be used to control the conformation and reactivity of organic compounds. We focused on the compounds dithienocyclooctadiene (DTCOD) and sulfonyl bisoxazolidinone (SBO).

METHODS:

Reactions at room temperature and at reflux were used to synthesize target compounds which were then purified using a variety of techniques including rotary evaporation, vacuum filtration, and column chromatography. Compounds were characterized using thin layer chromatography, proton NMR, IR spectroscopy and X-ray crystallography. PerkinElmer's ChemDraw software was used to draw compounds and reactions.

RESULTS & DISCUSSION:

Over the course of nine weeks my mentor and I successfully synthesized several mono-substituted and di-substituted derivatives of SBO which we then crystallized and submitted for x-ray crystallography. DFT optimized gas phase structures of these compounds were also generated to obtain further data. In addition, we conducted functionalizations of DTCOD to stabilize the compound's contracted conformation and explore potential liquid crystal mesophases.

ACKNOWLEDGEMENTS:

- Will Henderson, Postdoctoral Scholar, Stanford University
- Marissa Yáñez, SLI STEM Workforce Specialist
- Sophia Kim, SLI Director

Synthesizing and Characterizing Thin Films in Nuclear Science

Maya Vliegen

Summer 2022 Internship

About Me:

- Hometown: Redwood City, CA
- Major: Food Science
- Graduation Date: Transferring to UC Davis for Fall 2022

Placement:

- Name of Institution: San Jose University
- Supervisor: Dr. Nicholas Esker

Objective:

- Our goal for the internship was to synthesize barium carbonate.

Methods:

- First, I performed a literature search,
- where I learned how to read and understand scientific articles. I used the information to build a rough procedure for making barium targets.
- Then we performed a series of different experiments to synthesize barium carbonate. This included:
  - A dilution experiment where I learned how to make different solutions of different molarities and the calculations needed to determine the mass of the solute.
  - Using a centrifuge evaporator to optimize precipitating the product out of the solution. I learned how the machine worked and how to use it.
  - Analyzing the data using FT-IR spectroscopy to ensure the product was free of contaminants and impurities.
  - After many trial runs, we compared the data using google sheets.

Results:

- We were able to successfully synthesize barium carbonate. In the future, the product we synthesized will be used in a series of other reactions to create a barium-aluminum alloy target to trap barium-133 through laser ablation. The reason we want to trap Barium-133 because it has special nuclear properties making it an ideal qubit for quantum computing.

Acknowledgements:

- My mentor Dr. Nicholas esker, my supervisor Dr. Melody Esfandiari, Marissa, Sophia, Steve, and Foothill College + SLI.

COMPUTER SCIENCE & ENGINEERING

Optimization and Integration of Complex Algorithms for Xopt

Tyrell Baker

Summer 2022

ABOUT YOU:

- Hometown: Bethlehem, Georgia
- Major/ certificate: Computer Science
- Transfer institution: University of California, Berkeley
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: SLAC National Accelerator Laboratory Website: https://www6.slac.stanford.edu
Mission (if a company): "We explore how the universe works at the biggest, smallest and fastest scales and invent powerful tools used by scientists around the globe. Our research helps solve real-world problems and advances the interests of the nation."
Supervisor: Sara Miskovich

OBJECTIVE:

To implement a new optimization algorithm feature into the Xopt open-source optimization package by leveraging and refactoring the existing algorithm in the SciPy Python package. Doing so allows for efficiency in accelerator tuning.

METHODS:

This Summer, I worked with the Needer-Mead optimization algorithm. Python's SciPy library already had the implementation for the Nelder-Mead algorithm in its "optimize" package, but Xopt, the program I was working on, couldn't evaluate Nelder-Mead out of the box. In order to make it available for operator use, the algorithm had to be converted to the format accepted by the program. This is done by creating two separate functions: a generator which is responsible for accepting and formatting data, and an evaluator function, which tells the program what to do with the information.

RESULTS & DISCUSSION:

The process of creating the generator and evaluator functions was relatively straightforward, and although it took some time, was ultimately a successful endeavor. The significance of this project, however, is that SciPy algorithms hadn't been integrated into Xopt yet—so with the completion of the integration of Nelder-Mead, we confirmed that the formatting for algorithm integration within Xopt is, at the very least, working. The next step is to make sure it works properly. Alongside the implementation of other optimization algorithms, software engineers at SLAC will continue to evaluate edge cases, debug, and update the graphical interface.

ACKNOWLEDGEMENTS:

Jackie Garrahan & Jake Rudolph-SLAC National Accelerator Laboratory

Esperanto Technologies - AI Intern

Azaan Barlas

Summer 2022

ABOUT YOU:

- Hometown: Diamond Bar, California
- Major/certificate: Associate in Computer Science
- Foothill College graduation: Fall 2023

PLACEMENT:

Name of company/ institution: Esperanto Technologies
Website: https://www.esperanto.ai/
Mission: Help clients achieve outstanding AI performance and efficiency, from cloud to edge, with a low total cost of ownership (TCO) Supervisor(s): Sylvain Flamant and Jin Kim

OBJECTIVE:

The goal of this internship was to see if we could implement Facebook's DLRM code (the part where it can analyze fast memory) into Esperanto's ET-SoC-1 microchip. We were looking to achieve more understanding of how Facebook did this, as well as see if we could come up with something similar.

METHODS:

There were 2 main projects that we worked on at Esperanto, with the same overarching goal. The first project involved understanding Facebook's DLRM code. We analyzed this by reading through the code on GitHub and testing it on some sample data we created until we understood what the code was trying to achieve. The other project involved analyzing the 1 terabyte dataset Facebook analyzed in this DLRM code. We first had to manipulate this data using AWS CLI, and then we ran code on it with AWS Sagemaker (Python) to get key statistics out of it.

RESULTS & DISCUSSION:

What we found from the DLRM code was Facebook was first going through the entire dataset and looking for any duplicate entries of data and removing them. Next, they would look through every row of data and store information in three different categories. Flag (first data point of every row.), dense features (numerical data), and categorical features (non-numerical data). On the other side of the project, we used code to process the data to give us a similar output as the DLRM code. Some of what we found on the data side was that the least unique column frequency took up the majority of the first 10 percentiles, meaning that most of the data were not unique. This work helps us understand the algorithm Facebook uses to analyze data without storing this, and Esperanto can use this method to allow the ET-SoC-1 chip to work better.

ACKNOWLEDGEMENTS:

Science Learning Institute: Marissa Yanez, Sophia Kim, Steve Silva; Esperanto Technologies: Sylvain Flamant, Jin Kim; Special Thanks: Andrew Chung, Luca Garlati.

Machine Organic Chemistry

Daniel Chavez

Summer 2022

ABOUT YOU:

- Hometown: Novato, CA
- Major/ certificate: Chemical Engineering
- Transfer institution: UC Berkeley
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Stanford University
Website: https://mtzweb.stanford.edu/
Supervisor: Dr. Cody Aldaz

OBJECTIVE:

Our main objective was to streamline the calculations of reaction mechanisms by computing reaction networks from reactants to products with a template-based algorithm. This algorithm generates the network by iteratively applying template reactions from a library of elementary steps.

METHODS:

With a team, we coded chemical reaction templates using Python. We collaborated on a shared repository in Jupyter Lab, and individually pushed our edits and contributions to our project using Git. To coordinate tasks and document our progress, we used Obsidian for our lab notebooks and project planning.

RESULTS & DISCUSSION:

The result of our work coding reaction templates and developing template generators was a database of elementary steps that were used to create reaction mechanisms. Our individual Elementary Steps enabled us to map out a network of viable pathways from our reactants (purchasable molecules) to our desired products. With reinforcement learning, we can develop this program to recognize the most promising organic synthesis route for retrosynthesis.

ACKNOWLEDGEMENTS:

- Sophia Kim, SLI Director
- Marissa Yañez, STEM Workforce Specialist
- Dr. Cody Aldaz, Research Mentor & Post Doc Researcher at Stanford University
- Samuel Pavelites, Alessio Valentini, Jan Estrada, & Todd Martinez (Martinez Group)

Data Science Intern at Esperanto Technologies

Lily Knab

Summer 2022

ABOUT YOU:

- Hometown: San Jose, California
- Major/ certificate: AS-T in Computer Science
- Transfer institution: UC Santa Cruz
- Year of graduation from Foothill College: Spring 2022

PLACEMENT:

Name of company/ institution: Esperanto Technologies, Inc.
Website: https://www.esperanto.ai/
Mission: Achieve outstanding AI performance and efficiency, from cloud to edge, with low total cost of ownership.
Supervisor: Sylvain Flamant

OBJECTIVE:

Assist data science team with demonstrating the capabilities of the AI chip through preprocessing a large dataset.

METHODS:

I used Amazon Web Services (AWS) tools including AWS CLI, AWS S3, and AWS SageMaker to store and manipulate large data files. I also used Python to debug errors in large data files. I worked closely with another intern to understand his code so I could make certain procedures work in the AWS environment.

RESULTS & DISCUSSION:

The result of my part of the project is several Jupyter notebooks of code that analyze big data files in the AWS environment. Also, I used these notebooks to produce specific files with information about a specific large dataset. These files will be used to inform data segmentation for a demo for customers and potential customers of Esperanto Technologies.

ACKNOWLEDGEMENTS:

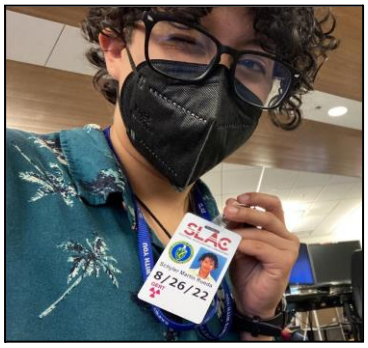
Jin Kim, Chief Data Scientist at Esperanto Technologies Marisa Yanez, STEM Workforce Specialist at Foothill College Sophia Kim, SLI Director at Foothill College
Steve Silva, STEM Workforce Program Assistant at Foothill College Miloni Gandhi, ITRN course instructor at Foothill College
Erik Mercado, Azaan Barlas, Andrew Chung, and Luca Garlati, fellow summer interns at Esperanto Technologies

Graphical User Interface for Cryomodule Signals

Schyler S. Martin

Summer 2022

ABOUT YOU:



- **Residence:** San Jose, California
- **Major/ certificate:** Biology/Physics major, Certificate of Achievement in Humanities
- **Year of graduation from Foothill College:** 2024

PLACEMENT:

Name of company/ institution: SLAC National Laboratory

Website: SLAC | Bold People. Visionary Science. Real Impact. (stanford.edu)

Supervisor: Lisa Zacarias

OBJECTIVE:

To develop a graphical user interface to view archived, simulated and live data from the particle accelerator.

METHODS:

Using PyDM, the PyQT designer and python, I assembled all the elements of the interface in a .ui file and backed it up using Python, connecting all the buttons to their functions with the help of PyCharm.

RESULTS & DISCUSSION:

Through my contribution to the development of this interface, the team at SLAC will be able to get the software running in less time than anticipated, which will allow them to switch from the outdated software they were using into the one I started building.

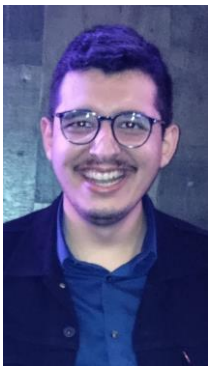
ACKNOWLEDGEMENTS:

Lisa Zacarias, SLAC; Nicole Neveu, SLAC; Sophia Kim, SLI; Marissa Yañes, SLI; Steve Silva, SLI; Miloni Gandhi, ITRN Course.

Microchips for Machine Learning

Erik Mercado

Summer 2022



ABOUT YOU:

- Hometown: Hayward, CA
- Major/ certificate: Electrical & Computer Engineering
- Transfer institution: UC Santa Cruz
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Esperanto Technologies Website: https://www.esperanto.ai/
Mission (if a company):Esperanto delivers high-performance, energy-efficient computing solutions that are the compelling choice for the most demanding AI and non-AI applications.
Supervisor: Jin Kim , Sylvain Flamant

OBJECTIVE:

My task was to understand and explain how Facebook's deep learning recommendation model worked. More specifically I worked on understanding how the data was being prepared to user later for training and testing the model

METHODS:

Some Key materials we used were GitHub which is where the code for the model can be found. We used Visual Studio to run the code. We used python as it is the most common language in machine learning . In our case we also used a library called NumPy that adds support for multidimensional arrays and mathematical functions to manipulate those arrays. We also used Pytorch which allows data scientists and developers to build and deploy machine learning models faster and easier. How we approached this task was to look over the code in GitHub and get a sense of what was occurring. Then we created a small dataset and used that to run the code. Once we started to run the code we ran into some errors but after debugging and with help with some team members and documentation we were able to successfully run the code.

RESULTS & DISCUSSION:

What we found from the DLRM code was that Facebook was first going through the entire dataset and looking for any duplicate entries of data and removing them. Next they would look through every row of data and store information. We found that the data was being stored into three different categories. Flag (first data point of every row.), dense features(numerical data) and categorical features(non-numerical data). For the model to work all inputs and outputs need to be numerical so the categorical features had to be converted into numerical data through a modulus function that converts hexadecimal to decimal. The data was then put into a lookup table so when it is referenced it will be found quicker.

ACKNOWLEDGEMENTS:

Thank you Jin Kim & Sylvain Flamant at Esperanto technologies, and the SLI team.

Alternatives for Mammograms

Gerardo R Padilla Jr.

Fall 2022

ABOUT YOU:

- Residence: Mountain View, CA
- Major/ certificate: Computer Science AS-T Foothill College; Biomedical Engineering and Software Engineering @ San Jose State University
- Transfer institution: San Jose State University
- Year of graduation from Foothill College: 2022

PLACEMENT:

- Name of company: iSono Health
- Website: https://isonohealth.com/
- Supervisor: Mohammad Ali Ghaderi

OBJECTIVE:

Add functionalities and Writing Automated Tests for a User Interface

METHODS:

The first step was to understand the project; the way it was all tied together, what each of the parts did, and how they would be used.
Next, I had to familiarize myself with JavaScript, Node.js, Quasar, and other softwares and frameworks that would make the softwares run like clockwork.
Finally, I would have to learn Typescript, playwright, and CodeGen to be able to write some automated tests for the Interfaces to prevent problems when the app is launched.

RESULTS & DISCUSSION:

Successfully contributed to the project and gained a significant amount of knowledge in JavaScript and a large and soft skills. Some of my contributions were additional functionalities to the user interface and fixing some formatting issues that were present in the user interface of the application. Some of these include text boxes, additional tabs, image manipulation, etc.
The most important highlight of my work was the testing code I wrote in TypeScript, and this was achieved using playwright, and codegen to carry this out.

ACKNOWLEDGEMENTS:

-Shadi Saberi - iSono health
-Sophia Kim and Marissa Yañez - Foothill SLI

Software Engineering Internship

Brianna Rogers

Summer 2022

ABOUT ME:

- Hometown - San Jose, California.
- Major/certificate - AST in computer science.
- Year of graduation - 2022.

PLACEMENT:

Name of company: Avenda Health

Website: https://avendahealth.com/

Mission: Introducing a new approach for treating prostate cancer that improves quality of life

Supervisor: Thomas Summers / Josh Shubert

OBJECTIVE:

My goal for this internship was to learn about the software lifecycle in a production environment and to develop skills that would help me grow as a software engineer.

METHODS/PROCESSES:

At the start of my internship, I read through tutorials on ReactJS and Golang, and also read up on prostate cancer and focal therapy. I learned how version control/code development works and was exposed to react and MySQL in a real-life application. I learned how to write tests in Python and how to work with apis, as well as learning a lot about the structure of Avenda's FocalPoint software and Golang by reading through the code. I learned how to use SQL through tutorials and got to use that and Golang to work with the backend.

RESULTS & DISCUSSION:

The main results of my work during my time at Avenda will be to inch them a bit closer to commercialization–one of the requirements for the FDA to approve software requires complete testing of every aspect of the application. When it does get released for use by doctors, hopefully their experience will be more bug-free and should anything go wrong, it will be easier and faster (by around 5x) to access the system logs and help diagnose the issue.

ACKNOWLEDGEMENTS:

My first acknowledgement goes towards my mentor, Thomas Summers, as well as the head of engineering, Josh Shubert, as well as the rest of the Avenda Software team.

I'd especially like to thank Marissa, Sophia and Steve at the SLI for putting all of this together and allowing all of us the opportunity to have such a valuable experience this summer.

Biomedical Data Fusion Internship

Arnoldo Sanchez

Summer 2022

ABOUTME:

- Hometown: San Jose, CA
- Major/ certificate: Electrical Engineering
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Gevaert Lab, Stanford Center for Biomedical Informatics Research Website: https://med.stanford.edu/gevaertlab.html Supervisor: Dr. Yuanning Zheng

OBJECTIVE:

I had two primary objectives which were to become familiar with epigenetic processes that underpin our project and to become familiar with Biomedical Data Science Methods. In doing so, I would gain experience and confidence with R Programming.

METHODS:

This was a three-step process. First, I would download and combine Lung Cancer data from TCGA.org, The Cancer Genome Atlas. Afterwards I would preprocess the data and finally try to identify differentially methylated genes using the Epimix computational tool.

RESULTS & DISCUSSION:

I was able to combine all the data and then use the tumor tissue samples to compare them to normal tissue samples. The results were that, yes, there are differentially methylated genes in tumor tissue samples in comparison to normal tissue samples. After that I checked to see if the tumor samples are different from each other and yes, they are different. I was able to create 4 methylations subtypes afterwards of the DNA methylation profiles.

ACKNOWLEDGEMENTS:

Dr. Olivier Gevaert - Principal Investigator Dr. Yuanning Zheng - Mentor
Sophia Kim - SLI Director
Marissa Yanez- STEM Workforce Specialist

Teaching Machines Organic Chemistry

Vivian Truong

Summer 2022

ABOUT YOU:

- Hometown: Sunnyvale
- Major/ certificate: Chemistry
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Stanford University Supervisor: Cody Aldaz

OBJECTIVE:

To train a computer to do organic chemistry

METHODS:

We organized our work with Obsidian and used Ubuntu to access Git and JupyterLab. We had a shared repository on GitHub and updated the changes we made with git. To code the reactions, we used JupyterLab and coded using Python.

RESULTS & DISCUSSION:

Last time in winter, we focused more on creating elementary step templates but this quarter, we were given more autonomy and focused on making mechanisms. Doing the mechanism did require us to continue making elementary steps, but the difference now was that we would create templates based on what we were missing for our mechanism and tried to connect the graphs ourselves. We were successful in connecting a few mechanisms and also used our problem-solving skills to resolve errors.

ACKNOWLEDGEMENTS:

Cody Aldaz, Stanford University Sophia Kim, Foothill College Marissa Yanez, Foothill College
Steve Silva, Foothill College
Samuel Pavelites, Cornell University Alessio Valentini, Stanford University
Jan Estrada Pablon, Stanford University Todd Martinez, The Martinez Group

MEDICINE

Tumor Segmentation @ Stanford

Jasslie Altamirano
Summer 2022

ABOUT YOU:

- Residence: San Mateo, California
- General Biology
- UC San Diego
- Graduation 2022

PLACEMENT:

- Stanford University School of Medicine,
  Department of Medicine – Biomedical Informatics Research
- https://med.stanford.edu/gevaertlab.html
- Supervisor: Olivier Gavert, PhD

OBJECTIVE:

Become proficient in a new programming language–since I only came to know C++ and MATLAB and become comfortable identifying tumors through CTs as well as be able to use the different applications/softwares to visualize data.

METHODS:

1. Read scientific journals/articles to understand the background of the project.
2. Download applications/softwares and data.
3. Explore data.
4. Learn how to learn CT scans and learn how tumors are identified.
5. Identify tumors in different cases and begin the segmentation process.
6. Begin learning python.
7. Visualize data through python.

Results & Discussion

This project is still ongoing. From learning python and being able to look through Stanford data, I was able to combine both learnings together in a code to practice viewing the data. Through the variations of codes that we used to visualize data I was able to pull different portions of the file and be able to combine the segmentation file with the CT to pull up the tumor. To continue this work, I would want to get more proficient with python in order to use different methods and see their efficiencies.

ACKNOWLEDGEMENTS:

I would like to thank Christoph Sadee for being my mentor throughout this journey and for having the patience with me while learning python. A huge thanks to the SLI team since without them this wouldn't have been possible at all. Lastly, thank you Marissa for always being my special cheerleader–unidas si se puede!

Isono Health Inc

Andre Augustin
Summer 2022

ABOUT YOU:

- **Hometown**
  - Palo Alto California United States
- **Major/ certificate:**
  - Computer Science AST
- **Year of graduation from Foothill College:**
  - Winter 2023

Name of company/ institution:

- Isono Health

Website:

- isonohealth.com

Mission (if a company):

- Make afford breast ultrasound for women and women of color

Supervisor:

- Navid Samavati and Mohammad Ali Ghaderi

OBJECTIVE:

I was able to use backend programing to make the app more invasive for their patients

METHODS:

During my time at iSono health, my mentor Navid Samavati had me working on the annotation of breast ultrasounds from numerous patients. For the majority of my work, I was doing my research on 3D Slicer App. The 3D Slicer App allowed me to work on breast ultrasounds and develop Outputs of shadows, nipple location and lastly breast segmentation.

RESULTS & DISCUSSION:

My work contributes to the company helping improve their Artificial Intelligence software. There software will have better detection of lesions and other breast cancer related issues that can occur for a patient who is being scanned for an ultrasound. In addition to adding feature to front end of their app making it more organized and readable for the user to navigate when looking for the results of their ultrasounds.

ACKNOWLEDGEMENTS:

- Navid Samavati
- Mohammad Ali Ghaderi
- Marissa Elena Yañez
- Sophia Kim
- Steve Silva
- Miloni Gandhi

Injectable Hydrogels for the Delivery of Gene Based Myocardial-Infarction Therapy

Giselle Aviles-Rodriguez
Summer 2022

ABOUT YOU:

- Hometown: I grew up in Santa Clara, California and am a first-generation student.
- Major/ certificate: An aspiring Latina Biology student, hoping to transfer to UCLA.
- Year of graduation from Foothill College: 2024

PLACEMENT:
Name of institution: Stanford University
Website: https://web.stanford.edu/group/heilshorn/ Supervisor: Dr. Renato Navarro

OBJECTIVE:
Assist in developing a new, injectable, hydrogel delivery system for a gene based Myocardial-infarction therapy.

METHODS:
Various methods were used to test the hydrogel mechanics, one being Stress Relaxation. A process in which we use a machine called a rheometer to measure how the gel is "relaxing" in comparison to the tissue samples. We needed the hydrogels to match the tissue samples as closely as possible. Another more common test is injectability tests, to see if the hydrogel at that molecular weight was even extrudable.

RESULTS & DISCUSSION:
Throughout my internship, I assisted in developing a hydrogel using Hyaluronic Acid (HA) and Elastin-Like Protein (ELP). This hydrogel can is helpful in various applications, from cell encapsulation to 3D printing. Cell encapsulation is a type of "cell-seeding" where cells are allowed to grow in hydrogel instead of growth media to explore their different phenotypes and maximize cell viability. 3D printing has long suffered with the question of cell viability, but now we have an extrudable gel that allows for filaments, which opens doors we never thought possible. Due to its injectable nature, it also retained the same goal of being an extrudable gel that can deliver a gene-based therapy. Though this did come with its challenges as it initially wasn't extrudable, we quickly overcame this by using HA of different molecular weights.

ACKNOWLEDGEMENTS:
Dr. Renato Navarro, Mentor Prof. Sarah Heilshorn, PI
Isabelle Hong, Student Researcher
Thank you so much for this opportunity, it feels absolutely surreal.

Injectable Gene Therapy for Myocardial Infarction Treatment

Isabelle Hong
Summer 2022

ABOUT YOU:

- Hometown: Seoul, South Korea
- Major/ certificate: Cognitive Science
- Transfer institution: UCLA
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Stanford Heilshorn Biomaterials Group Website: https://web.stanford.edu/group/heilshorn/
Mission (if a company): None Supervisor: Renato Sam Navarro

OBJECTIVE:

To develop injectable hydrogel for the delivery of minicircle gene therapy for myocardial infarction treatment.

METHODS:

Cardiovascular disease such as acute myocardial infarction is one of the leading causes of death worldwide. Delivering an effective therapy that reduces the infarct zone would prevent the spread of cell death and the loss of function in cardiovascular tissue. Studies have shown that stromal cell-derived factor 1 α (sdf-1 α) has great potential to prevent the spread of the infarct zone after myocardial infarction. However, delivering a therapeutic dose to the affected tissue continues to be a challenge – in part due to increased protease activity after myocardial infarction, which can degrade the sdf-1 α. To address these limitations, we developed an injectable hydrogel to deliver gene therapy in the form of a minicircle encoding sdf-1 α, which will provide a sustained therapy dose in the infarct site.

RESULTS & DISCUSSION:

Right now we are at the beginning stage of the pilot studies, so most of the work was related to optimization, which did not show a distinctive result. However, based on our early experiment, the preliminary results indicate limited minicircle uptake, so future work will include optimization of the transfection protocol.

ACKNOWLEDGEMENTS:

The work was supported by Foothill College Science Learning Institute, Stanford Heilshorn Biomaterials Group, National Institutes of Health, and the American Heart Association. I would like to thank Professor Heilshorn, Marissa, Sam, Sophia, and Steve. It would have been impossible for me to learn this much without the opportunities they have provided and special thanks to my awesome mentor Sam. He supported and encouraged me to learn continuously, and I would have not finished my internship without his mentorship.

R&D Internship on Characterizing Hydrogels Solutions and Investigating Protein Stability

Chelsea Navarro

Summer 2022

ABOUT YOU:

- Hometown: San Francisco, CA
- Major/ certificate: Clinical Lab Science
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of company/ institution: Intact Therapeutics
Website: https://intacttherapeutics.com/
Mission: Use therapeutic smart gels to treat gastrointestinal (GI) disorders. These gels are liquid at room temperature and gel at body temperature. Intact Therapeutics use these specialized gels as excipients to target localized parts of the GI tract.
Supervisor: Chris Zhan

OBJECTIVE:

One of Intact Therapeutics' goal is to develop a protein mouthwash that muco-adhesively gels in the mouths of cancer patients to prevent and treat oral mucositis. One of my specific goals is characterizing polymers that will be used as excipients for our treatment protein. Another goal is to investigate protein stability in different conditions and in liquid solutions.

METHODS:

For the gel formulations, I mixed different ratios of polymers. I measured the formulation's pH, gelation temperature and muco-adhesion retention. Muco-adhesion involves weighing and calculating how much formulation is retained after it is exposed and dispensed out of a mucin plate. For protein stability, various experiments were used to measure protein stability. Some methods include ELISA and HPLC. However, I mainly used SDS-PAGE which involves adding conditioned proteins samples into a gel. The proteins degradation is measured based on the protein bands' color intensity found in the gel.

RESULTS & DISCUSSION:

We found some formulations that fit our target specifications. We also noticed how certain polymers affect the gelation temperature when mixed with other polymers. Moreover, the data gathered from the gel characterization will help finalize five different formulations that will be used in Intact Therapeutic's progress report for their current grant. As for protein stability, I mainly worked with an older protein while conducting the SDS-PAGE and ELISA tests. This means that the data results gathered during my internship will be used to compare repeated test results with a newer protein that Intact Therapeutics received recently.

ACKNOWLEDGEMENTS:

Chris Zhan, Senior Scientist
Ravi Pamnani, CEO of Intact Therapeutics Marissa, Steve, and Sophia (SLI)

R&D and Manufacturing Intern at Potrero Medical

Freddi Reyes

Summer 2022

ABOUT YOU:

- Hometown: Sunnyvale
- Major/ certificate: Civil Engineering
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Potrero Medical Website: https://potreromed.com/
Mission: Health company developing the next generation of medical devices with smart sensors and artificial intelligence. Their mission is to help clinicians transform patient care by developing a predictive technology platform for early detection of critical illnesses.
Supervisor: Dillon Arey

OBJECTIVE:

The goal of this internship was to develop and implement process improvements on a new medical device. My specific projects involved testing on small parts of the device that helped contribute to the overall aspects and potential improvements of the device.

METHODS:

I used several tools to complete each project, including general machine shop (hand tools), Solidworks, 3D Printers, Excel Sheets, and AutoCad. Each of these played an important role when researching key aspects of the device as well as developing ways to improve the device. The steps I took to complete each project involved prototyping, experiment designing, testing, and lab reports to document each project.

RESULTS & DISCUSSION:

The results that my projects delivered included potential adjustments to the new Accuryn Monitor that the company is currently working on whether it is how much weight the port from the monitor can hold as well as the magnetic force needed in order to have the removable Accuryn Tablet attach onto the monitor well and detach easily for clinicians to use. These results ultimately provide new insights on the device to improve the qualities and solve any complications.

ACKNOWLEDGEMENTS:

- Dillon Arey, Manager of Research and Development-Systems
- Marissa Yanez, SLI STEM Workforce Specialist
- Sophia Kim, SLI Director
- Steve Silva, SLI STEM Workforce Specialist

STEM EMPOWERMENT

Analysis of Public Attention and Sentiment Towards US Inflation Using Twitter Data

Van Thanh Chau

Summer 2022

ABOUT YOU:

- Residence: Mountain View, CA
- Hometown: Ninh Thuan, Vietnam
- Major: Computer Science
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Stanford University, Graduate School of Business, Data, Analytic, & Research Computing Team
Website: https://www.gsb.stanford.edu/faculty-research/darc Supervisor: Wonhee Lee & Amy Ng

OBJECTIVE:

Study how the US inflation news spreads and is discussed on social media using a textual analysis of tweets on Twitter. Additionally, the internship aims to introduce the process of social science research, from determining topic focus, writing proposals, pulling appropriate data, cleaning data for analysis, to analyzing strategies.

METHODS:

Using the Twitter API v2 for Academic Research, I pulled tweets with a query that I built and tested. I then stored and started cleaning the data with various tools including Python's pandas, NumPy, clean-text package, etc.
With the data, I ran three tests:

- Producing a time series graph for the amount of Tweets per month to observe trend.
- Building a WordCloud with the 200 most mentioned words across all of the Tweets.
- Producing sentiment scores for each Tweet to measure its sentiment, i.e. negative, positive, or neutral.

RESULTS & DISCUSSION:

The amount of Tweets dramatically increased starting from June 2022, when the record-high inflation rate are announced, which is expected. Through the WordCloud, I found out many interesting words that are associated with "inflation", including "gas", "money", "biden", "trump", "potus", "ukraine", etc. Finally, the sentiment analysis revealed that each month, after the CPI report is released, there is a spike in the number of Tweets, especially the negative ones. Although those are some intuitive results, I learned a incredibly lot of skills, from technical skills such as working with servers, virtual environment, packages, to life skills like communicating in the office, presenting, etc.

ACKNOWLEDGEMENTS:

- The DARC Team: Wonhee, Amy, Mason, Brian, Alex, Savannah.
- The Foothill's SLI coordinator: Sophia, Marissa, Steve.
- Computer Science Independent Study Professor: Eric Reed.

PRE-STEM Summer Institute Leadership Internship

Dylon Moala

Summer 2022

About Me:

- Hometown: Hayward
- Major/certificate: Civil Engineering
- Year of graduation from Foothill College: 2023

Placement:

Name of organization: SLI Pre-STEM Summer Institute Website: https://foothill.edu/sli/pre-stem/index.html

Mission: Giving everyone equal opportunity and being able to support those from underrepresented groups, helping them to know that they have a future in STEM. Creating an inclusive space for everyone to be able to build relationships as well as building off each other to help in the classroom.

Supervisor: Sophia Kim

Objective:

The goal of this internship was to be able to support students and prepare them for college. We were teaching them college readiness and math classes to give them a head-start for the fall quarter.

Methods/Process:

I used different tools for my internship such as Excel, Google Slides, and Google Docs. We used Excel for the Data Science class to show students how to clean up data. For our college readiness classes, we used Google Slides, so it looked prepared, and we were able to navigate everything efficiently. Then for different projects the students worked on, we used Google Docs to put everything together.

Results & Discussion:

The results that my internship delivered included helping students learn about Data Science and Math to get them a jumpstart to college, being able to build relationships inside and outside of the classroom, and to teach them about Foothill's different resources so they can utilize them when they need it. We were able to grow in our facilitation skills and were able to present what we wanted to a large group.

Acknowledgements:

- Director of SLI: Sophia Kim
- SLI STEM Workforce Specialist: Marissa Yanez
- Data Science Instructor: Gabriela Basel
- Math Instructor: I-Heng McComb

Redefining poverty: Examining how financial scarcity affects brain development and learning in children and adolescents.

Dara Robles
Summer 2022

ABOUT YOU:

- Hometown: Coban, Guatemala
- Major/ certificate: Pre-Nursing
- Year of graduation from Foothill College: 2023

PLACEMENT:
Name of company/ institution: Stanford University and Foothill
Mission (if a company): To study how poverty is measured and how it affects brain development of children living in such conditions.
Supervisor: Gabriel Reyes

OBJECTIVE:
The goal of this internship was to study the different ways poverty is measured to try to understand which one might be the most inclusive way possible. A second part of this internship included understanding how poverty and the conditions it creates and how that affects children's developing brain. My personal task in this internship was to study the differences between how children and adults perceived and understood poverty and its causes within their own home or in their communities.

METHODS:
I spent the summer reading many different research articles that all studied different perspectives on different aspects of poverty between children and adults. I annotated and summarized all of these articles to try to organize all of the conclusions to determine the overall results.

RESULTS & DISCUSSION:
Overall, the results showed that adults for the most part had very negative feelings and attitudes towards poverty and the solutions in place. Most people placed a lot of blame on the individual and not other structural problems such as racism, fair wages, and opportunities. Most adults did not agree on who deserved government aid and had negative feelings towards welfare for the most part. Children seemed to eventually follow this pattern of thinking as they got older however they did seem more positive and empathetic. It seemed like if age-appropriate material was prepared for children of young ages to learn about poverty and its causes we could set them up for being the future of society with more knowledge on the causes so that solutions can be found for poverty.

ACKNOWLEDGEMENTS:
Gabriel Reyes, Mentor Marissa Yanez, SLI
Sophia Kim, SLI

Pre-Stem Summer Institute Leadership Fellow

Fatima Sanchez

Summer 2022

ABOUT ME:

- Hometown: Mexico City/ Redwood City
- Major/ certificate: Biology
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of company/ institution: SLI @ Foothill College Website: https://foothill.edu/sli/pre-stem/summer-institute.html Supervisor: Sophia Kim

OBJECTIVE:

My objectives are how to structure a lesson plan, I also have how to lead a class and make transitions during the sessions, and finally build connections with others and showing vulnerability too.

METHODS/ PROCESS:

This program provides three weeks training before the summer institute with the new incoming freshmen. It was very interesting to have this training because the main goal was to inform the Intern about the activities and work schedule for the summer institution. In the same time I was able to conduct a workshop and gain more skills that facilitated the resources at Foothill College. I also learned how to create a workshop with the switch that I needed to make it interactive with the students and in the same time during the process of this workshop I also had collaboration from the other fellows which represent teamwork.

RESULTS & DISCUSSION:

During the summer institute program I accomplished different skills like clean concise communication in front of people which was a challenge for me but with practice I felt more confident in myself. I had to also get out of my comfort zone in areas like socializing. One of my favorite goals for me was also to make an inclusive environment where anyone will feel safe, heard, and valued. For me this internship makes me see that everything is connected because for any individual it is fundamental to have basic skills like time management, teamwork, creativity, problem-solving, and leadership. I feel that it is essential to have these skills because in any other project people need to apply different skills during the process. It was a wonderful experience to have this internship because I was exposed to new situations that at the end of the day gave me new skills. I enjoyed the team that I had because I felt supported and I also had a supervisor that was understanding.

ACKNOWLEDGEMENT:

Director of SLI and Mentor: Sophia Kim Program Coordinator: Lily Swedlow
Data Science Fellow: Adriana Guerrero De Santiago
Other Fellows: Dylon Moala, Ammy Vejar, Raymond Yum.
Other SLI Staff: Marissa Yáñez and Steve Sliva

Pre-Stem Summer Institute of 2022

Ammy Vejar

Summer 2022

About Me:
Hometown: Los Angeles, CA. Raised in the Bay Area.
Major/Certificate: Biology/ Radiology
Year of graduation from Foothill College: 2024.

Internship Placement:
Name of Institution: Pre-Stem Institute Leadership Fellow at Foothill College
Mentor's name: Sophia Kim

Internship Objective: Our goal was to reach out to those who are underrepresented in the STEM community especially those that are studying these topics. We wanted the students to feel welcome regardless of age, color and level of education. We wanted the students to succeed and gather as many resources that Foothill College offers.

Methods: Our mentor, Sophia Kim trained us and the other interns on lesson planning. We learned more about our leadership style, gained facility training and also the basics of being an intern. We also led the orientations for the Pre-Stem program - this activity exposed us in hopes to get more familiar with the participants in the summer program. During the summer institute the program allowed us to build important relationships with the SLI community, most importantly each other. The other interns and I focused on supporting the Pre-Stem students with questions, guidance and most importantly with care.

Results & Discussion: It may seem like a small acknowledgement for others, but where I come from this is never imagined. Being a leader in this program taught me in so many ways and helped me build confidence in areas that I did not know I could build in. I was able to be more outspoken, overcome challenges with the support from my team. In the end, this internship also helped me gain confidence in the career that I'm pursuing by building connections in my community.

Acknowledgements: Dr and Mrs Goodman, for funding the pre-stem institute of summer 2022 and making this possible!
For my mentor, Sophia Kim.
The program coordinator of the pre-stem institute, Lily Swedlow.
My fellow leaders: Dylon Moala, Fatima Sanchez and Raymond Yum

Brain and Poverty/Redefining Poverty

Will Anderson

Summer 2022

ABOUT YOU:

- Hometown: Angola
- Major/ certificate: Economics
- Transfer institution: Columbia University
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of company/ institution: Stanford University
Supervisor: Gabriel Reyes

OBJECTIVE:

Evaluate common poverty metrics used by neuroscientists and recommend a standard poverty measure for a more objective analysis.

METHODS:

1. Read a research paper that analyzed socioeconomic status to familiarize myself with the nature of our research.
2. Reviewed and copied ~21 studies done on correlation between SES and structural brain development (2000 – 2013) to an excel spreadsheet.
3. Performed literature search on Connected Papers website from 2014 - 2022 and found ~100 derivative studies that was added on the same excel spreadsheet.
4. Reviewed ~250 scientific papers, to attempt to find key words relevant to our research like education, income, grey matter, and brain size.
5. Presented relevant scientific papers to mentor for further analysis.
6. Reviewed economic literature to determine the most recommended metric to measure poverty.

RESULTS & DISCUSSION:

- Our research showed that Education was the most widely used SES measure in brain studies, used in ~35% of the studies, and Income used in ~24% of the studies.
- Parental education is correlated with overall cortical surface area, regions of the brain involved in language, reading, and memory.
- Problems with education: Studies show that the size of the cortical surface area can be affected from life experiences (e.g., stress, environmental toxins, insufficient nutrition).

ACKNOWLEDGEMENTS:

- Summer Team: Gabriel Reyes, Aracely, Dara, Allan
- SLI: Marissa, Sophia, Steve
- Foothill College, SLI funding

Pre-Stem Summer Institute Leadership Fellow

Raymond Yum

Summer 2022

ABOUT ME:

- Hometown: Gilroy, CA
- Major/ certificate: Physics
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: SLI @ Foothill College
Website: https://foothill.edu/sli/pre-stem/summer-institute.html
Supervisor: Sophia Kim

OBJECTIVE:

The main objective of this internship was to lead the Pre-Stem Summer Institute. The sub objectives were to acquire valuable knowledge and techniques on how to lead a classroom of students, and to develop skills in how to reduce nervousness and anxiety of the students in the classroom.

METHODS/ PROCESS:

During the internship, I had lead workshops on many topics that the interns felt would be useful for incoming students to be prepared for the upcoming school years. Topics were determined by the interns that will have the most effectiveness and usefulness for students and were based on our personal experiences on starting college and the struggles of learning about these resources. We then created lesson plans that were both interactive and informational for the students.

RESULTS & DISCUSSION:

The results of this internship was very positive for both the students and the interns. The students were able to learn and develop skill in networking and leadership. Many of these skills that students learn will be applicable in their future academic and professional careers. Whereas, the results for the interns was that we learn about how to lead workshops, develop our network, and work in a team. I especially, have taken a lot of the internship such leading workshop and developing a network. Most of these skills I haven't ever really use or learn about.

ACKNOWLEDGEMENT:

Director of SLI and Mentor: Sophia Kim Program Coordinator: Lily Swedlow
Data Science Fellow: Adriana Guerrero De Santiago
Other Fellows: Dylon Moala, Ammy Vejar, Fatima Sanchez Other SLI Staff: Marissa Yáñez and Steve Sliva

Redefining poverty: Examining how financial scarcity affects the brain development and learning in children and adolescents

Aracely Zavala

Summer 2022

ABOUT YOU:

- Hometown: Sunnyvale
- Major/certificate: Public Health
- Year of graduation from Foothill College: 2022

PLACEMENT:

Name of company/ institution: Stanford University
Mission: Examining how financial scarcity affects the brains development and learning in children and adolescents
Supervisor: Gabriel Reyes

OBJECTIVE:

For this internship, my goal was to learn about factors influencing the mental health of children through their developmental stages.

METHODS:

The process of my project replicated a research study. I began to search what topics interested me and pursued one relevant to my internship but also interesting to myself. The next step was to construct a question in an area of the topic. I began to search through the Fragile Families & Child Wellbeing Study from Princeton to base the majority of my evidence from that data-rich study. I also read scholarly papers and introduced myself to programming to anticipate what my results would display for this project.

RESULTS & DISCUSSION:

The anticipated results of my project revealed that the developing mental health of children is directly influenced by their support system/ their parents and their involvement academically and one-on-one. I concluded that my research study would reveal an outcome. Which would display that children lacking a support system (academically and one-on-one attention from parents) could cause the child to express more signs of depression and anxiety throughout their early developmental years. While children who have a strong support system from their parents or guardians showed fewer signs of developing anxiety or depression through their early childhood years.

ACKNOWLEDGEMENTS:

- Gabriel Reyes, Stanford Ph.D. Student
- Marissa Yanez, SLI STEM Coordinator
- Sophia Kim, SLI Director
- Steve Silva, SLI STEM Coordinator

PHYSICS AND ASTRONOMY

Analyzing the predictive power of kinematics factors in the regression of head impact force

Daisy Fragoso
Summer 2022

ABOUT YOU:

- Hometown: San Jose, California
- Major: Computer Science

PLACEMENT:
Name of company/ institution: Stanford University
Website: https://camlab.stanford.edu
Supervisor: Xianghao, Zhan

OBJECTIVE:
The purpose of the study is to analyze the predictive power of kinematics factors in predicting Force on the helmet so that we can better design prediction models & deduce the impact information based on sensor measurements.

METHODS:
My first steps were to understand the X & Y. Then build the linear regression model to calculate the R^2 value. The way to create the linear regression model was to import the modules, load the X & Y, standardize the X, fit the linear regression model, and predict on the X & get the Y predictor. apply commonality analysis and dominance analysis.

RESULTS & DISCUSSION:
The results of the R^2 of the physical signals, linear velocity, angular velocity and linear velocity were amazing. Even when it was more condense to look at the features within the physical signals. Most resulted as strong predictors to predict the outcome. When it came to the commonality analysis which decomposes the R^2 into different unique/shared parts from different kinematic factors it didn't show good results for the unique information of X/Y/Z/Magnitude.
With all of the results it showcases that more analysis is needed with different paring and other physical features other than the three involved, angular velocity, angular acceleration, and linear acceleration.

ACKNOWLEDGEMENTS:
Xianghao

Research Intern at UCSC

Xuanwei Liang
Summer 2022

ABOUT YOU:

- Hometown: Jiangmen, China
- Major: Physics
- Transfer Institution: UC Santa Barbara
- Year of Graduation from Foothill College: June 2022

PLACEMENT:

Name of Institution: UC Santa Cruz Supervisor: Dr. Yong Zheng

OBJECTIVE:

1. Understand the gaseous structure of neutral hydrogen (HI) in the Milky Way that was observed with single-dish radio telescopes.
2. Develop a set of criteria to classify HI Structures seen in the data and understand how the structures correlate with their surrounding environments.
3. Learn how to conduct literature search using NASA ADS, how to read literature, and present the project.

METHODS:

Identify individual cloudlets in a subset of the AC Complex using source finding algorithm (SoFiA 2). Generate a catalog of clouds and classify their structures based on the shape and size.

RESULTS & DISCUSSION:

The study of gaseous clouds in the Milky Way gives us a better understanding of a galaxy's formation and evolution. This project is the first known study to present a catalog of clouds in the AC Complex. Our findings on the cloud types in the AC Complex is consistent with a previous reported study on the region of the Magellanic Leading Arm. The identification and classification algorithm could be applied to other regions in the Milky Way.

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Dr. Yong Zheng - UC Berkeley Postdoctoral Scholar, SIP Mentor
Professor Puragra (Raja) GuhaThakurta - UC Santa Cruz Department Chair f Astronomy & Astrophysics
Sophia Kim - SLI Director
Dr. Marissa Elena Yanez - SLI STEM Workforce Specialist Steve Silva - SLI STEM Summer Internships Program Assistant Dr. Miloni Gandhi - Internship Course Instructor

Astronomy Research Internship

Eitan Smolyar

Summer 2022

ABOUT YOU:

- Hometown: Palo Alto
- Major/ certificate: Aerospace Engineering
- Year of graduation from Foothill College: 2023

PLACEMENT:

Name of company/ institution: Summer Internship Program
Website: https://sip.ucsc.edu/
Supervisor: Aparajito Bhattacharya

OBJECTIVE:

Writing Python code to work with FITS files. Understand the basics of multi-slit spectroscopy.

METHODS:

I started learning python a few months before the internship to make sure I'm able to understand the code and focus only on learning the conceptual aspects of the research. I also became familiar with the astro.py package which helped me load the astronomical data, generate the complex plots, and analyze the data. Using astronomical data that was collected by the Keck telescope, I was able to generate the fits file and run them through the MARZ interface for analysis. I successfully generated the different 2D spectra and was able to start identifying the different interstellar medium emission lines.

RESULTS & DISCUSSION:

Using the steps described above, I successfully identified the common interstellar medium (ISM) emission lines; for example, Hα, Nitrogen 2 doublets, Sulfur 2 doublets etc'. I also found more rare ISM lines in many different slits, which included many of the Hydrogen Peschen lines. The ISM emission lines always followed a certain vertical profile with bright spots and feint spots. Due to the color coding being flipped, we had to keep reminding ourselves that the dark regions corresponded to brighter spots while the lighter regions corresponded to feinter spots. The imperfect airglow subtraction left many airglow lines on the spectra, which made it more challenging to identify the ISM lines. The difference between both types of lines is that while the airglow lines look like distorted lines, the ISM lines follow a certain vertical profile. Although some ISM lines are easy to identify, others are quite feint and hard to identify. With the results that we got we can create a color-coded velocity map of ISM in the Triangulum galaxy, which will allow us to compare the highly populated stellar regions of the galaxy to the lower ones and see which components of ISM make up both types of regions.

ACKNOWLEDGEMENTS:

Aparajito Bhattacharya, my mentor
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Foothill College/ FHDA District

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- Dr. Miloni Gandhi - Internship Class Instructor
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- Zachary Cembellin - Acting Dean, STEM Division
- Foothill STEM faculty - helping refer students and encouraging them to apply
- The FHDA Foundation - for their ongoing support to help SLI fundraise
- Judy Miner - Chancellor, FHDA
- Bernadine Chuck-Fong - Interim President, Foothill College

Community Champions

- SLI Advisory Board Members
- Kyle Cole - Director, Office of STEM Outreach at Stanford
- Daniella Duran - Education and Outreach Manager, nano@Stanford

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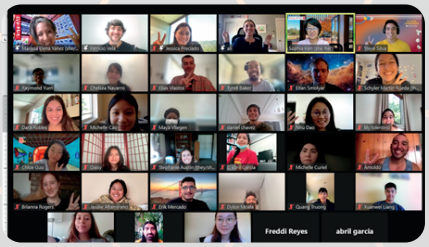

STUDENT TESTIMONIALS

The summer 2022 SLI Interns researched an incredible range of topics from hydrogen bondind to machine learning. Many of the interns had some final words about their experience, some of which we share below.

"I never thought I'd be here. The whole thing is kind of surreal. I guess the most rewarding thing is the fact that I get to update my resumé with my internship. My skills are developing and I really feel like I'm a burgeoning software engineer." -Tyrell Baker

"This internship provided me the "behind-the-scenes" and insight I needed to know if research is a career I want to pursue post-undergrad. I used to have doubts in research because of my previous experience in being overworked in a lab, lack of mentorship and lack of confidence. However, I now view research with an abundance of opportunities." -Stephanie Austin

"I would recommend this internship not just because of the valuable first-hand experience that I was able to gain but also because I was able to meet some new people and be exposed to a new community that I wish I had been apart of earlier. If I had known about the resources that SLI provided earlier, I would have taken advantage as soon as I could." -Quang Truong

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