SLI STEM Internships

Volume 4, Number 1, 2024
Summer 2024
Los Altos Hills, CA

FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE

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.

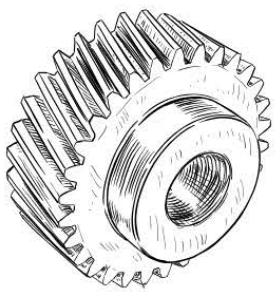
Students participating in the SLI STEM Internship program will

- 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 $3000- $4000 depending on the time commitment.

Foothill students participating in the summer 2024 cohort were paired with mentors from local higher education institutions and tech companies to work on research and industry projects. These projects, ranging from understanding the biochemistry of human chromosomes to process engineering at a semiconducto company, 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 2024
Los Alto Hills, CA

FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE

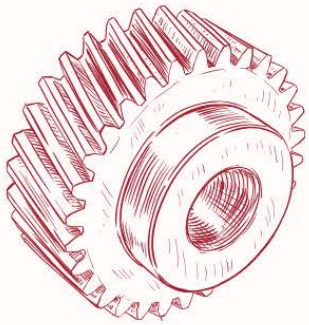
TABLE OF CONTENTS

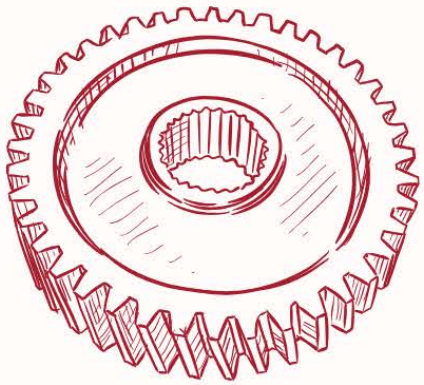
ENGINEERING - PHYSICS

COMPUTER SCIENCE

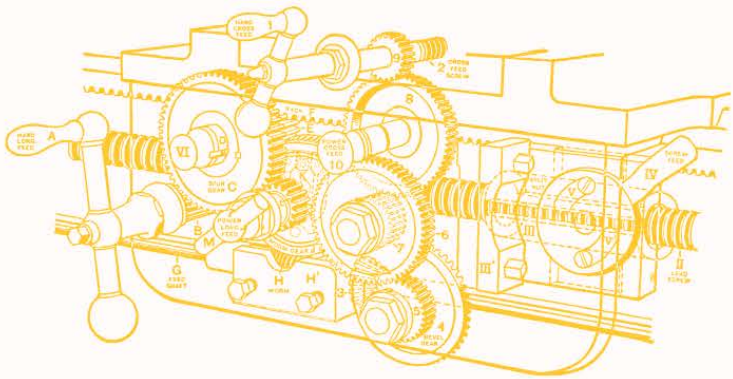
BIOLOGY - CHEMISTRY

STEM EMPOWERMENT





ENGINEERING - PHYSICS



TCAD Simulation of Silicon Detectors

Alexis Aguilar

Summer 2024

ABOUT YOU:

- City of residence: San Jose
- Hometown: Oakdale
- Major/ certificate: Physics
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of organization: SLAC National Accelerator Laboratory
Website: https://www6.slac.stanford.edu/
Mission: 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: Julie Segal.

OBJECTIVE:

The goal of the internship was to help develop silicon sensors that provide image detection for high energy particle physics experiments, using computational simulations with TCAD tools. These sensors are somewhat like the camera chips in cell phones but optimized for high energy particle tracks. I was also exposed to real-world semiconductor fabrication in a fabrication lab.

METHODS:

I will use TCAD tools (technology computer aided design) that are widely used in the semiconductor industry to develop semiconductor devices. As well as Unix, Microsoft Word, and Powerpoint. I will use a process simulation tool to simulate the semiconductor fabrication process, and a device simulation tool to simulate the device operation. After analyzing these results I will optimize the parameters for the special silicon detector known as the ac_lgad and dj_lgad, which is used in science experiments involving a particle accelerator at SLAC.

RESULTS & DISCUSSION:

The results that my project delivered was simulation data that I gathered for optimizing LGAD devices used in image detection for the real-world version. The TID sensors group recently learned that they want the new variation to have a gain of 10 at 100 volts or less, because their current variation is above that. They will continue running simulations and utilizing the data I have already gathered to try and perfect the version they will be implementing in the future, for now they will be using my gathered information in meetings and such.

ACKNOWLEDGEMENTS:

Julie Segal, Xavier, Paul, Angela, Mathew, Jasmine; SLAC National Accelerator Laboratory TID Sensors Group.

Energy Storage Devices - Lithium Sulfur Battery

Tosif Aliyev
Summer, 2024

ABOUT YOU:

- City of residence: San Jose, CA
- Major/ certificate: Electrical Engineering
- Transfer institution: San Jose State University
- Year of graduation from Foothill College: 2024

PLACEMENT:
Name of company/ institution: San Jose State University
Website: https://www.sjsu.edu
Supervisor: Philip Dirlam, Ph.d

OBJECTIVE:
The main objective of this internship was to study the degradation mechanism of Lithium Sulfur (Li- S) batteries and come up with the solution that would improve the lifespan of Li-S batteries that is practical to produce, which would be a step closer towards greener energy.

METHODS:
The methods involved four major steps: chemical formulation, cathode construction, battery assembly, and data collection. We first prepare a chemical substance for cathode coating. After coating a thin aluminum sheet, we punch out and mass out cathode discs to determine the amount of active material on each cathode disc. We then take cathode discs into an Argon-filled (air-sealed) glove box for Li - S assembly. After assembly, we place a battery tester that continuously charges and discharges the battery, logging the battery cycle.

RESULTS & DISCUSSION:
We built the first functional Li-S battery in our lab, and through some procedural improvements in cathode construction and battery assembly, we increased the success of functional Li-S batteries in our lab. Although the Li - S battery has astounding energy capacity and is a greener option than the current batteries, its short life cycle makes it impractical. Thus, we are next going to test the Metal Organic Framework(MOF) to improve the life cycle of Li-S Batteries potentially. We believe solving energy storage problems using batteries that are environmentally friendly is a significant step towards greener energy.

ACKNOWLEDGEMENTS:
Mentor: Dr. Philip Dirlam
SLI Team: Sophia Kim, Amanda Carbajal, Miloni Gandhi
San Jose State Team: Daryl Miranda, Lisette Garcia, Jack Lee, Erin Magabo
Chico State Team: Dr. Monica So, Dr. Kathleen Meehan, and others.
Funding: U.S Department of Energy
Big thanks to our Donors

Mechanical/Equipment Engineering Intern @ Intermolecular

Patton Bui

Summer 2024

ABOUT YOU:

- City of residence: San Jose
- Major/ certificate: Mechanical Engineering
- Transfer institution: SJSU
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of company:
Intermolecular
Website:
https://www.emdgroup.com/en/expertise/semiconductors/custom-innovation/intermolecular.html
Mission:
"...We explore, test and develop advanced materials that are revolutionizing the next generation of electronics that make lives easier, entertaining and more productive. For more than 15 years, our team, methodologies and quality data have driven impactful outcomes, market opportunities and innovative product designs for our customers…"
Supervisor:
Stephanie Limon

OBJECTIVE:

The goal of this internship was to design and contribute to several innovative projects for Intermolecular. This included designing blank off plates for the Atomic Layer Deposition (ALD) chamber body, redesigning and improving upon panel designs, and developing a working AR/VR prototype to present to potential investors.

METHODS:

The tools that I used to design the blank off plates and panels were with Autodesk Fusion and SolidWorks as the Computer Aided Design (CAD) interface. I also used a Modix 3D printer in order to prototype the designs, and PrusaSlicer to slice 3D objects into instructions for the 3D printers to follow. In order to create an AR/VR prototype to showcase, I used Jigspace on MacOS to assemble the several "steps" that would assemble the blank off plates and screws to their respective positions on the ALD chamber body. It would then be able to be viewed on the Apple Vision Pro in virtual reality and on an iPhone 14 Pro Max in augmented reality.

RESULTS & DISCUSSION:

The redesigned blank off plates and panels facilitate efficient gas leak testing in the ALD machine, a typically time-intensive process. The AR/VR implementation using Jigspace enables both engineers and investors to visualize designs in three-dimensional space, which improves their understanding of design features and functionality through interactive engagement.

ACKNOWLEDGEMENTS:

I would like to thank and acknowledge: **Stephanie Limon**, Sr. Equipment Engineering Manager; **Leonardo Zuniga**, Equipment Engineer; **Sophia Kim**, SLI Director; **Amanda Carbajal**, UCSC; and **Rosa Nguyen**, Foothill College.

Preventing rust while heating rare extraterrestrial materials to understand their magnetic properties

Mateo Chavez

Summer 2024

ABOUT YOU:

- City of residence: San Jose
- Major/ certificate: Physics
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: Stanford Geophysics Department
Website: https://magnetism.stanford.edu/
Supervisor: Thom Chaffee

OBJECTIVE:

The goal of my internship was to develop a method to prevent oxidation while heating rare extraterrestrial materials, allowing for a more accurate study of their magnetic properties. Through this project, I aimed to deepen my understanding of lunar paleomagnetism and gain hands-on experience with advanced lab techniques.

METHODS:

For my project, I started by familiarizing myself with lunar paleomagnetism and setting up/calibrating the necessary lab instruments, including the 2G SQUID magnetometer and a controlled atmosphere oven. I performed initial tests with iron samples, heating them in Earth's atmosphere to observe oxidation. Then, I leak-tested the oven to ensure it mimicked the Moon's low-oxygen environment. Finally, I repeated the heating process in the controlled atmosphere to minimize oxidation and measured magnetic susceptibility to assess the results. Further calibration was needed to perfect the method and apply it to actual lunar samples

RESULTS & DISCUSSION:

The results of my project showed that our controlled-atmosphere oven effectively reduced oxidation when heating iron samples, compared to Earth's atmosphere. After heating the sample at 500°C, only a 2% change in magnetic susceptibility was observed, indicating minimal oxidation. However, the sample was still slightly oxidized on the outer layer, suggesting potential impurities in the gas or the need for further calibration of the oxygen levels in the oven. These findings are significant for advancing lunar paleomagnetism research, as they demonstrate progress toward creating an environment suitable for accurately heating lunar samples without altering their magnetic properties. Perfecting this method will allow scientists to apply heating techniques to lunar rocks, providing more precise paleomagnetic data.

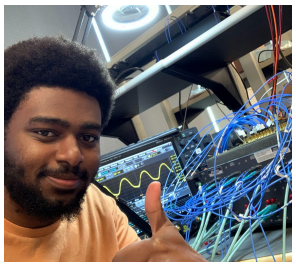
ACKNOWLEDGEMENTS:

- Thom Chaffee, Geophysics Graduate Student
- Sonia Tikoo, Associate Professor + PI
- Sophia Kim, SLI Director

Rambus Validation Intern

Josh Germain

Summer 2024



ABOUT YOU:

- City of residence: Sunnyvale
- Major/ certificate: Electrical Engineering
- Year of graduation from Foothill College: 2026

PLACEMENT:

Name of company/ institution: Rambus
Website: Rambus.com
Mission (if a company): Accelerating Next-Generation Computing
Supervisor: Max Mu, Davy Pang

OBJECTIVE:

The goal of the internship was to automate parts of the testing process. I specifically worked on automating the keysight switch matrix and 2d eye generation.

METHODS:

By using PyVisa, I was able to set multiple configurations that the switch matrix could cycle through, which allowed the automated test to test over 30 signals at a time despite the oscilloscope only having 4 inputs. I wrote a script to generate images from a log file using Pillow. The images generated represented the reliability of the ram and they could be grouped by the ram channel, ram subchannel, rank and more.

RESULTS & DISCUSSION:

The validation team at Rambus is currently using my code to test their upcoming products. My switch matrix code is reducing the need for engineers to manually reconfigure the oscilloscope setup in between tests.The images generated by my script allows engineers to be able to see patterns and also quickly compare different ram manufacturers.

ACKNOWLEDGEMENTS:

Max Mu, Rambus
Davy Pang, Rambus
Richard Park, Rambus
Caleb Kahookele, Rambus
Sophia Kim, SLI

Process Engineer Assistant in Semiconductor Company

Carlos Hernandez

Summer 2024

ABOUT ME:

- City of residence: Redwood City, CA
- Major/ certificate: Mechanical Engineering
- Year of graduation from Foothill College: 2026

PLACEMENT:

Name of company/ institution: EMD Electronics
Website: https://www.emdgroup.com/
Mission: To support semiconductor R&D activities within EMD Electronics
Supervisor: Samira Bagheri

OBJECTIVE:

My primary goal for this internship was to gain knowledge in semiconductor manufacturing, specifically focusing on deposition tools such as Atomic Layer Deposition (ALD) and Physical Vapor Deposition (PVD), as well as metrology tools, including X-Ray Diffraction (XRD), X-Ray Reflectivity (XRR), and X-Ray Fluorescence (XRF) analysis.

METHODS:

When I first entered the cleanroom, I was initially overwhelmed by the variety of equipment and tools. I quickly focused on familiarizing myself with the specific tools that aligned with my interests, particularly metrology tools. I sought guidance from my mentor to learn more about these tools and dedicated several days to deepening my understanding. I reviewed the standard operating procedures and observed other process engineers in action, gaining valuable insights into the tools' operation.

RESULTS & DISCUSSION:

The primary focus of my internship was to deepen my understanding of semiconductor manufacturing, particularly the use of deposition and metrology tools. Through extensive research and hands-on practice, I gained a comprehensive understanding of the tools used in the testing and manufacturing processes of semiconductors. This experience sparked my interest in further exploring semiconductors through a research-based approach, and I am eager to pursue similar opportunities for my next internship.

ACKNOWLEDGEMENTS:

Sophia Kim, Amanda Carbajal, Samira Bagheri, Emmanuel, Khang, Peyton, Charles

Broadening Accessibility and Training to Emerging Researchers for Innovative Energy Storage (Batteries)

Sofia Marquez

Summer 2024

ABOUT YOU:

- City of residence: San Mateo
- Major/ certificate: Physics
- Year of graduation from Foothill College: Spring 2025

PLACEMENT:

Name of company/ institution: San Jose State University
Website: https://batteries.sites.csuchico.edu/
Supervisor: Dr. Philip Dirlam

OBJECTIVE:

This project's goal is to create functional lithium-sulfur batteries that will be able to hold more charge than current batteries, will be less expensive to make, and will be safer than batteries currently on the market. My time at this lab consisted mostly of assembling prototypes of this battery inside a glove box and running tests on them to gather data on their performance. During my time at this lab I also was involved in the organic synthesis of one of the components needed to create one of the layers within the battery.

METHODS:

I was involved in constructing our cathodes which involved two main steps, creating a primer layer and creating an active layer (which contained the sulfur), both of which were layered onto aluminum. Once completed, they would be punched out into small disks (cathodes) which were then brought into a glove box. Inside, the battery would be assembled and then taken out to record its rate of charging and discharging. I also participated in an organic synthesis, focusing mostly on the purification of that product which included the use of a rotavap machine and running simultaneous dry column vacuum chromatography (DCVC) and thin layer chromatography tests (TLC) to find our purified compound.

RESULTS & DISCUSSION:

So far, the lithium batteries are performing as we expected them to, if not better that we had originally expected. In well built batteries they are reaching their maximum voltages and have steady charging and discharging rates. That being said, this is an ongoing project still in early stages, so there is a lot of room for improvement. We are working on systems that will make assembly in the glove box more efficient and uniform and we are experimenting with different amounts of electrolyte to see its effect on performance.

ACKNOWLEDGEMENTS:

Thank you Dr. Dirlam, Lisette Garcia, Daryl Miranda, Jack Lee, Erin Magabo, Tosif Aliyev, Sophia Kim, and Amanda Carbajal

Discover the world of digital infrastructure and understand how the internet works behind the scenes.

Ana Soto

Summer 2024

ABOUT YOU:

- City of residence:Redwood City
- Major: Mechanical Engineer
- Year of graduation from Foothill College: 2026

PLACEMENT:

Name of company: EVOCATIVE
Website: EVOCATIVE
Mission: Whether you're deploying new infrastructure or expanding your presence, our mission is to help you drive your business forward, now and in the decades to come.
Supervisor: Wayne Liang

OBJECTIVE:

The goal of my internship was to maintain continuous operation of data centers by maintaining critical equipment such as Automatic Transfer Systems, Uninterruptible Power Supplies, Cooling Units and Backup Generators. My specific goal was to gain knowledge of infrastructure equipment and hands on experience to provide a reliable network through regular inspection and maintenance.

METHODS:

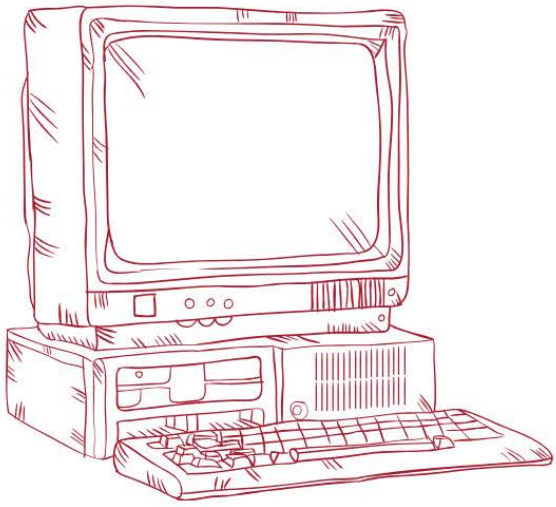
I performed weekly inspections to critical equipment including Backup Generators and Automatic Transfer Systems. I performed fire inspections to ceiling and floor and cooling units and tested load capacities on generators to prevent hazards. I monitored cooling systems sensors and maintenance accordingly. Additionally daily inspections of the water towers infrastructure, pumps, water, cooling and operational speed to ensure optimal performance.

RESULTS & DISCUSSION:

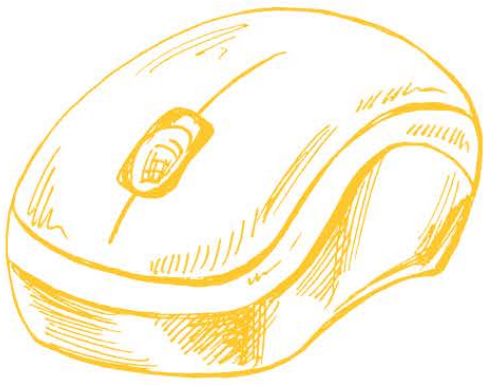
As a result the data center achieved uninterrupted operation through my internship. The redundancy equipment operated as intended providing continuous power supply and safety standards. Despite small equipment failure the facilities “plus-one” on all its equipment allowed such issues to be repaired without any disruptions to operation. Moreover, I learn how engineers plan and manage construction projects. This project showed me how engineers enhance existing equipment to meet customers needs while providing eco friendly solutions. My internship gave me valuable insight on both mechanical engineering and project management, reinforcing the mindset to adapt to complex situations.

ACKNOWLEDGEMENTS:

Wayne Liang, Manager
Jason Martizes, Facilities Engineer
Sophia Kim, SLI Director
David Thornton, Director Facility Construction



COMPUTER SCIENCE



Traveling Waves and Sound Propagation Simulations using Data-Driven Framework

Tanequa Bailey

Summer 2024

ABOUT ME:

- City of residence: San Jose, CA
- Major/ certificate: Computer Science, AS-T
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of company/ institution: San Jose State University (SJSU)
Website: https://www.sjsu.edu/
Supervisor: Dr. Feruza Amirkulova

OBJECTIVE:

The focus of my research was to develop simulations of solutions to partial differential equations, specifically time dependent wave equations.

METHODS:

The tools I used to complete my project include SJSU High Performance Computing (HPC), VS Code, Julia language, PuTTY, WinSPC, and Github Repository Waves.jl by Tristan Shah. Programming was done using high-level programming language Julia by accessing SJSU HPC through VS Code and PuTTY terminal. WinSPC was used to safely transfer files from Github and computer to HPC. The Github Repository Waves.jl by Tristan Shah was used as the starting code base.

RESULTS & DISCUSSION:

Using Waves.jl data repository, I was able to simulate waves in 1 dimension. I am still currently running 2D simulations as the project is ongoing. I finished generating a dataset for training a forward 2D model. These 2D simulations would train the model and would allow me to get another data set. I then will use the dataset to run MPC and try to minimize the total scattering cross section. Applications include: acoustic cloaking, noise reduction, and metamaterial design.

ACKNOWLEDGEMENTS:

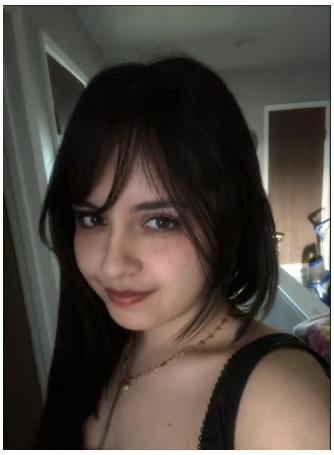
Name of person, their affiliation
- Dr. Feruza Amirkulova, Associate Professor Mechanical Engineering
- Tristan Shah, Graduate Student and NASA Intern
- Sophia Kim, SLI Director
- Amanda Carbajal, SLI STEM Workforce Specialist
- Tien Tran and James Wu Zhenyu, SJSU HPC IT
- Aanya Bhardwaj, Intern
- Alex Jr. Boch, Intern
- Ariv Bhatnagar, Intern
- Estrella Chavez, Intern

PDBCleanV2, A python library to curate molecular structures

Paulina Cabral

Summer 2024

ABOUT ME:



- Hometown: San Jose, CA
- Major/ certificate: Mathematics
- Year of graduation: 2025

PLACEMENT:

- Institution name: Stanford School of Medicine
- Website: https://med.stanford.edu/levitt.html
- Supervisor's name: Fatima Pardo Avila

OBJECTIVE:

The goal of this internship was to prepare the PDBCleanV2 repository for code review. I was looking to accomplish a better and cleaner codebase for the project while simultaneously adding slight improvements to have the code run more efficiently. Additionally, I was looking to achieve as many github issue closures as possible.

METHODS:

There were several steps I had to take for the project I worked on. I had to do a crash course on biochemistry my first week, then I had to familiarize myself with the code collaboration platform GitHub. Following that I had to learn to navigate in the terminal and jupyter notebooks. Then there were the CIF files which I had to comprehend, which are the downloadable text-files containing information pertaining to the location of atoms in molecules. Lastly, I had to increase my knowledge in python.

RESULTS & DISCUSSION:

My project delivered a well-documented codebase with clear docstrings, making the code easier to navigate and maintain. I also improved the GitHub repository to meet current standards. I wrote a new notebook tutorial explaining an additional option for users, filling a gap in understanding PDBCleanV2's full capabilities. In another notebook, I introduced a simplified way to write code blocks, reducing clutter and improving visibility.

ACKNOWLEDGEMENTS:

- Fatima Pardo, Research Scientist
- Michael Levitt, biophysicist
- Sophia Kim, SLI director
- SLI team

Towards Reliable and Explainable Visual Assistance Using Data Science; Advancing Speech Enhancement Accessibility & Efficacy

Vince David Muego

Summer 2024

ABOUT YOU:

- City of residence: Milpitas, CA
- Major/certificate: Mathematics, Computer Science/Data Science
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: University of California, Santa Cruz (UCSC)
Website: https://www.ucsc.edu/
Supervisor: Li Liu

OBJECTIVE:

This internship aimed to use data science for social impact by developing a project that improves accessibility and effectiveness in speech therapy and improves phonological awareness for the speech impairment community. I propose a web-based system with real-time language processing and direct monitoring, featuring NLP pipelines and Speech-to-Text (Wav2Vec 2.0) for tailored, data-adaptive customization based on the user's phonetic challenges.

METHODS:

In the first to the third week of my internship, I learned Hugging Face Transformers and basic Python, studied various pipeline models, and then iterated them using Google Colab and Jupyter Notebook. I then spent most of my time doing literature research with Google Sheets and writing my project proposal, which involved developing my system architecture. Integrating OpenAI APIs and pipeline models into the system architecture required significant time to understand each repository, with trial and error to filter out overly complex or irrelevant models.

RESULTS & DISCUSSION:

The project resulted in a formal proposal and system architecture, which included the integration of the Wav2Vec 2.0 model. This model plays a key role in converting spoken audio into text and detecting phonetic irregularities. I used OpenAI API for speech-to-text and text-to-speech elements of the architecture despite challenges in latency and file format limitations. These developments represent a significant step toward achieving full direct monitoring through a data science approach.

ACKNOWLEDGEMENTS:

- Li Liu, UCSC Ph.D. student
- Gillian Schultz, Environmental Biology Professor
- Sophia Kim, SLI Director
- Marissa Yanez, SLI STEM Workforce Specialist

Lab Intern - Rambus Inc.

Ricardo Diaz

Summer 2024

About You:

- City of residence: San Jose, CA
- Major: A.S. Computer Science, De Anza College
- Transfer institution: UC Santa Cruz
- Graduation 2026

Placement:

- Name of company/ institution: Rambus Inc.
- Website: Rambus.com
- Mission: “Make data safer and faster”
- Mentor: Will Ng, Tech Dir Validation Eng.

Objective:

The goal of my internship was to gain technical experience and network with my coworkers who’ve had extensive experience in the industry.

Methods/Process:

For my project, the goal was to design and write a script that would facilitate a piece of the validation engineering team's day to day work when testing the memory chips sold to customers. Using Python, I wrote an automation script that captures the complete BIOS settings of a CPU on a server computer which would allow validation engineers to view which settings are applied on the specific system they are running a chip on and what additional BIOS settings were available to tweak. The process of implementing this project was:

- Review the existing codebase
- Study the code that could be useful for my project
- Design and write script
- Set up a server in order to access remotely and test script
- Revise and debug script, meet with team members for help

Much of the time working on this project was debugging and devising creative solutions to get the script running as designed.

Results/Discussion:

I was able to get a good version of my script running and was able to capture the settings needed for the validation team to conduct their testing. However, the script needs more work to be fully functional for all types of CPUs, as it only currently works on machines running Intel CPU’s.

Acknowledgements:

- My mentors, Will Ng and and Noel Shamoon.
- Sophia and the SLI program.
- My team members from the validation team who were extremely supportive

Utilizing Machine Learning to Create Non-Invasive Biopsy for Early Detection of Cancer

Diego Alejandro Godoy Ruge

Summer 2024

ABOUT YOU:

- **City of residence:** Cupertino
- **Major/certificate:** Computer Science
- **Year of graduation from Foothill College:** 2026

PLACEMENT:
Institution: Stanford University
Website*:* ***https://med.stanford.edu/news/all-news/2024/04/virtual-biopsy.html***
Supervisor: Yonatan Winetraub

OBJECTIVE:

This internship aimed to enhance non-invasive imaging techniques using machine learning. The initial focus was a literature review exploring the potential of translating H&E stained images to IHC-like images, identifying markers and genes directly from H&E. The second phase involved hands-on work with Optical Coherence Tomography (OCT) to prepare and analyze samples and develop code to improve image processing methods.

METHODS:

I conducted a comprehensive literature review utilizing resources like Google Scholar and ScienceDirect, extracting key data and analyzing it with MS Excel and Google Sheets. In the lab, I utilized an OCT machine for sample preparation and scanning, analyzed results with ImageJ, and primarily used MATLAB for code development and image processing algorithm refinement. Python was also briefly employed for initial data tasks.

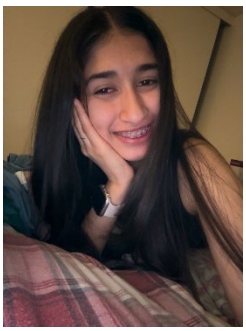
RESULTS & DISCUSSION:

The literature review unveiled the vast potential of machine learning in non-invasive diagnostics, identifying 77 markers and genes across over 60 papers. The script I developed successfully removes coverslip artifacts and corrects lens-induced parabolic distortions in OCT images, leading to improved visualization and analysis. Additionally, the script also generates heatmaps to visualize tissue depth, further enhancing the accuracy and analytical capabilities of OCT scans. These advancements provide the lab with powerful new tools, potentially transforming future research and clinical practices.

ACKNOWLEDGEMENTS:

- Yonatan Winetraub – Lead Research Scientist, Stanford University
- Aidan Van Vleck - Lab Manager, Stanford University
- Zerlina Lai - Research Assistant, Stanford University
- Komal Sharma - Research Assistant, Stanford University
- Emilie Manning - Research Assistant, Stanford University
- Sophia Kim - SLI Program Director, Foothill College
- Amanda Carbajal - SLI Internship Program Specialist, Foothill College

Front-End Web Development
CC Pathways, Apprenticeship Program
SLI STEM Internship
SANDRA LOPEZ
Summer 2024



ABOUT YOU:

- City of residence: SANTA CLARA, CALIFORNIA, US.
- Major/ certificate: COMPUTER SCIENCE/ DATA SCIENCE/ STAS
- Year of graduation from Foothill College:2025

PLACEMENT:
Name of company: CCPATHWAYS
Website: https://www.ccpathways.org/
Mission: Empowering community college students with resources, support, and connections to thrive in their academic journey.
Supervisor: Jean Calderon

OBJECTIVE:
The goal of my internship was to get practical experience in data science and computer science by working on real projects. I wanted to improve my coding skills, especially in front-end development, and contribute to meaningful projects while learning from experienced professionals.

METHODS:
For my project, I followed a structured process. First, I collaborated with my mentor to understand the project requirements and goals. Then, I broke down the tasks into smaller steps, focusing on front-end development. I used tools like GitHub for version control and Jira for task management. I worked in Visual Studio Code and tested the code using Ninja Console to ensure functionality. Throughout the process, I regularly sought feedback and made improvements. Finally, I documented my progress and reflected on each step to enhance my learning and problem-solving skills.

RESULTS & DISCUSSION:
The project helped me improve my coding skills, especially in front-end development. By the end, I was able to complete tasks related to the project, including testing code and fixing issues. I contributed to the larger team by making sure the code I worked on was clean and functional, helping the overall progress of the project with the help of my mentor which was really helpful. I also learned how to work better with a team and use tools like GitHub and Console Ninja. Overall, this project helped me grow as a developer, and the work I did will benefit the company by keeping the project on track and improving the final product.

ACKNOWLEDGEMENTS:

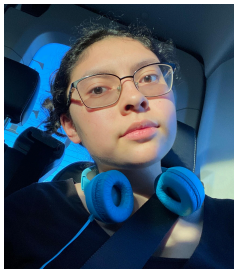
- **Ms. Paty Villegas:** I am deeply grateful to Ms. Paty for encouraging me to apply for this internship, even when I was hesitant due to my shyness. I don't usually enjoy talking much, but through this experience, I've grown more confident in my communication skills. Her constant support and reminders that it wasn't too late to apply made a huge difference, and I truly appreciate her guidance.
- **Sophia Kim:** Thank you, Sophia, for providing me with this amazing opportunity and for being so supportive throughout the internship. Whether it was helping me navigate the timesheet or reminding me to submit it, you were always there when I needed assistance. Your patience and willingness to help made a big impact. I will always appreciate that, thank you!!!
- **Marcos Aguirre & Jean Calderon:** I want to express my gratitude to both Marcos and Jean for their invaluable support over the past nine weeks. Your feedback has helped me improve my work, and I greatly appreciate the time and effort you put into guiding me.
- **Professors/Staff Encouragement:** Kyle Taylor, Amanda Carbajal

CC Pathways Front-End Web Development Apprenticeship Program

Brittany Morales

Summer 2024

ABOUT YOU:



- Hometown: Menlo Park
- Major/ certificate: Computer Science & Mathematics
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: CC Pathways
Website: https://ccpathways.org
Mission: To create a world where every individual, regardless of their background or circumstances, has equal access to opportunities for skill development, personal growth, and workforce success, fostering a global community empowered to realize their full potential and contribute positively to society. Be able to empower community college students to navigate their college career by providing accessible resources, support, and connection.
Supervisors: Marco Aguirre, Jean Calderon

OBJECTIVE:

This internship is focused on training and building skills in Front-End Web Development as an onramp before working on real-world company projects. As a Frontend Developer Intern, one collaborates with our team to design and develop user-friendly interfaces for web applications. As well as, learn JavaScript while implementing responsive design principles and enhancing user experience.

METHODS:

I used several tools to learn the basics of Web Development, including Visual Studio Code, Git, GitHub, Javascript, HTML, Python, and my computer's Terminal. My programming work was mainly done in JavaScript, which is the main language used for the code used in the practice projects and files we worked on with the team. Steps I took to accomplish these projects included learning new coding languages such as Javascript, Learned how to access files from GitHub using Git commands on my computer terminal, and learned to use my very first code editor Visual Studio Code.

RESULTS & DISCUSSION:

The results of this internship over the course of 9-weeks includes; improving my coding skills in Javascript, gaining experience with Git/GitHub version control, learning how to use Visual Studio Code and its commands. As well as enhance our problem-solving skills and technical knowledge in the field of front end web development.

ACKNOWLEDGEMENTS:

Name of person, their affiliation

- Jean Calderon, Program Director CC Pathways
- Marco Aguirre, Mentor CC Pathways
- Sophia Kim, SLI Director
- Amanda Carbajal, SLI Internship Program Specialist

The Textsmith Emotion Detection Project

Chrystyan Pulido

Summer 2024

ABOUT YOU:

- City of residence: Whittier
- Major/ certificate: Computer Science
- Year of graduation from Foothill College: 2024

PLACEMENT:

Name of institution: Stanford University, Graduate School of Business
Website: https://www.gsb.stanford.edu/faculty-research/darc
Supervisor: Wonhee Lee and Jeff Ott

OBJECTIVE:

My objective during the first part of my internship was to test OpenAI models for accurately detecting human emotions through text analysis. Then I tested open-source models and compared the results.

METHODS:

The methods I followed involved improving my Python fundamentals and developing functions using Python to test and fine-tune AI models. Additionally, I created charts to track and present the models' accuracy in detecting human emotions. Each step was documented to ensure reproducibility and collaboration across teams. Regular feedback sessions allowed me to refine the models and improve their performance, ensuring accurate emotion detection across diverse text inputs.

RESULTS & DISCUSSION:

The results of my project showed that OpenAI had the strongest performing model for detecting human emotions through text analysis. However, when comparing GPT-4o to the Llama 70B open-source model, the performance difference was not as substantial as anticipated. This ongoing research will help refine future approaches to AI model optimization, focusing on improving open-source models' competitiveness.

ACKNOWLEDGEMENTS:

I would like to acknowledge the data engineer on the DARC team, Savannah McCoy, for assisting me with the presentations.

BIOLOGY - CHEMISTRY

Protein 3610

Fernanda Aboytes Villaseñor

Summer 2024

ABOUT YOU:

- City of residence: East Palo Alto
- Major: Biology
- Year of graduation from Foothill College: 2024-2025

PLACEMENT:

Name of company/ institution: Stanford University
Website: https://mskc.stanford.edu/
Mission: to crystalize protein 3610 to study it further
Supervisors: Dr. Daniel Fernandez and Dr. Olivia Pattelli

OBJECTIVE:

Protein 3610 has never been crystallized, so our overall goal was to crystallize it to study its properties and functions. We purified and concentrated the protein through many different trials to start the crystallization process.

METHODS:

Protein 3610 is derived from the E-coli virus, so we started by producing the virus on a plaque and pre-culturing one colony of cells, we tried three different strains of E-coli. After letting the pre-culture grow overnight it's then placed into the media, we tried five different medias. It becomes a cell culture and has to wait about 4 hours for the cells to grow. Once we have our desired growth which we checked using the OD, it is ready to centrifuge. For the first spin, we threw away the liquid and kept the pallet of cells at the bottom. The cells are then placed in a sonicator to break the cells apart using sound and repinned this time, keeping the liquid and throwing away the cells. The liquid is then run through the FPLC machine twice, the first using a nickel column and the next size exclusion. We then took the most concentrated part of our protein, 7% of the whole FLPC run, and centrifuged it in a test tube with a filter to further concentrate the protein. Once we got a decent concentration it was ready to be placed on crystalization plates.

RESULTS & DISCUSSION:

Due to the shortage of time, we weren't able to see if the protein crystallized since time varies depending on the protein, some can take hours others months to crystallize. With more time we would have been able to make more protein to achieve our objective since it's critical to have enough protein, allowing us to experiment with different concentrations.

ACKNOWLEDGEMENTS:

- Dr. Daniel Fernandez, Stanford Mentor
- Dr. Olivia Pattelli, Stanford Mentor
- Sophia Kim, SLI Director

Study of Salmon Aquaculture

Alexander Ardon

Summer Quarter, 2024

ABOUT YOU:

- City of residence: Menlo Park, CA
- Major/ certificate: Environmental Studies
- Year of graduation from Foothill College: 2025

PLACEMENT:

- Name of company/ institution: Carnegie Science
- Website: https://carnegiescience.edu/
- Mission (if a company): to advance investigation, research, and discovery, and apply that knowledge to the improvement of humankind
- Supervisor: Jemma Fadum

OBJECTIVE:

Fieldwork method development, measuring different levels of nutrients, oxygen, and temperature in bodies of water.

METHODS:

Before doing the fieldwork, I did a bit of research on the area we were going to be doing our work at. We also made sure when we tested the water, it was in 3 separate locations at the same beach so we would have a broad range of data. We used pretty simple tools to sample our water. We did tide pools as our testing grounds and we would collect some water to then filter our into smaller containers that we would later analyze in the lab for levels of nutrients. We would also measure the oxygen level and temperature using a device called a miniDOT logger which was also simple to use. Leave in the water for about 2 minutes and later analyze the results using a computer.

RESULTS & DISCUSSION:

Unfortunately, we ran out of time to be able to analyze our water samples for levels of nutrients. The process for it usually takes quite a bit of time. We did have results of oxygen and temperatures. From one of the locations which was where the tide pools was specifically located at, the levels of temperature and oxygen would be pretty different then the rest of the other sampling sites. Temperature was a little bit higher and oxygen levels were a little lower. During low tide this area would be more exposed to the sun which could explain the temperature. When we were doing the fieldwork, we noticed a majority of the beach had a lot of dead kelp and seaweed washed up and mixed in the tide pools. This does affect the level of oxygen because decomposing kelp consumes the oxygen nearby which could explain why the oxygen level was a bit different. By doing these tests, it could help with fieldwork methods development for researching salmon aquaculture in the surrounding area.

ACKNOWLEDGEMENTS:

Jemma Fadum, Supervisor/Mentor
Zakem's Lab, lab group for internship
Sophia Kim, SLI Mentor

Optimizing Interpenetrated Structures for High-Energy Zinc Batteries

Samuel Avalos

Summer 2024

About You:

- San Jose, CA
- Chemistry Major
- UCSC
- 2024

Placement:

- UCSC Yat Li lab
- Xinzhe Xue

Objective:

The focus of the research was to optimize Interpenetraded structures for high-energy Zinc batteries by focusing on metalizing polymer substrates, MnO2 electro-deposition optimization, and overall improvement of the electrochemical performance of the battery system.

Methods:

The primary focus of the experimental design was to optimize the layered deposition of PEDOT/MnO_2. This was achieved by independently depositing PEDOT and MnO_2, a departure from previous methods where the two were combined. The process began with the removal of impurities from the polymer substrate using NaOH, followed by tin plating. Subsequently, the substrate was plated with palladium, which was then succeeded by electroless nickel plating and further nickel deposition. Zinc was electrodeposited, followed by the sequential electrodeposition of PEDOT/MnO_2/PEDOT layers. Finally, the system was tested in an electrolyte solution composed of zinc sulfate and manganese sulfate to assess battery performance.

Results and Discussion:

We achieved an increase in specific capacity by 1200%, a Comprehensive improvement of rate retention from 0.5 to 5.0 mA cm^2, and an increase in areal capacity by 560%. Future directions lead us to study the structural effect of the H^+/Zn^{2+} insertion ratio, improving the reversibility of charge/discharge capacity, and increasing the longevity of the battery lifespan.

Acknowledgements:

- Xinzhe Xue, UCSC
- Yat Li, UCSC
- Sophia Kim, SLI (Foothill)

Improving immunotherapies through T-cell Engineering

Danna Avila

ABOUT YOU:

- Hometown: Sunnyvale
- Major/ certificate: Public Health Sciences
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: Stanford Cancer Institute- Mackall Lab
Website: https://med.stanford.edu/mackalllab.html
Mission: "The Mackall lab seeks to discover fundamental principles that control tumor: immune interactions and to apply these insights to develop novel immunotherapies for cancer."
Supervisor: Sean Yamada-Hunter

OBJECTIVE:

Throughout these nine weeks, our goal was to genetically engineer the CD47 protein so that we could combine two types of immunotherapies: anti-CD47 and CAR-T cells. Our goal was to have the CD47 receptor on T cells bind to its ligand SIRPα to avoid phagocytization by macrophages, but not to anti-CD47 therapeutic antibodies. To achieve this goal, we used base editors and various forms of Cas-9 to create a specific mutation at the Q31 mark.

METHODS:

We primarily dedicated our time to molecular cloning, specifically amplifying the necessary DNA segments for constructing our plasmid. Following that, we employed bacterial transformation to amplify our cloning material and facilitate its submission for sequencing to verify the presence of our mutation. Subsequently, we employed a miniprep kit to extract the DNA from the bacteria. After isolating the plasmid, we needed to enhance its amplification to introduce a poly-A tail into the DNA. This tail would serve as a signal for the polymerase to terminate the IVT process. Following successful amplification, we can perform in vitro transcription to generate our RNA and mRNA, which will subsequently be acquired by T cells.

RESULTS & DISCUSSION:

We successfully produced two iterations of modified T cells using varying quantities of mRNA. For our initial attempt, we employed 1.5 µL of mRNA and 1 µL of nucleotides. However, upon conducting a flow cytometry analysis to identify antibody binding and examining our sequencing results, we recognized that we may have insufficiently added mRNA and nucleotides to the IVT solution. Consequently, the desired clarity of our mutation was not achieved. Based on these findings, we opted to use 4.5 µL of mRNA and 1.5 µL of nucleotides. This combination resulted in a more distinct mutation. However, it also had an unintended impact on the binding of SIRPα, which was not our desired outcome.

ACKNOWLEDGEMENTS:

Sean Yamada-Hunter: Mentor
Sophia Kim: SLI Director

Binding and structural analyses of neutralizing fabs in complex with coronavirus spike protein peptides

Daniel Hernandez Rufino

Summer 2024

ABOUT YOU:

- City of residence: San Jose
- Major/ certificate: Biology
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: Barnes Lab
Website: https://www.thebarneslab.com/
Mission: Research on viral-host interactions, aimed towards potential treatments and therapies.
Supervisor: Christopher O. Barnes

OBJECTIVE:

The goal of the internship was to form complexes between fusion peptides from different coronavirus spike proteins and antibody fabs. We want to observe what this looks like by building 3D models of the complexes.

METHODS:

The project can be separated into three smaller goals: confirming and measuring the binding of our complexes, forming crystals out of our crystals and using these crystals to collect data, using the data we collect to create 3D structure models of our complexes. Many laboratory techniques and tools were used, including: Biolayer interferometry assay on an octet machine, concentration calculation using a nanodrop, crystal tray setting on a mosquito machine, x-ray imaging, Blueice and Coot softwares for model building.

RESULTS & DISCUSSION:

We were able to confirm that our antibody fabs and coronavirus fusion peptides did indeed bind and we measured constant values that represented how strong they binded together. We were then able to set crystal trays with our complexes and get crystals to form for collection. During the time of the internship, we were able to work with data collected from two of our crystals and build 3D models of our complexes using computer software.

ACKNOWLEDGEMENTS:

- Sheena Vasquez, PhD Structural Biologist
- Christopher O. Barnes, Principal Investigator
- Barnes Lab and Stanford Staff
- Sophia Kim, SLI Director
- SLI Staff

Development of microfluidic platform for throughput genomic analysis

Emily Jimenez

Summer 2024

ABOUT YOU:

- City of residence:Mountain view, CA
- Major/ certificate: Public Health of science
- Transfer institution: UC Irvine
- Year of graduation from Foothill College: Fall 2025

PLACEMENT:

Name of company/ institution: Standard BioTools
Website: https://www.standardbio.com/
Mission (if a company): Providing essential, standardized tools to accelerate breakthroughs in human health.
Supervisor: Mackenzie Bullock

OBJECTIVE:

My objective for this internship was to be able to get knowledge and experience in the field that was related to my major and interest.

METHODS:

I knew this internship was important for my future career and life, so I started from my first day with getting my journal and materials ready for my first day. We started with a project and learned how to use the proper tools from the lab. Once I was ready, we did a few tests for a project and I did a lot of journaling and note taking. It was important to document everything I did because that was going to help me throughout the internship and will allow me to see what I can do better on.

RESULTS & DISCUSSION:

We tried various methods and runs to ensure we had the correct steps and tests to be able to use that run in the future for the project. We did about a total of 4 runs to see which one would give us better results. The results we were looking for included time consumption, cost and accuracy. I was a little disappointed when the first test did not go correctly. I ended up not using the right sample, and due to the high cost of the materials, I was unable to run that test again. So right away I knew that test we were not going to use for the project. The next runs were taking too much time and would not allow us to have an efficient workflow. So the last test we did finally gave the results we wanted and I was able to present that to the team. Overall it was a very good internship experience and I am now more confident with my utter science classes. My mentor and also her manager taught me a lot about the company's work and how to go over the analysis and data. They were very patient and understanding of my very little knowledge.

ACKNOWLEDGEMENTS:

Mackenzie Bullock- mentor and research scientist
Michael Gonsalez- manager for Standard BioTools
Sophia Kim, SLI director and Amanda Carbajal, internship program specialist

FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE

Research Intern

Juan Lara-Nava

Summer 2024

ABOUT MYSELF:

- City of residence: I live in Menlo Park, CA
- Major/ certificate: I am a Biochemistry major at Foothill College, and I hope to receive an associate's degree if possible, and then transfer for my Bachelor's degree.
- Transfer institution: I hope to transfer to Stanford University, although, I also have a couple of other schools in mind, particularly in the UC system.
- Year of graduation from Foothill College: I will be graduating from Foothill College in 2025

PLACEMENT:

Name of company/ institution: Stanford University, Department of Structural Biology
Website: https://med.stanford.edu/structuralbio.html
Supervisor: Andrew Beel

OBJECTIVE:

The goal I sought to achieve out of this internship was to learn valuable lab skills and procedures, and how to do these procedures on my own. I believe these will help significantly in getting me through upper division courses such as biochemistry.

METHODS:

One of the many methods I used during my internship was the scientific method, this method has been the most important throughout my internship, as it has helped me understand why steps are taken in the order that they are. Some other methods I used during my internship have been things such as chromatography of all kinds, gel extraction, midipreps, gel electrophoresis, etc. I've been able to apply many different methods over the course of the last 9 weeks.

RESULTS & DISCUSSION:

So far during my internship, I have worked on two different projects and planned to work on an extra one, however, that did not go as planned due to an unforeseen situation; someone had already done research on the project I was planning for, and had answered the question we were asking. The first project I was a part of was to help me learn molecular biology such as cloning. The second project I am doing, my own independent project that I will be starting soon (8/16), the project is to figure out if there is any interaction between topoisomerase 2A and condensin in our chromosomes. I have already successfully purified condensin I and II and have it ready for use when necessary.

ACKNOWLEDGEMENTS:

Stefany Maldonado
Summer 2024

ABOUT ME:

- City of residence: Menlo Park, CA
- Major/ certificate: Transfer with focus on ecology, computer science, anthropology
- Transfer institution: N/A
- Year of graduation from Foothill College: 2025

PLACEMENT:
Name of company/ institution: Carnegie Institute
Website: https://carnegiescience.edu/
Supervisor: Andrea Nebhut and Prof. Jeffrey Dukes

OBJECTIVE:
Research work regarding ecological survey and climate analysis. Carnegie Institute is a global ecology research lab at Stanford.

METHODS:
Long term projects involving on-field work, laboratory research and data analysis

RESULTS & DISCUSSION:
Project that I participated in is still ongoing, it began last year and is projected to continue on for multiple years. I aided in collecting further on-field data concerning plant community behavior and soil moisture and nutrient quality as well as helping in the construction of field sets and construction and calibration of moisture probes. I help to record and digitize data for archival and analysis purposes.
My project for my internship concerned the dynamics of flowering success for invasive and native plant communities in California serpentine soil with a focus on the controlled levels of precipitation and climate, finding a notable determining factor in higher temperature and higher precipitation, using data colleted form early season flowering and the recorded rates of temperature and precipitation.

ACKNOWLEDGEMENTS:
Andrea Nebhut, Professor Dukes, research technician Julie Marcos, my fellow interns and the Carnegie Institute office and lab staff.

Investigating the Non-Ionic Surfactant Mechanisms of Action in Biologic-Related Activity Enhancement

Hannah Shong
Summer 2024

ABOUT YOU:

- City of Residence: Palo Alto
- Major: Molecular, Cell, and Developmental Biology
- Year of Graduation from Foothill College: 2025

PLACEMENT:
Company: Intact Therapeutics
Website: intacttherapeutics.com
Mission: Intact Therapeutics is developing smart gels for local drug delivery to the gut, innovating targeted therapies for digestive diseases.
Supervisors: Chris Zhan | Ravi Pamnani

OBJECTIVE: Our objective was to better define the parameters and potential applications of smart gel vehicle, F61. Previous experiments indicate RSpo1 protein activity in the Wnt pathway consistently improved 3-5x across several activity assays; from this, we explored the possibility of this phenomenon occurring in other biological pathways in effort to provide insight pertaining to F61 assay optimization, to F61 application-specific modifications, and to the F61-related half-maximal inhibitory concentrations (IC50) to assess F61-related therapeutic efficacy.

METHODS:

- Bioactivity Assay Prep/Execution: NF-κB Reporter (Luc) HEK293 Cell Line, Infliximab, htnfα
- High-Performance Liquid Chromatography (HPLC): Investigate as another assay for quantification.
- Assay Development: Design, optimize, and validate assay(s)' potential.
- General Lab Techniques: Well design, cell culture, pipetting, sterile technique, etc.
- Literature Review: Provide background necessary to identifying potential areas of interest related to projects such as assay development, protocol execution, specific biologics (e.g. monoclonal antibodies/mAbs of interest), and any other relevant information.

RESULTS & DISCUSSION: The model biologic in question is a monoclonal antibody, Infliximab (INF). Via the NF-κB cell response pathway, INF was heat-stressed at 37 C for 10 minutes before treatment to test if F61 could significantly increase activity of other biologics beyond the established RSpo1/Wnt data. The results, while not statistically significant in the difference of enhancement from control and F61, warrants further project exploration. Next steps include modifying the assay's parameters and repeating the experiment to 1) test F61's ability to enhance activity significantly in harsher conditions (e.g. higher temperature, longer duration of time) and 2), to repeat the experiment to calculate the IC50 with consideration of standard error.

ACKNOWLEDGEMENTS: Chris Zhan (*Mentor, Sr. Scientist*) | Ravi Pamnani (*Mentor, CEO/Co-Founder*) | Sophia Kim (*SLI Program Director*) | Amanda Carbajal (*SLI Program Specialist*) | Kyle Taylor (*Chemistry Professor*) | Ron Painter (*Chemistry Professor*)

Human Cytomegalovirus: Glycoprotein B Research Internship

Mishelle Solis Juarez

Summer 2024

ABOUT YOU:

- City of residence: San Jose
- Major/ certificate: Public Health & Nursing
- Year of graduation from Foothill College: 2026

PLACEMENT:

Name of company/ institution: Stanford School of Medicine
Website: https://med.stanford.edu/structuralbio.html
Supervisor: Dr. Javaria Najeeb

OBJECTIVE:

The goal of my internship was to stabilize longer versions of glycoprotein B in pre-fusion form of the Human Cytomegalovirus so that there are no missing important regions of the protein.

METHODS:

I began by expressing 24 mutants of gB in HEK-293E cells and performing plasmid midi preps to isolate and purify DNA from each gB mutant. After we put them in a western dot blot to detect the presence of the gB mutants and once we examine our results and found some of our mutants where expressing well we ran another western blot with a SDS-PAGE gel to evaluate that the secreted protein were of the expected size we needed of 200kD. After seeing encouraging results we did an affinity chromatography pull out and purify the gB from each soup and concentrated them down for a stability test, which would cause precipitation if the protein was unstable. Seeing our mutants did crash out we ran another SDS-PAGE gel to determine where most of the gB was in and did a binding test.

RESULTS & DISCUSSION:

Our results showed us that 8 out of the 24 gB mutants bind to an antibody that only binds to pre-fusion gB which is a hopeful sign that they are all folded correctly in pre-fusion form and the next step is to introduce stabilizing mutations to which we think will increase stability of the longer gB.

ACKNOWLEDGEMENTS:

I want to thank my mentor, Dr. Javaria Najeeb for taking the time to educate and guide me. My professor Dr. Amy Edwards who inspired me to seek this opportunity. Sophia Kim, Amanda Carbajal and SLI Team for providing this great opportunity and being a supportive resource throughout the nine weeks of the internship, all your hard work was appreciated and valued.

STEM EMPOWERMENT

A Qualitative Exploration of Low-Income Student's Experience in Science

Florencia Barbieri

Summer 2024

ABOUT YOU:

- City of residence: Palo Alto, CA
- Major/ certificate: Business Administration
- Transfer institution: Undecided
- Year of graduation from Foothill College: 2025

PLACEMENT:

- Name of company/ institution: FLi Sci
- Website: https://flisci.org/
- Mission (if a company): To support the scientific development of students who identify as either first-generation and/or low-income by providing opportunities that foster integral skills necessary to pursue science either professionally and/or academically.
- Supervisor: Gabriel Reyes and Marissa Mora

OBJECTIVE:

The goal of this internship was to expand my data analysis knowledge, develop workplace communication skills, and be more comfortable doing qualitative research.

METHODS:

In this internship, I had to read scientific articles about low-income students and faculty and how that affects their academic and professional lives, I had to connect those articles with my internship program and use them as a guide to analyze data collected from the program participants. With help from my mentors, I created a qualitative interview protocol and conducted interviews based on that, I also started the transcripts for some of the interviews. I will keep working on them alongside my mentors in the future.

RESULTS & DISCUSSION:

We are not done with the interviews yet so we don't have any clear results but from what we have seen in the first round of interviews the majority of the participants changed their perception of science and STEM after participating in the program. We will be able to dive deeper into that once we finish the interview process and analyze all the transcripts.

ACKNOWLEDGEMENTS:

Marissa Mora and Gabriel Reyes my mentors at FLi Sci
Sophia Kim, my supervisor at SLI.

A Platform For Elevating Youth Voices and Choices

Haily Garcia

Summer 2024

ABOUT YOU:

- City of residence: East Palo Alto
- Major/ certificate: Economics
- Year of graduation from Foothill College: 2025

PLACEMENT:

Name of company/ institution: Stanford University-Psychology Department
Website: https://ltbdraft.sites.stanford.edu/
Supervisor: Virginia Isarraras

OBJECTIVE:

Improve the re-enrollment of formerly incarcerated youth, foster youth, and those who have a history of substance abuse by creating solid student-teacher relationships, improving their success in school, and empowering their voices on their terms.

METHODS:

The work we completed during the summer was targeted at extending both arms of this work by supporting different parts of the research process (analyzing scenario study materials of foster youth stereotypes that are perceived by teachers which impact the relationship they develop) (JJ) developing code books (JJ) (which are coding schemes for data trying to find themes within the data), conducting literature reviews and adapting measures (Foster), developing intervention materials for more specific populations dealing with substance use.

RESULTS & DISCUSSION:

The results of the Lifting the Bar Project at Stanford University showed that strengthening student-teacher relationships is particularly beneficial for students from marginalized backgrounds, including those who have been incarcerated or are in foster care. Currently, stereotypes and biases often prevent these relationships from flourishing. Foster and juvenile youth are frequently labeled as "troublemakers" or assumed to be lazy and disengaged with lectures, leading to a lack of understanding from teachers and school staff. This negative labeling hinders students' academic progress and fosters feelings of inferiority and alienation, making it difficult for them to succeed in higher education.

Despite these challenges, many teachers genuinely want to support and guide these students toward academic success. However, they often need more insight into the unique challenges these students face in and out of school. The project offered a platform for students to introduce themselves to educators on their terms, helping to break down negative stereotypes and foster a more empathetic and supportive school environment. By encouraging open communication, the initiative built positive, meaningful relationships that empower students to voice their goals and seek the support they need to thrive.

ACKNOWLEDGEMENTS:

Ariyanna Wesley
Amanda Carbajal
Sophia Kim

ACKNOWLEDGEMENTS

We are grateful to all those who help to make this program possible:

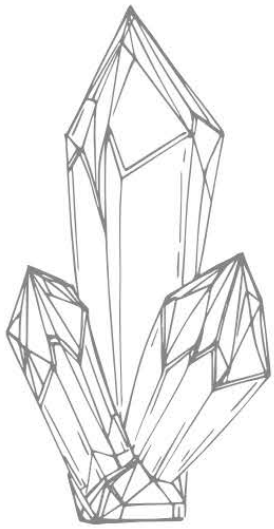
Foothill College/ FHDA District

- The SLI Internships team - Dr. Amanda Carbajal, STEM Internship Program Specialist; Lillian Swedlow, Program Assistant; Sophia Kim, SLI Director
- Dr. Miloni Gandhi - Internship Class Instructor
- Zachary Cembellin - Dean, STEM Division
- Foothill STEM faculty - referring students and encouraging them to apply
- The FHDA Foundation - for their ongoing support to help SLI fundraise
- Kristina Whalen - President, Foothill College
- Foothill Equity Office
- SLI Advisory Board Members

Funding for internship stipends provided by

- Labs and companies who cost-shared with us (75% of partners!)
- The Science Learning Institute
- Individual donors and supporters

We are especially appreciative of and grateful for this summer's mentors. Each mentor is listed in the student's final report. They were an amazingly committed group of individuals, all dedicated to ensuring the most fruitful experience for students.



STUDENT TESTIMONIALS

The summer 2024 SLI Interns researched an incredible range of topics from hydrogen bonding to machine learning. Many of the interns had some final words about their experience, some of which we share below.

Although this was my first internship and I initially faced some challenges with communication and guidance, I learned the importance of being proactive in seeking mentorship. Additionally, it has boosted my confidence and helped me realize the importance of self-motivation and independence in a professional setting.

- Daniel, Biology Major

Because of this internship through SLI I feel much more confident about my future. I feel inspired to broaden my studies to include chemistry along with physics and to see where those two programs can meet. I've made a lot of connections with people I worked with this summer, and thanks to all of the experience I've gained, I feel confident in both my ability to secure my next internship and to do well in it

- Sofia, Physics Major.

Because of this internship through SLI, I have gained valuable lab and research experience, have prospect and connection to possible future research work, an impressive addition to my resume, and a better understanding of my academic path moving forward with a new perspective

- Stefany, biotech

FOOTHILL COLLEGE
SCIENCE LEARNING INSTITUTE