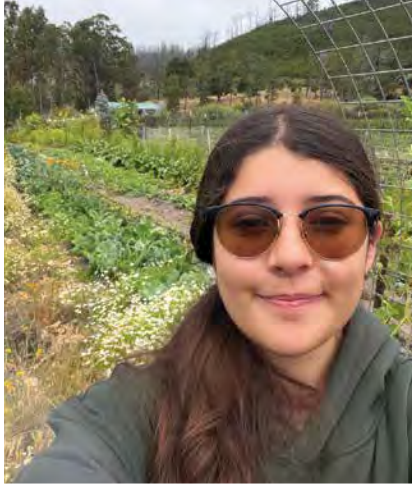






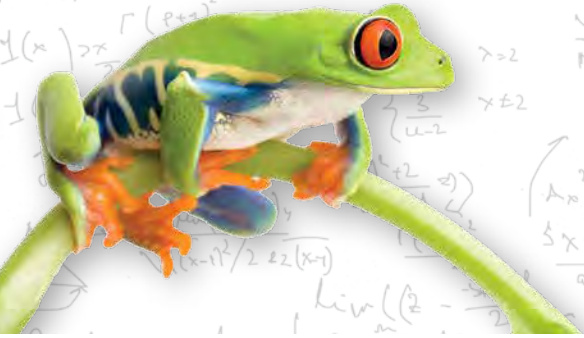


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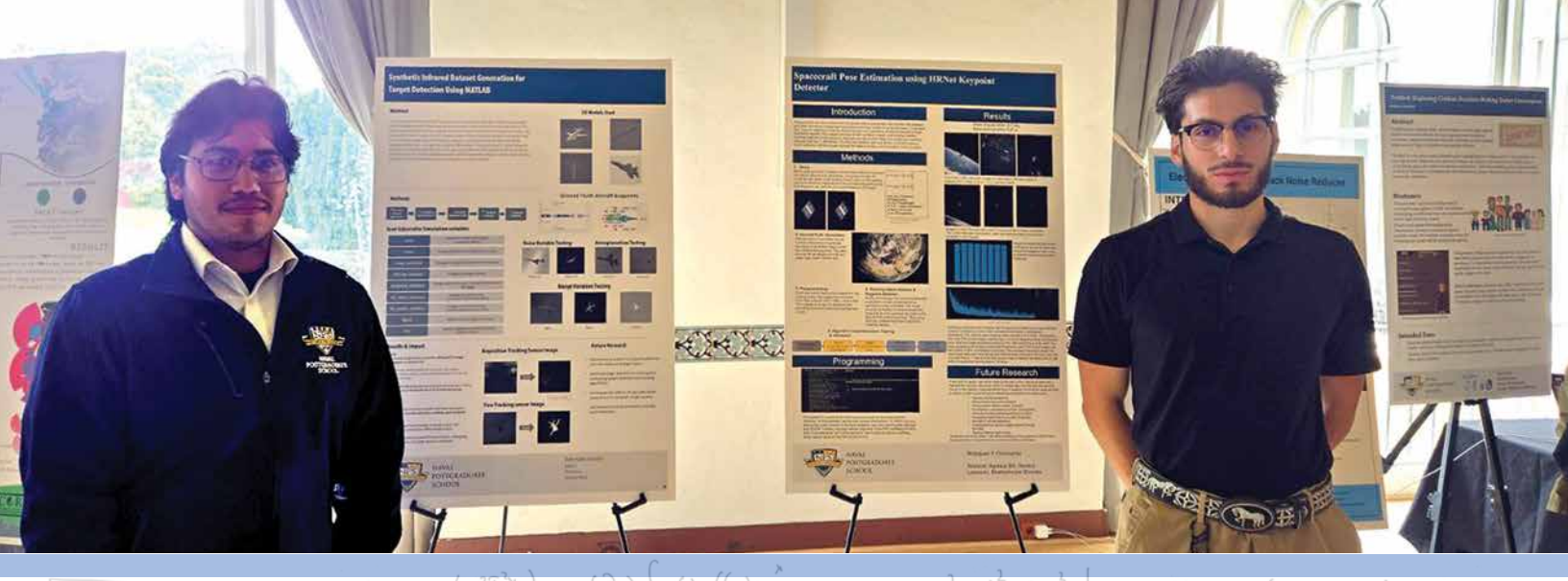








09.12.2026



20th ANNUAL STEM

INTERNSHIP SYMPOSIUM



20th ANNUAL

HARTNELL COLLEGE

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THE PROGRAM

Hartnell STEM Internship Program

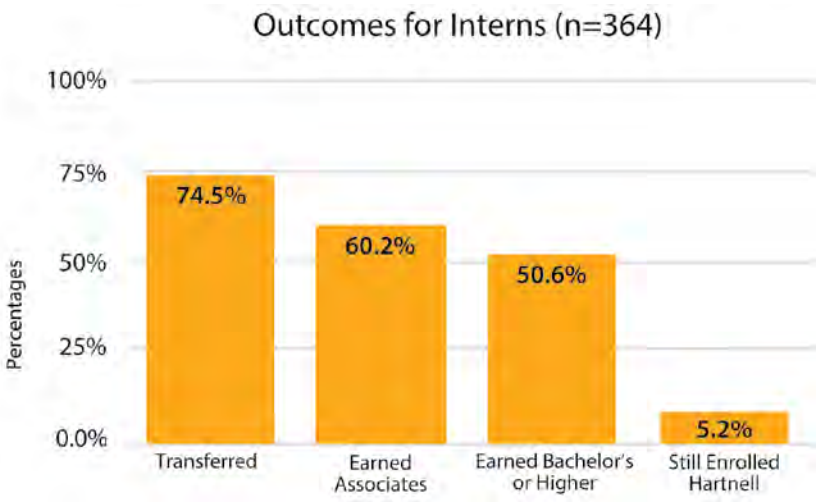
The STEM (Science, Technology, Engineering and Math) Internship Program at Hartnell Colleges supports and engages students in undergraduate academic research and/or professional internship experiences. Internships include relevant and innovative projects with regional research institutions, local partners, and national REU (Research Experiences for Undergraduates) programs. Internships are guided by experienced mentors who provide authentic professionalism and transfer preparation for upper-division and graduate studies. Students are provided the opportunity to share their work with academic and professional communities through presentations and publications.

Hartnell STEM Micro Internship Program

Hartnell College received a National Science Foundation Hispanic Serving Institution grant, with a goal of extending the reach of the Internship program. When students were polled regarding why they were not participating in internships, they stated that they did not feel ready academically or that they could not fulfill the time commitment. To bridge these gaps, we developed the STEM Micro Internship Program, in which students participate in faculty-led, 25-hour applied learning experiences.

Hartnell is strengthening diversity in STEM while taking on the challenge of meeting our nation's skilled workforce needs. The program is creating a new legacy of opportunity for the families of the Salinas Valley by producing future generations of bright young scientists through innovative and comprehensive STEM programs and initiatives. For the past 20 years, our unique STEM Internship Program has achieved unprecedented success, matching hundreds of community college students with university researchers and industry experts in prestigious laboratories throughout the Central Coast and beyond.

The STEM Internship Program began in 2006 with the placement of six student interns. Since then, the program has placed more than 1,500 students in undergraduate research and professional internship opportunities. In addition to its growth over the 20-year period, the program has demonstrated higher academic success rates for participating students when compared with their peers. For example, degree attainment for Hartnell interns is dramatically higher than that of non-participants. Of the 364 interns from cohorts 2016 through 2025, **74.5% have transferred, 60.2% earned their Associate of Science, 5.2% still enrolled at Hartnell College**. Of the interns who have transferred, **50.6% have earned their bachelor's degree**. Evidence shows that STEM internships have been a valuable resource not only for skill-building, but also for overall student success and degree completion.



FUNDING SOURCES

- Hartnell College MESA Program
- Hartnell College Foundation
- National Science Foundation

Thank you!

20th ANNUAL STEM INTERNSHIP PROGRAM TEAM

HARTNELL COLLEGE

Mohammed Yahdi
Dean of Academic Affairs, Science, Technology, Engineering and Math (STEM)

Richard Morales
Director of Communications and Marketing

Joel Thompson
Director of Academic Affairs, Science and Math Institute

Anely Meneses
SMI Program Specialist

Belen Gonzales
Director Career Hub

Dina Uribe
Coordinator of Job & Internship Placement

Edlin Hernandez
Coordinator of Job & Internship Placement

Shannon Bliss
Director of Agriculture Innovation and Technology

Andrea Tinajero
Program Coordinator of USDA NextGen Learning to Lead

Micro-Internship Mentors

Dr. Jeffrey Hughey

Mohammad (Tarek) Hussain

Dr. Rosser Panggat

Dr. Ver Marie Myr Panggat

Tito Polo

Hartnell Community College District Governing Board

Alejandra Gonzalez – Board President

Kari Valdes – Board Vice President

Angela Der Ramos – Trustee

Ray Montemayor – Trustee

Candi DePauw – Trustee

Cesar Iracheta – Trustee

Irma Lopez – Trustee

Luzelena Atrisco – Student Trustee

Michael Gutierrez – Board Secretary and College Superintendent/President





HARTNELL COLLEGE

MISSION

We advance social and economic justice
through the transformative power of education.

At Hartnell College, we know that post-secondary education is the lever that can propel the economic and social mobility of our community, and we understand how critical it is for us to reverse these educational and economic inequities. Our commitment is to provide high-value baccalaureate degrees, associate degrees, certificates, and transfer opportunities for our students, so they can achieve their career and academic goals, contribute to the economic and social vibrancy of our community, and become the leaders and changemakers of tomorrow.

HARTNELL VISION

If you could imagine the most perfect Hartnell College,
what would that look like?

- A place where students receive the message every day that they belong, their ideas matter, and they bring worth to the community.
- A place where students build relationships and build their future.
- A place where students can give their all to their education and future without worry that something will stop their educational journey.
- A place where we dismantle self-imposed and societal barriers.
- A place of transformation, growing the thoughtful leaders of tomorrow.
- A place where dreams become possibilities.

Vision statements reflect the voices of
Hartnell College students, faculty, and staff.





20th ANNUAL Hartnell STEM Internship Symposium

Twenty years ago, a question became an idea. What if students didn't just read about science, but experienced it firsthand? What if they could stand in a real lab, ask real questions, and follow them to discovery? That idea is why we are here today.

Welcome to the 2026 Hartnell College STEM Internship Symposium.

Today, we celebrate the 20th anniversary of the program. Leading this milestone is the 2026 cohort, a group of inquisitive students who spent their summer break deepening their understanding of science, technology, engineering, and mathematics. What you'll read and learn today is the culmination of that work, built on their research and the experiences they gained. More than that, you'll come away with a sense of who these students are resilient, impeccable in their work, and ready to lead.

This anniversary also marks 20 years of our community showing up for our students. Hartnell College staff, our industry partners, educators, and countless supporters have given their time, year after year, to make that happen. Because of this support, the idea of a full immersion opportunity for our students never had to stay an idea, but more of a reality.

Congratulations to all,

Michael Gutierrez
Superintendent/President, Hartnell College

HARTNELL COLLEGE



20th ANNUAL STEM PARTNERSHIPS & MENTORS

HARTNELL COLLEGE

California State University, Monterey Bay
Dr. Arunkumar Sharma
Dr. Prashanta Pokharel
Jeffrey J. Boggs
Marie Michaela Ibanos
Jessica Bautista

California Space Grant Consortium
Dr. John Kosmatka
Amy Arkwright

Ciarra Construction
Anselma Aviles
Mike Henson

City of Salinas
Cristobal Banuelos

County of Monterey
Jackie Estrada

Ecology Action
Marisol Diaz

Fremont Peak Observatory Association
Rob Howley

Hartnell College
Dr. Jeffrey Hughey
Mohammad Hussain
Dr. Ver Marie Myr Panggat
Dr. Rosser Panggat
Tito Polo
Paul Chen

Joby Aviation
Omar Perez-Sandoval
Amanda Archer
Audrey Shanks
Loren Meisser

Joby Aviation, continued
Miguel Maldonado
Ken Burleigh
Eric Dungan
Nicole Kyine Lain
Priyank Nandu
Abby Lacheur
Brittany Blessie
Cody Cleverly
Jacob Crocker
Lance Jones
Eric Lehnertz
Josh Payne
Jeff Richards
Mauricio Romero

Matthew Ronconi Orthodontics
Dr. Matthew Ronconi

Monterey Institute for Research in Astronomy
Dr. Jean Perkins

Monterey County Health Department
Donna Ferguson
Rawni Lunsford
Carlos Anaya

Naval Postgraduate School
Dr. Alan Van Nevel
Dr. Jennifer Carson
Dr. Brij Agrawal

Oregon State University (COLDEX Program)
Dr. Keeley Corder

Sunflower Star Laboratory
Andrew Kim
Reuven Bank

United States Department of Agriculture
Dr. Juan Alvarez (OPPE)
Dr. Greg Simmons (APHIS)
Dr. Daniel Hasegawa (ARS)
Dr. Steve Klosteman

France
Dr. Gaylord Desurment
Dr. Marie Bon-Claude
Dr. René SFORZA Javid Kashefi
Nicholas Manoukis
David Shapiro
Mélanie Tanniers
Melanie Broin

Puerto Rico
Hugo Cuevas (REE-ARS)
Timothy Porch (REE-ARS)
Luz Serrato (REE-ARS)

Hawaii
Scott Geib
Charles Mason (REE-ARS)
Chan Heu (REE-ARS)
Sheina Sim (REE-ARS)

University of California, Santa Cruz
Dr. David Bernick
Dr. Aide Macias-Munoz
Dr. Rachel Meyer
Dora Rasch
Deana Tanguay

University of California, San Francisco
Dr. Ellen Fung
Dr. David Killilea
Dr. Alexander Fay
Dr. Jason Nagata
Marissa Evans

Special Thank You

to our

Andy Newton STEM Internship Partner

Award Winner

Dr. Jeffery Hughey



THANK YOU TO

the human Chevron energy company™

for supporting this year's STEM Internships and the

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SYMPOSIUM AGENDA

Welcome

Michael Gutierrez
Superintendant/President

Presentation of the Andy Newton STEM Internship Partner Award

Presented by Dr. Joel Thompson
Director of the Science and Math Institute

Student Panel Discussion

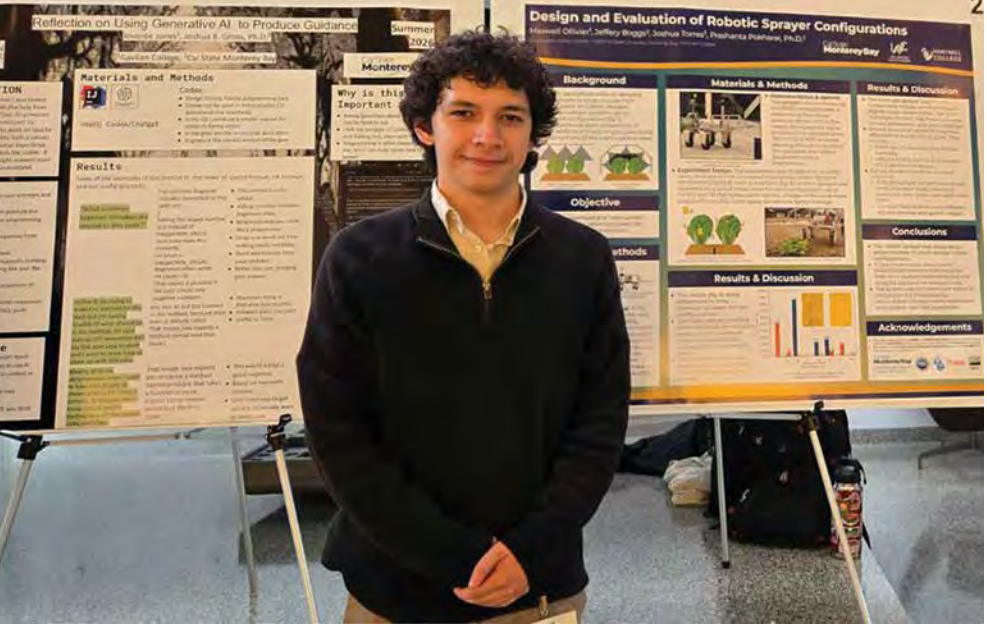
Presented by Anely Meneses
Program Specialist

Esteban Berelleza - USDA-EBCL, France
Amner Flores - Joby
Gladys Cabrera Luis - Sunflower Star Lab
Kamila Ait Aissa - Hartnell IT Department

Walkthrough of Posters

Chevron

MESA Math · Engineering · Science Achievement









20th ANNUAL STEM INTERNSHIP SYMPOSIUM







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STUDENT INTERNS

Kamila Ines Ait Aissa
Salud Anguiano
Leilani Arroyo
Gisselle Avila
Pedro Bairez-Gonzalez
Kaeley Barbosa
Gabriel Bello
Esteban Berelleza
Alonso Cabrera
Gladys Cabrera Luis
Tomas Calusdian
Fernando Chavez
Saul Contreras
Daniel Cruz
Israel Crystalinas
Paloma Degrandis-Figueroa
Melissa Distancia
Claudia Dominguez-Trejo
Allen Escolta
Abigail Ferrales
Socrates Figueroa
Amner Joel Flores
Marissa Flournoy
Alondra Garcia Bejarano
Julian Garcia-Montejano
Hezekiah Gonzalez
Daniel Gonzalez Cuevas
Virgilio Hernandez Cruz
Jimena Hernandez-Tejeda
Emma Herrera
Henry Huynh
Kayla Kennamore
Keily Lepiz-Rangel
Julia Lewis
Aaron James Lomboy
Juan Lopez Naranjo
Brianna Martinez
Juan Martinez Montesino
Montserrat Mata-Vargas
Fatima Mendez
Flavio Mora
Samuel Ochoa
Janai Orozco
Jesus Ortiz Ramos
Erick Oviedo
Adolfo Ramirez
Rafael Ramirez
Camilo Ramos Polo
Denise Regalado Ramos
Christopher Rodriguez
Karolina Rodriguez
Salma Rodriguez
Roberto Ruelas Guevara
Elizabeth Ruiz-Gonzalez
Kevin Ruiz Hernandez
Carlos Sanchez
Maria Santibanez Calderon
Jeriel Sevilla
Christopher Talavera
Hailey Thomas
Joshua Torres Cepas
Bryanna Valdez
Samuel Valencia
Isaac Virgen
Aurora Webeck
Soraya Alina Zuniga





Evaluating Azure Virtual Desktop as a possible alternative to the current AWS AppStream Virtual Desktop

Intern: Kamila Ines Ait Aissa

Mentors: Paul Chen, Director of Technical Services

Opportunity: Hartnell IT

HARTNELL COLLEGE

This internship project evaluated Azure Virtual Desktop (AVD) as a potential replacement for the institution's current AWS AppStream environment to improve the virtual desktop environment for students and to simplify IT management. The primary objective was to determine whether AVD could provide faster performance, easier application deployment, enhanced security, and more efficient administration while maintaining a scalable cloud-based infrastructure. During the project, a proof-of-concept AVD environment was designed and configured using Microsoft Azure. Virtual machines were deployed and integrated with Microsoft Entra ID and Intune for centralized management. Applications were packaged and deployed through Intune, user access was configured using role-based access control and security groups, and automation was implemented to remove local user profiles daily to maintain clean session hosts. Additional testing included web and remote desktop access across multiple devices, application control policies, and power management autoscaling. Testing demonstrated that Azure Virtual Desktop significantly reduced desktop launch times from approximately 4–5 minutes with AWS AppStream to about 1 minute, providing a noticeably improved user experience. The project also showed that AVD offers streamlined application management, centralized administration through Microsoft tools, stronger security capabilities such as Conditional Access and Multi-Factor Authentication, and reduced maintenance compared to managing traditional AppStream golden images. Overall, the project demonstrated that Azure Virtual Desktop is a practical and scalable solution capable of improving student accessibility while reducing administrative workload for the IT department. These results support moving forward with a larger pilot deployment to further evaluate AVD as the institution's future virtual desktop platform.

Kamila Ines Ait Aissa

Major: Computer Science



Preliminary Approach on Biological Control

Intern: Salud Anguiano

Mentors: Dr. René Sforza and Nathalie Ramaualde

Opportunity: USDA-EBCL, France

USDA ARS
United States Department of Agriculture
Agricultural Research Service

This internship was completed at the USDA Agricultural Research Service (USDA-ARS), European Biological Control Laboratory (EBCL) in Montpellier, France, during an eight-week internship. My goal was to gain hands-on experience in biological control research, insect rearing, and invasive species management while learning how scientifi c research is conducted in a laboratory and greenhouse. I worked under the guidance of my mentor, Dr. René Sforza and Nathalie Ramaualde, who taught me about biological control and the importance of developing safe methods to manage invasive species. My main project focused on rearing Condica viscosa, a moth that is being studied as a possible biological control agent for stinkwort (Dittrichia graveolens), an invasive weed found in California. I helped care for stinkwort plants and rear the moth throughout its life cycle. I also helped with host-specifi city trials by testing the moth on stinkwort and two other plant species to see if it feeds only on stinkwort. This research is important because the moth must be shown to target only stinkwort before it can be considered for release in California. The results of these trials are still being evaluated. In addition to this project, I maintained Bagrada hilaris colonies in a quarantine laboratory and helped rear Gryon aetherium, an egg parasitoid that is being studied as a biological control agent for the Bagrada bug with Nathalie. I also transplanted host plants used to feed the Bagrada bugs and support ongoing research. During my internship, I gained experience in insect rearing, greenhouse work, plant care, data collection, and laboratory safety while improving my communication, teamwork, and problem-solving skills. This experience strengthened my interest in agricultural research, biological control, and sustainable pest management and helped prepare me for a future career in agriculture.





Salud Anguiano

Major: Plant Science



Fighting the Fuzz: Downy Mildew in Spinach

Intern: Leilani Arroyo

Mentor: Dr. Steven Klosterman

Opportunity: USDA Seed Treatment

USDA ARS
United States Department of Agriculture
Agricultural Research Service

Plant pathogens are a substantial concern to farmers. The team I work with at the USDA-ARS, focused on *Verticillium* & downy mildew. *Verticillium* is a fungus that affects the root systems of crops, reducing the crops viability; forcing farmers to take a loss. The main concern regarding *Verticillium* is how long the spores can remain dormant in soil, up to 15 years. While downy mildew mostly affects the leaves of the crop, which can be an issue when what is harvested from the crops are the leaves (ex. Spinach). Most of my time was spent on hands-on tasks inside & outside the lab. I got first-hand experience & training alongside one of the biological technicians. I helped facilitate & set up experiments with post-doc researchers, whilst learning more about their specific research & specializations. My hands-on tasks included planting viroflay spinach, collecting and creating downy mildew inoculum for experimentations, inoculating the viroflay spinach, collecting spore samples from the field, & making media plates. I would spray the inoculated viroflay spinach with deionized (DI) water twice a day, once in the morning and once in the evening. As downy mildew grows best in cool wet environments. Once spores were observed on the underside of the leaves, the tray of spinach would be placed into a dew chamber for a minimum of 24 hours and up to 48 hours. When trays were taken out of the dew chamber, collection of infected leaves would commence. Some leaves were immediately utilized for inoculum solution, whilst others were frozen at -80 Celsius for future experimentation & inoculation. The downy mildew inoculum solution goal was to have a minimum of 20 spores' ppm, but preferable 30-40 ppm. The purpose of the repeated inoculation & collection was to eventually have 20 ppm in a liter of DI water was to inoculate an experiment out in the field by Spence Road. The media plates were utilized to see the levels of *Verticillium* that resides on differing parts of the seed by carefully analyzing the number of colonies under a microscope after 2 weeks in the incubator. For experiments on treatment efficacy, germinated seeds, ground seeds, & whole seeds were put into the media plates. Germinated seeds were used to see how the treatment may have affected the germination. Ground seeds measured if the treatment affected the spores residing within the seed. Whole seeds measured how the treatment affected *Verticillium* spores on the seed coat. All were compared to a control of the seed type (ground, germinated, whole) & then comparing the initial and final number of colonies. I followed safety protocols & procedures to prevent the spread of pathogens. The range of differing tasks allowed me to learn to quickly, adapt and pivot, pay attention to details, patience, working under pressure, & communicate efficiently.

Leilani Arroyo

Major: Biology



Pannexin Channel Blocker Prevents Hyperexcitability Induced by Fibrillated Tau Protein in Mouse Hippocampus

Intern: Gisselle Avila

Mentors: Rajkamal Mann, Dennis Tabuena, Misha Zilberter

Opportunity: PUMAS, Gladstone Institutes

GLADSTONE INSTITUTES

Alzheimer's disease (AD) is a neurodegenerative disease leading to progressive cognitive decline and death. One of the symptoms of AD is hyperexcitability in the brain, which is seen early on in patients. Subclinical epileptiform spikes are also reported in AD patients (42%) and are linked to disease progression and faster cognitive decline (Vossel at al., 2016). AD is pathologically categorized by an accumulation of misfolded proteins such as amyloid beta plaques, phosphorylated tau and neurofibrillary tangles (NFTs). Misfolded proteins have been shown to cause neuronal hyperexcitability, as i.c.v. injection of Aβ induces epileptiform spikes (Malkov, 2021). Aβ has also shown induced hyperexcitability depending on intracellular ATP levels. Clamping ATP at higher levels has been shown to prevent Aβ toxicity (unpublished data). The objective of this study is to understand the effects and mechanisms of tau on neuronal network excitability. We hypothesized that tau fibrils will cause network hyperexcitability and will be dependent on intracellular ATP levels. To study tau's effects on hyperexcitability, we conducted local field potential recordings in hippocampal slices and washed in tau fibrils during recordings. To understand how intracellular ATP affects the potential tau-mediated hyperexcitability, we used a pharmacological blocker for pannexin 1 channels (mefloquine, MFQ). The results showed that blocking pannexin channels prevented tau-mediated hyperexcitability, indicating ATP release may be a crucial mechanism by which tau increases neuronal excitability. Future studies will work on evaluating whether Aβ induced hyperexcitability is also dependent on pannexin 1 channels, by conducting LFP recordings with Aβ and MFQ administration. We will also focus on if MFQ itself causes changes to the resting membrane potential.

Gisselle Avila

Major: Biology



Synthetic Infrared Dataset Generation for Target Detection Using MATLAB

Intern: Pedro Bairez-Gonzalez

Mentors: Brij Agrawal & Leonardo Herrera

Opportunity: Naval Postgraduate School

During my summer internship at the Naval Postgraduate School, I worked on a MATLAB and Python based simulation project designed to generate synthetic image datasets for acquisition and fine tracking sensor systems provided by Lockheed Martin. My main goal was to understand the existing project structure, by identifying the main data generation scripts, configuring the required software environment, and producing simulated sensor images. I reviewed MATLAB scripts for Acquisition tracking sensor (ATS), Fine tracking sensor (FTS), and a combination of both in one script. I successfully generated ATS and FTS images, associated 3D models with their respective key points, and identified important target locations such as the nose, tail, wings, and center. I also generated and examined FTS imagery and compared the visual differences between ATS and FTS outputs. Throughout the project, I modified simulation parameters including sensor resolution, integration time, noise, anisotropic effects, target range, altitude, background selection, and the number of images generated. I inspected output images and mask files to identify unexpected pixels and other possible data-quality issues. I also troubleshot challenges involving MATLAB file paths, graphics timeouts, empty output folders, Python installation, CUDA configuration, and required Python packages. This work improved my MATLAB programming, debugging, dataset-generation, and sensor-simulation skills while providing experience working with a large research codebase.

Pedro Bairez-Gonzalez

Major: Mechanical Engineering



County of Monterey – Public Health Lab Internship

Intern: Kaeley Barbosa

Mentors: Rawni Lunsford, Assistant Director and Alexis Topete, Lab Assistant

Opportunity: Monterey County Public Health

The Monterey County Public Health Laboratory plays an important role in protecting the health of our community through laboratory testing, disease surveillance, and environmental monitoring. Through my internship, I have had the opportunity to learn from laboratory assistants and microbiologists across several specialties, including bacteriology, tuberculosis (TB), mycology, and environmental testing. Throughout the experience, I have been introduced to laboratory techniques including streaking, subculturing, Gram staining, and the use of different microbiological media for the growth and identification of microorganisms. I have also learned about TB and mycology testing and the identification of fungal organisms. The area I have enjoyed most has been environmental testing, particularly water testing, where I learned how beach and drinking water samples are tested for chlorine, E. coli, and total coliforms and was introduced to methods such as Colilert and Quanti-Tray. Learning about these processes has helped me understand how laboratory testing can identify potential health risks and directly contribute to protecting the community. This experience has given me a greater appreciation for the connection between laboratory science, public health, research, and medicine. While I hope to pursue a patient-focused career as a physician, I have learned that the work taking place behind the scenes is equally important to understanding disease and protecting population health. I am grateful to have gained this experience early in my pre-med journey and am excited to continue building on the knowledge and skills I have gained through future research opportunities and eventually carry them into my career in medicine.

Kaeley Barbosa

Major: Biology



Promoting Sustainable Transportation Through Community Outreach and Electric Vehicle Partnerships

Intern: Gabriel Bello

Mentor: Marisol Diaz

Opportunity: Ecology Action

Transportation-related emissions and unsafe infrastructure continue to challenge environmental sustainability and community well-being. Ecology Action addresses these issues by promoting sustainable transportation, bicycle safety, and community education through outreach initiatives. During my internship, I supported these efforts by strengthening community partnerships, promoting electric vehicle (EV) adoption, and improving public awareness of sustainable transportation options.

My primary responsibilities included representing Ecology Action at farmers' markets and community events, where I engaged residents in conversations about available transportation programs and environmental initiatives. As a member of the Electric Vehicle Program, I researched regional automobile dealerships, established professional contacts, and helped develop partnerships for future events showcasing electric vehicles and their environmental benefits. I also conducted transportation safety audits by identifying hazards such as potholes, deteriorating pavement, and damaged roadway markings while documenting recommendations to improve pedestrian and cyclist safety. Throughout these projects, I utilized Microsoft Excel, Google Sheets, Google Docs, Microsoft Teams, and Asana to organize data, manage projects, and maintain communication with team members.

This internship strengthened my leadership, communication, networking, professionalism, and problem-solving skills while reinforcing the importance of persistence and collaboration. Participating in educational outreach events, including interactive bicycle activities for children, demonstrated how community engagement can inspire healthier and more sustainable transportation choices. This experience showed me that meaningful environmental progress depends not only on infrastructure and technology but also on educating communities, building partnerships, and empowering individuals to create lasting positive change.

Gabriel Bello

Major: Civil Engineering



Developing a protocol for isolating seed endophytes of Ventenata dubia

Intern: Esteban Berelleza

Mentor: Dr. Mélanie Tannières

Opportunity: USDA-EBCL, France

Invasive winter annual grasses such as *Ventenata dubia* have become a growing invasive concern across the western United States, where they reduce forage quality and resist conventional control. Characterizing the microbial communities carried within these weeds is an early step toward identifying organisms with potential as biological control agents. Seed-borne endophytes such as fungi and bacteria that live inside seed tissue are of primary interest. They can influence germination, plant health, and a species' ability to establish. Our goal is to isolate and identify fungal and bacterial endophytes from *Ventenata dubia* seeds to characterize the microbial aspect of the species. This is done through a seed sterilization process. Seeds are dissected to extract the embryos, and their surfaces are sterilized through a sequential protocol: 70% ethanol, a rinse in sterile water, bleach, then four rinses in sterile water and drying on sterile paper. Sterilized seeds are then plated across eight plates — four half-strength potato dextrose agar (½ PDA) plates for fungal endophytes and four nutrient agar (NA) plates amended with cycloheximide (100 µg/mL) for bacterial endophytes. We also included isolation and control plates prepared from the final rinse and imprints to confirm surface sterility. Plates were then examined over the course of three weeks in search of colonies emerging from the seed. The intended workflow was to subculture any distinct colonies to pure isolates and identify them by DNA barcoding. Across multiple trials, unfortunately, no endophytic growth was recovered, so no isolates were available for identification, and efforts were redirected toward optimizing the isolation protocol. The absence of endophytes may result from several factors, such as seed age, insufficient quantity, sterilization time, or a naturally low endophyte abundance in the seed batch. We successfully developed a protocol that consistently achieved complete sterilization, allowing us to fully focus on endophyte growth without the interference of external bacteria. Ongoing work focuses on adjusting these parameters to improve recovery in future trials.

Esteban Berelleza

Major: Biology



Augmentorium Development for Black Scale (*Saissetia oleae*) and Olfactory Host-Finding in the *Viburnum* Leaf Beetle (*Pyrrhalta viburni*)

Intern: Alonso Cabrera

Mentor: Gaylord Desurmont

Opportunity: USDA-EBCL, France

Biological control and behavioral ecology offer sustainable alternatives to chemical pest management. During a research internship at the USDA-ARS European Biological Control Laboratory (EBCL) in Montpellier, France, I contributed to two projects targeting invasive insect pests. The first extends the augmentorium, a screened enclosure that retains pests while allowing their parasitoid natural enemies to escape, to black scale (*Saissetia oleae*), a major sap-sucking pest of olive and citrus. Because scale crawlers are far smaller than the fruit flies for which augmentoria were developed, mesh selectivity poses a new technical challenge. We were evaluating multiple mesh types in mini-augmentorium assays, measuring crawler retention and escape of encyrtid parasitoids (*Metaphycus* spp.) under controlled conditions. The second project investigates olfactory host-finding in the *Viburnum* leaf beetle (*Pyrrhalta viburni*), an invasive defoliator of *Viburnum* shrubs in North America. Using behavioral assays, we are testing female preferences for damaged versus intact host plants and analyzing the associated plant volatiles, with the goal of developing attractant lures for monitoring. Together, these two projects demonstrate how insect behavior, parasitoid dispersal, and pest chemical ecology, can be leveraged into practical, non-toxic management tools for invasive species.

Alonso Cabrera

Major: Math and Physics



Welfare tracking for a critically endangered marine invertebrate, *Pycnopodia helianthoides* at Sunflower Star Laboratory

Intern: Gladys Cabrera Luis

Mentors: Andrew Kim, Mariana Jimenez, and Celine De Jong

Opportunity: Sunflower Star Lab

Since 2013, sea star wasting disease (SSWD) has devastated sea star populations along the Pacific coast. Notably, the sunflower sea star (*Pycnopodia helianthoides*) experienced greater than 90% population decline of an estimated nearly 6 billion lost. SSWD is caused by *Vibrio pectenicida* (V.pec), a bacterium that causes torsion of the arms, lesions, and in severe cases, complete deterioration of the tissues ("melting"). Although anthropogenic activity is not directly linked to the emergence of V. pec, human-induced climate factors contributed to "The Blob"—a massive 2013 marine heatwave in the Pacific Ocean that generated the highest sustained sea surface temperatures on record. The increase in temperature favored the spread of the bacteria.

The catastrophic loss of the sunflower sea star triggered a trophic cascade along the northern California coastline. With no major predator, sea urchin populations surged exponentially, consuming over 90% of the regional kelp canopy. This overgrazing transitioned diverse kelp ecosystems into urchin barrens, fundamentally disrupting coastal ecological dynamics leading to the growing need and interest in advancing restoration efforts across their range

At Sunflower Star Laboratory (SSL), we are actively raising sunflower stars with a mission to restore this species and strengthen ecosystem resilience. To better increase survival and welfare of this species under human care, it is of critical importance to develop methods for identifying symptoms of both wasting or other signs of stress and possible treatments.

This project presents a case study which summarizes the welfare tracking of three individual stars at SSL with varying health trajectories following treatments: Gen, Olive, and X. These individuals experienced numerous stress events, responding with symptoms representative of other stressed stars in the broader lab population, such as arm curling and autotomy (dropping arms). The data presented here came from qualitative health scores given to each individual in a daily log to measure their health at the start and end of each day. There is little research addressing *Pycnopodia's* behavior but through these case studies and continued welfare tracking we can further investigate the potential causes of these symptoms and potential treatments. Understanding this can help support the conservation of the sunflower sea star which will help restore coastal kelp forest ecosystems.

Gladys Cabrera Luis

Major: Biology



Composite Manufacturing Engineering Intern

Intern: Tomas Calusdian

Mentors: Zenith Star and David Herrera

Opportunity: Joby Aviation

As a Composite Manufacturing Intern at Joby Aviation, a leader in all-electric vertical-takeoff-and-landing (eVTOL) aircraft, I gained practical experience in the precision manufacturing of composite components. Working alongside CNC (Computer Numerical Control) engineers, I observed how advanced materials are transformed into lightweight, high-strength parts through careful fabrication, trimming, and machining.

My responsibilities included shadowing CNC operations, assisting with composite part preparation and handling, and learning various trimming techniques. I also became familiar with production workflows. Beyond the technical work, I collaborated with engineers and technicians, which helped me appreciate how effective communication and teamwork are essential to meeting strict engineering standards.

Through this experience, I learned that producing high-quality composite parts requires meticulous planning, accurate machining, and rigorous adherence to specifications. I also saw how even minor errors can affect the performance and safety of flight-critical components. This internship reinforced my understanding that precision manufacturing is not just about meeting tolerances. It's about ensuring the reliability of next-generation aircraft.

Tomas Calusdian

Major: Engineering



Optimizing Facility Maintenance Through Preventive Maintenance and 5S

Intern: Fernando Chavez

Mentor: Jeff Richards, Facilities Technician V

Opportunity: Joby Aviation | Facilities Operations

Facility maintenance is critical to keeping manufacturing operations safe, reliable, and efficient. The purpose of this internship was to gain hands on experience in facility operations while learning how preventive maintenance, workplace organization, and safety support day to day manufacturing.

During my internship with Joby Aviation, I completed preventive and corrective maintenance work orders involving electrical, plumbing, HVAC, carpentry, equipment installation, and general building maintenance. Work orders were managed through the Work Apps maintenance management system, and each project was completed by following company safety procedures and applying 5S workplace organization principles.

Working alongside experienced facilities professionals taught me how planning, communication, and teamwork are essential to successfully completing maintenance projects. My mentor, Jeff Richards, taught me how facilities teams communicate with engineers, production teams, and contractors to plan projects, solve problems, and keep facility operations running smoothly. I also gained experience learning how custom parts are machined to support facility equipment when standard solutions are not available.

5S (Sort, Set in Order, Shine, Standardize, and Sustain) is a workplace organization method used to improve safety, efficiency, and organization. I applied 5S by organizing tools and materials, cleaning work areas, and returning equipment after each job.

Safety was a major part of every project. Before starting any task, I learned to inspect the work area, identify potential hazards, and make sure the proper safety procedures were followed. I gained experience with Lockout/Tagout procedures and learned how isolating equipment before maintenance helps prevent injuries caused by unexpected startup or stored energy. Applying 5S principles became part of my daily routine by keeping tools and materials organized, cleaning work areas, and returning equipment after each job.

These experiences showed me that successful facility maintenance is not just about repairing equipment. It requires strong communication, attention to safety, workplace organization, and the ability to work with others to complete projects safely and efficiently. I strengthened my technical, communication, and problem-solving skills while giving me a greater appreciation for the role facility maintenance plays in supporting manufacturing operations and reinforcing my goal of pursuing a career in engineering.

Fernando Chavez

Major: Engineering



Capital Improvements Projects Division for the City of Salinas

Intern: Saul Contreras

Mentors: Victoria Gutierrez, Phavana Aramkul, Victor Sanchez

Opportunity: City of Salinas

I had the opportunity to intern for the City of Salinas in the Capital Improvement Projects Division. I enhanced my skills in project development through getting hands-on experience. I directly assisted the Capital Improvement Projects team with ongoing and future projects that aim to improve the daily lives of the people in the City of Salinas. Projects like the 2026 Sidewalk project which covers the complete repair of a variety of sidewalks and ADA ramps throughout the city. I assisted by inspecting and making sure, the sidewalk and ADA ramps pass standard compliance. A future project that I assisted in is the San Juan Grade Road project which is going to add sidewalks and lights as well as an improvement to the actual road. I also assisted by gathering information about the utilities around the area such as electricity, fiber optic, gas, and water lines and then implementing them into the plans. I used my skills in AutoCAD and Excel to draft plans and calculate the estimated price of projects before having them be sent out to bid. During this experience I learned about the importance of, teamwork, coordination and patience to ensure that projects are completed properly, efficiently, and on time. Through this experience I gained a lot of knowledge on how city infrastructure projects are chosen, developed, and executed.

Saul Contreras

Major: Civil Engineering



Data Collection Technician at Agrobotics

Intern: Daniel Cruz

Mentors: Micheal Coetzee, Shiraj Mishra, Cody Falconer

Opportunity: California Space Grant Consortium

As agricultural labor shortages continue to grow, advancing automation is crucial to bridging the gap in harvest operations. Machine learning models require a mass volume of diverse field data to train robust machines to automate manual labor. This project focuses on supporting the deployment of a complete autonomous rover that locates, harvests, and collects strawberries in field environments. Working as a Data Collection Technician with Agrobotics, teleoperation protocols and field troubleshooting procedures were taken to collect precise spatial, kinematic, and visual data. Each logged interaction, called an episode, directly trains the rover's computer vision and manipulator algorithms, optimizing its speed and efficiency toward full operational autonomy. Tasks involved operating a teleoperation setup to execute harvest cycles across varying lighting, crop density, and field conditions. Each teleoperated pick generated spatial mapping and sensory logs used directly to train machine learning vision models and refine path-planning algorithms. Additionally, hardware diagnostics and field troubleshooting procedures were performed to keep the systems running smoothly during multi-hour deployment shifts. The resulting datasets directly contribute to improving the speed, success rate, and reliability of autonomous strawberry harvesting. By capturing these diverse scenarios in live fields, this work bridges the gap between lab-tested robotics and fully reliable, commercial-grade field automation.

Daniel Cruz

Major: Electrical Engineering



TerraDAK

Intern: Daniel Cruz

Team Members: Aaron James Lomboy, Hezekiah Gonzalez

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

With the exponential growth of technology, we have seen the potential to explore other planets and establish a sustained human presence beyond Earth. It becomes critical that crew members verify that the surrounding terrain and atmospheric conditions are safe before exiting the habitat for extravehicular activity. Our custom-built project, the TerraDAK, is a remote-controlled reconnaissance rover that collects environmental data across a diverse set of surface conditions and monitors whether the surrounding terrain is safe for crew deployment. All collected data is transmitted wirelessly and presented through a user-created web application for real-time analysis using safety thresholds derived directly from the NASA Spaceflight Human-System Standard, NASA-STD-3001, governing crew health and performance standards for spaceflight systems. The rover is built using an Arduino Mega 2560, which houses every sensor and motor driver onboard, and a Raspberry Pi 4, which serves as a server which hosts a user-generated web dashboard. The sensors measure parameters including carbon dioxide concentration, humidity, temperature, carbon monoxide, flammable gas presence, and dust particulates. A NEO-6M GPS module provides UTC timestamping for every data point collected. Controlling the rover is an Arduino Uno paired with a joystick shield, communicating wirelessly via NRF24L01+ radio modules. The controller cycles between all-wheel, front-wheel, and rear-wheel drive modes with an active emergency brake. All parameters are continuously evaluated against NASA thresholds.

Daniel Cruz

Major: Electrical Engineering



CAMRE: RIMPAC 2026 – Rapid Part Development and Distributed Manufacturing

Intern: Israel Crystalinas

Mentor: Christopher Curran

Opportunity: Naval Postgraduate School

During my internship at the Naval Postgraduate School, our team supported real manufacturing requests for the U.S. Navy. In addition to helping organize the workflow and assign project tasks, I reviewed engineering drawings, created and modified CAD models, prepared parts for 3D printing and CNC machining, developed Mastercam toolpaths, and performed simulations using ANSYS. We also supported RIMPAC-related projects by manufacturing replacement parts and preparing digital files for production in the field. These files were sent to vessels including the USS Theodore Roosevelt, USS Essex, and the Canadian support vessel MV Asterix. Through this work, our team gained experience with advanced manufacturing while demonstrating how digital design and manufacturing can help deliver replacement parts more quickly.

Israel Crystalinas

Major: Mechanical Engineering



The Impacts of Chronic Exercise on Gene Expression and Mitochondrial Function of Mouse Skeletal Muscle

Intern: Paloma Linda Degrandis-Figueroa

Mentor: Dr. Matthew Romero

Opportunity: University of California, Santa Cruz Genomics Pathway

Adaptation to exercise is multifactorial, with many correlated metabolic and endocrine signals. While whole-body exercise remains the gold-standard model, isolating variables in muscle contraction and subsequent investigative practices present several methodological limitations. Our study aims to design and validate an in vitro exercise protocol to model physiological responses and investigate the effects of exercise at a cellular level. RNA sequencing (RNA-seq) and an Electrical Pulse Stimulation (EPS) in vitro model were used to explore the molecular mechanisms promoting exercise-induced adaptation of skeletal muscle. Using a DESeq2 differential expression pipeline, young, endurance-trained mouse skeletal muscle was analyzed through principal component analysis (PCA), heatmaps, Gene Ontology (GO) enrichment, and Fast Gene Set Enrichment Analysis (FGSEA). The data describe widespread transcriptional changes in response to mechanical stress. FGSEA indicates coordinated enrichment of oxidative phosphorylation and mitochondrial metabolism in exercised muscle. To substantiate these findings, differentiated C2C12 myotubes were exposed to Electrical Pulse Stimulation to initiate contraction-induced signaling. Quantitative RT-PCR measured mitochondrial regulation in the expression of candidate genes UCP3, PDK4, PGC1-α, and KLF4. RNA expression of both PGC1-α and PDK4 showcased statistically signifi cant increases, while changes in UCP3 and KLF4 remained insignifi cant. Repeated testing may determine whether these results are consistent, with the prospect of adding more genes to experimental parameters in future trials. RNA-seq data show broad transcriptional remodeling in mitochondrial energy metabolism pathways of skeletal muscle after chronic exercise, and EPS data suggest isolated muscle contraction reproduces expression changes. The results establish a comparison benchmark for future studies investigating metabolic disease, muscular regeneration, and overall health.

Paloma Linda Degrandis-Figueroa

Major: Biology



Assessment and Management of Thrombotic Microangiopathy following AAV gene therapy for pediatric CNS diseases

Intern: Melissa Distancia

Mentors: Alexander Fay, MD, PhD; Marissa Evans

Opportunity: UCSF SSRP

Thrombotic Microangiopathy (TMA) is a life-threatening disorder that can develop as a complication of adeno-associated virus (AAV) gene therapy. This is a result of the inappropriate activation of the complement system, a component of the innate immune system. In this context, a high viral vector load triggers an overactivation of this innate immune defense, causing it to mistakenly target and lyse host cells. AAV-induced TMA is characterized by microangiopathic hemolytic anemia, thrombocytopenia and ischemic end-organ injury, particularly in the kidney. While the science behind this phenomenon is known, one critical question remains unaddressed. How can physicians effectively manage and monitor the treatment course of patients with TMA? To resolve the knowledge gap, this study aims to describe the laboratory abnormalities most predictive of TMA onset and severity, the management of TMA, and the key laboratory improvements that signal recovery. We hypothesize that we will be able to define a time course of lab changes and the response to treatment in a cohort of four pediatric patients with TMA following CNS-directed AAV gene therapy.

This retrospective project analyzes the electronic health records (EHR) of four pediatric patients with TMA, utilizing the APeX interface. By structuring longitudinal clinical test and intervention data in Google Sheets, the study uses R to run trajectory analysis of hematologic and immunologic markers. The study tracks biomarker changes over time to describe TMA onset, progression, treatment response, and recovery. We will be able to characterize the laboratory features and treatment responses of gene therapy-associated TMA. Using these findings, we will propose a treatment and monitoring algorithm to guide physicians managing this condition.

Although TMA is a well understood disorder, the lack of laboratory parameters leaves physicians without definite treatment guidance. We intend to identify these critical diagnostic predictors that will provide physicians with a clear framework for treating TMA.

Melissa Distancia

Major: Biology



Impact of the Avocado Lace Bug on the Avocado Bacterial and Fungal Microbiome

Intern: Claudia Dominguez-Trejo

Mentor: Dr. Charles Mason

Opportunity: USDA ARS - Hawaii

The avocado (*Persea americana* cv. Sharwil) phyllosphere is a living community for different types of bacteria and fungi that is constantly changing. When avocado lace bugs (*Pseudacysta perseae*) attack the avocado leaves, they cause substantial cellular damage to the leaf surface. We hypothesized that the changes to the plant foliar surface would also impact the bacteria and fungi which colonize the avocado leaf surface. We performed surveys to investigate the microbiome of an apparently healthy avocado leaf and how it differs from those which are damaged in response to ongoing and previous infestations by the avocado lace bug (ALB). We implemented two approaches. The first was a culture dependent approach where we cultured bacteria and fungi from the leaf surfaces. For the culture dependent investigations, we looked at a small sample size of infested and uninfested older leaves from the avocado tree at Pacific Basin Agricultural Research Center (PBARC) at Hilo, HI. We swabbed and sonicated leaves to be able to culture bacteria and fungi (bacteria: Pseudomonas Agar and CHROMagar Orientation; fungi: Potato Dextrose Agar (PDA) + chloramphenicol and Sabouraud Dextrose Agar (SDA) + chloramphenicol). Additionally, we performed culture independent examinations of the avocado phyllosphere. We collected 100 avocado leaves from a single avocado tree at a commercial farm in Kona, HI. This included swabbing and imaging a pool sample of both older and younger leaves. DNA was extracted from swabs using magnetic bead-based laboratory protocols. We performed barcoded PCRs for bacteria and fungi using primers targeting the full-length 16S-rRNA and ITS, respectively. Our sequencing data indicate that there was a change in the leaf phyllosphere in the leaves damaged by avocado lace bug. Specifically, we observed greater fungal biodiversity for damaged leaves. Our results provide new insights into the avocado leaf phyllosphere and indicate that insects play important roles in mediating host-microbiome interactions.

Claudia Dominguez - Trejo

Major: Biology



Traffic Engineering Intern With the City of Salinas

Intern: Allen Escolta

Mentor: Cristobal Banuelos

Opportunity: City of Salinas

I have been working as an intern with the City of Salinas in the Traffic Department and Public Works as a traffic engineer since September 2025. During this internship, I was tasked with many different types of studies and projects to help my community and gain amazing experience during this time. For this summer specifically, we have been tasked with gathering intel and data about traffic in certain streets and areas in Salinas. During this study, we use traffic-specified equipment that includes black lines nailed into the street to measure the speed and volume of cars, cameras called Miovision that capture cars and pedestrians, and new black boxes called Jamal Black Cat Radars that also measure the speed and volume of cars. With all this equipment being used, we also studied how to use Excel, CAD, and other specified traffic tools to send this data to the engineers in our department. In conclusion, this internship has given me lots of knowledge about my career and has been an amazing experience as well in the office area, where I have learned office etiquette as well. Another important thing this internship has given me is the ability to help my community more directly.

Allen Escolta

Major: Mechanical Engineering



Interdisciplinary Polar Science Resource Kit for K-12 Educators and Their Communities

Intern: Abigail Ferrales

Mentors: Keely Corder and Melinda N. Nicewonger

Opportunity: Coldex Oregon State University

Despite strong economic demand for geoscientists, fewer students are choosing to pursue the field. One of the biggest drivers of this trend is that most students never encounter geosciences (including polar science) in K-12 classrooms (Moss et al, 2025). The National Science Foundation Center for Oldest Ice Exploration (COLDEX) is a Science and Technology center with the goals of recovering some of Earth's oldest ice to study past climate and extending polar science to K-12 educators. Project Ice, developed in partnership with the American Meteorological Society (AMS), lets educators see polar research happen firsthand and bring that experience back into their classrooms. However, third-party evaluation interviews with past Project Ice participants revealed a need for greater interdisciplinary integration and a single place to access current research (Ettenauer, 2024). There are also barriers to bringing new research into the classroom that teachers face such as limited time to plan, low awareness of new findings, and research scattered across sources. The result is a persistent gap between what scientists discover and what reaches students. To address this gap, we developed a website that hosts an interdisciplinary resource kit about polar science. By translating current COLDEX research into ready-to-use, classroom friendly materials, it removes the barriers of time, awareness, and access that keeps the new science out of classrooms. The kit includes five components: a Polar Science Crash Course, Hot Off the Ice research updates, an interdisciplinary infographic with linked resources, "A Day in the Field", featuring social media posts from polar scientists in the field, and an Ultimate Resource Guide. By equipping teachers with accessible, research-backed materials, this kit works to improve K-12 access to current polar science. Increasing students' hands-on exposure to real-time scientific research may spark curiosity, engagement, and representation in polar sciences and other geosciences. The more students see science, the more they see themselves in it, as the next generation of scientists.

Abigail Ferrales

Major: Environmental Science



Link Seeker: Low-Cost Aerial Plant Scout (LCAPS)

Intern: Socrates Figueroa

Team Members: Joshua Torres Cerpas and Daniel Gonzalez Cuevas

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Link Seeker LCAPS (Low-Cost Aerial Plant Scout) is a precision agriculture project that combines aerial imaging, artificial intelligence, and autonomous robotics to provide an affordable solution for crop health monitoring. The system is designed to detect plant stress early, enabling growers to identify problem areas before they become widespread.

The project utilizes a DJI drone to capture high-resolution aerial images of agricultural fields. These images are uploaded to a custom Python-based web application, where they are analyzed using computer vision and image segmentation techniques to classify crops into three health categories: Healthy, Stressed, or Dead. In addition to crop classification, the application generates an annotated image overlay, segmentation masks, and health statistics that summarize the condition of the surveyed field. The platform also produces map-based visualizations that identify the locations of unhealthy crops, allowing users to quickly locate areas requiring further inspection.

To validate the aerial analysis, the coordinates of areas identified as unhealthy are transmitted to a remotely operated ground rover. An operator then uses these coordinates to manually drive the rover to the affected location, where it collects additional sensor and soil data to verify the drone's findings. By combining aerial scouting with targeted ground-based inspection, the system provides a more complete assessment of crop health while reducing the time and effort required to identify and investigate problem areas.

Link Seeker LCAPS demonstrates how low-cost commercial drone technology, autonomous robotics, and AI-powered image analysis can be integrated into a scalable precision agriculture platform. The project aims to provide farmers and researchers with actionable crop health information, improve resource management, and support more efficient and data-driven agricultural decision-making.

Socrates Figueroa

Major: Engineering



Industrial Hygiene at an eVTOL Aircraft Manufacturer

Intern: Amner Joel Flores

Mentor: Eric Lehnertz, Staff EHS Manager

Opportunity: Joby Aviation

The practice of Industrial Hygiene (IH) protects worker health through the anticipation, recognition, evaluation, and control of workplace hazards. As an IH intern in the Environmental, Health & Safety (EHS) group at Joby Aviation, a manufacturer of all-electric vertical-takeoff-and-landing (eVTOL) aircraft, I supported occupational exposure monitoring and compliance work in a developing manufacturing environment. My work included personal noise dosimetry and airborne contaminant sampling, instrument calibration, conducting hands-on surveys and assisting EHS professionals in completing compliance audits against various OSHA, ACGIH, and NIOSH standards and guidelines. Alongside the fieldwork, I built digital tools for the team: two interactive study consoles for instrumentation evaluations and an equipment-inventory web application with QR "scan and go" tracking of instruments and calibration dates. Through this experience I learned that accurate exposure assessment depends as much on disciplined procedure (calibration, breathing-zone placement, and documentation) as on the instruments themselves, and that effective safety work is relational: earning workers' trust is what surfaces real problems. This internship showed me why safety belongs at the start of the engineering process, especially for technology as new as eVTOL flight.

Amner Joel Flores

Major: Mechanical Engineering



Improving Manufacturing Workflow Visibility Through Human-Centered Interface Design

Intern: Marissa Flournoy

Mentor: Chris Curran

Opportunity: Naval Postgraduate School

During my internship at the Naval Postgraduate School's Consortium for Advanced Manufacturing Research and Education (CAMRE), I worked to improve how interns, engineers, and machine operators access and communicate manufacturing information. The existing Job and Manufacturing System (JAMS) contains extensive production data, but its complexity can make it difficult for users to quickly determine machine availability, current jobs, maintenance conditions, and upcoming work. The purpose of my project was to explore how a more approachable, user-centered interface could extend JAMS's capabilities without replacing the existing system.

I designed and developed a React-based machine-tracking prototype that presents machine status, location, current job information, estimated availability, queue details, specifications, and recent activity in a clearer format. My process included gathering feedback from software engineers, mechanical engineers, machinists, mentors, and fellow interns; studying the existing JAMS interface and Python/Django codebase; translating stakeholder needs into interface requirements; and iteratively improving the prototype based on user feedback. I also coordinated intern projects and helped less-experienced team members research technical concepts, communicate findings, and begin developing their own solutions.

Preliminary feedback indicated that the prototype could make important manufacturing information easier to locate and understand while supporting faster communication between users. This experience demonstrated that successful engineering requires more than writing code. It also requires listening to users, translating between technical and nontechnical perspectives, organizing collaborative work, and designing technology around the people expected to use it.

Marissa Flournoy
Major: Engineering



Internship:
Don Chapin Company Incorporated (DCCI)

Intern: Alondra Garcia Bejarano

Mentors: Ricardo Cortez and Jose Arreola

Opportunity: Don Chapin Company, Inc

The Don Chapin Company, Inc. is a full-service general engineering construction firm serving the Tri-County area from its headquarters in Salinas, CA. During the summer of 2026, I interned for the field operations team at The Don Chapin. Company, Inc. As a mechanical engineering major, this opportunity allowed me to significantly broaden my technical knowledge within the civil engineering discipline while collaborating closely with project engineers, directors, dispatchers, and superintendents. Throughout the internship, I gained a comprehensive understanding of industry terminology and civil engineering practices, including over-excavation, subgrade preparation, and the analysis of geotechnical reports. Under the mentorship of Ricardo Cortez, I learned essential project initiation and management procedures, focusing on work orders, purchase orders, requests for information (RFIs), change orders, document organization, tags, transmittals, and submittals. Additionally, I developed skills in interpreting plan layouts, utilizing scaled architectural and engineering rulers, and understanding plan keywords. My responsibilities also included daily site visits to monitor operations and study field safety procedures, including safety signage and road terminology. Guided by Jose Arreola, I gained practical knowledge in identifying storm drains, reading survey stakes, and ensuring compliance with 811 excavation tickets. Furthermore, I gained experience utilizing Procore to review project documents and manage upcoming permits and municipal requirements, which included drafting resident notifications and letters of responsibility. I also learned to use Bluebeam software for document preparation and successfully earned my Bluebeam certification. A significant highlight of the internship was observing the live repair of a road sinkhole at UC Santa Cruz after reviewing its specific work order. Beyond this, I developed a technical understanding of hot and cold asphalt mixes, emulsion, heavy machinery categorization, soil characteristics, and traffic control protocols. This experience provided invaluable insight into horizontal construction and the core aspects of construction engineering.

Alondra Garcia Bejarano

Major: Mechanical Engineering



Spacecraft Lab Robotics Lab/Design

Intern: Alondra Garcia Bejarano

Mentor: Jessica Herman & Joshua Mayberry

Opportunity: Naval Postgraduate School

During this internship in the Spacecraft Robotics Lab, I developed hands-on experience in robotics, embedded systems, and software integration under the guidance of Jessica Herman and Joshua Mayberry. I performed reverse engineering on a circuit system incorporating a Raspberry Pi and multiple sensors, producing detailed documentation including system diagrams and component descriptions to define its functionality. I gained experience with learning about building containers with Docker environments on Ubuntu and deploying containers directly on a Raspberry Pi. Which allowed me to get much more exposure with Linux commands, and file managers. Through Joshua Mayberry mentorship, I developed foundational knowledge of the Robot Operating System (ROS2), including nodes, publishers, subscribers, and topics, and applied these concepts to test a Raspberry Pi 4B integrated with an 8-channel relay module. I contributed to research about air bearing systems, analyzing airflow design principles that allow near-frictionless motion. I also learned about pneumatic systems to troubleshoot issues related to pressure gauges and air leakage. I explored CubeSat systems and what Simulink is used for by reviewing prior research and creating innovative ideas to improve the system in the future.

Alondra Garcia Bejarano

Major: Mechanical Engineering



Laboratory Inoculation of Coffee Leaves with Hemileia vastatrix

Intern: Julian Garcia-Montejano

Mentor: Luz M. Serrato Diaz

Opportunity: USDA ARS, Puerto Rico

Hemileia vastatrix Berk. & Broome, the causal agent of coffee leaf rust (CLR), is one of the most detrimental fungal diseases affecting coffee production worldwide. The disease is a major concern in coffee-growing regions across Puerto Rico and Southern America. Infection can reduce photosynthetic activity, weaken coffee plants, reduce yield and bean quality, and ultimately, cause significant economic losses for coffee producers. The objective for this research was to better understand CLR through pathogen identification, laboratory evaluation, and inoculation of healthy coffee leaves. Coffee leaves showing symptoms of CLR were carefully collected from experimental plots. Leaves showing signs of *Lecanicillium* spp., a fungus known to parasitize *H. vastatrix*, were excluded from sampling. In the laboratory, rust spores were collected from infested leaves using an angled straw under a stereomicroscope. Eight healthy, asymptomatic leaves were collected from fifteen coffee plants and arranged in sterilized trays inside a laminar flow hood. The collected *H. vastatrix* spores were suspended in water and the resulting suspension was applied to healthy leaves using a micropipette. Inoculated leaves were then maintained under controlled lighting and monitored for one month to evaluate disease development. The inoculation trial did not produce successful CLR infection. Some of the inoculated leaves died while others gradually deteriorated during the observation period. These results suggest that additional factors, such as inoculum viability, environmental conditions, or inoculation protocols may have affected the establishment of *H. vastatrix*. Additional trials and refinement of the protocol are needed to identify the conditions necessary for successful infection. This work provides valuable experience in identification, collection, and inoculation of *H. vastatrix* and contributes to a better understanding of some of the challenges associated with studying CLR under controlled settings.

Julian Garcia-Montejano

Major: Plant Science



TerraDAK

Intern: Hezekiah Gonzalez

Team Members: Daniel Cruz, Aaron James Lomboy

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

With the exponential growth of technology, we have seen the potential to explore other planets and establish a sustained human presence beyond Earth. It becomes critical that crew members verify that the surrounding terrain and atmospheric conditions are safe before exiting the habitat for extravehicular activity. Our custom-built project, the TerraDAK, is a remote-controlled reconnaissance rover that collects environmental data across a diverse set of surface conditions and monitors whether the surrounding terrain is safe for crew deployment. All collected data is transmitted wirelessly and presented through a user-created web application for real-time analysis using safety thresholds derived directly from the NASA Spaceflight Human-System Standard, NASA-STD-3001, governing crew health and performance standards for spaceflight systems. The rover is built using an Arduino Mega 2560, which houses every sensor and motor driver onboard, and a Raspberry Pi 4, which serves as a server which hosts a user-generated web dashboard. The sensors measure parameters including carbon dioxide concentration, humidity, temperature, carbon monoxide, flammable gas presence, and dust particulates. A NEO-6M GPS module provides UTC timestamping for every data point collected. Controlling the rover is an Arduino Uno paired with a joystick shield, communicating wirelessly via NRF24L01+ radio modules. The controller cycles between all-wheel, front-wheel, and rear-wheel drive modes with an active emergency brake. All parameters are continuously evaluated against NASA thresholds.

Hezekiah Gonzalez

Major: Engineering



Engineering and Survey Intern - Monterey County Public Works, Facilities and Parks Department

Intern: Daniel Gonzalez Cuevas

Mentor: Jackie Estrada, GIS Analyst II

Opportunity: Monterey County Public Works, Facilities and Park Department

Modern infrastructure management depends on accurate geospatial data to support informed planning, maintenance, and public safety. As an Engineering and GIS Intern with the Monterey County Public Works, Facilities, and Parks Department (PWFP), I contribute to the County's ongoing implementation of a Computerized Maintenance Management System (CMMS). This is a centralized platform designed to improve the management and maintenance of public infrastructure assets. Under the mentorship of GIS Analyst II Jackie Estrada, I worked alongside the County's GIS team to support the development of a reliable geospatial database that will serve both engineering staff and maintenance personnel. My work focuses on developing and maintaining GIS data for County-owned infrastructure by collecting and updating spatial attribute information through both office analysis and field investigations.
I perform asset management for storm drainage systems, culverts, roadside ditches, gutters, and other water resource infrastructure. Additionally, ongoing review of engineering plans and historical as-built drawings help improve the accuracy of the County's geospatial database. During fieldwork, I collaborate with the County's District 1 and District 2 maintenance crews, whose extensive knowledge of the infrastructure and day-to-day maintenance operations helps verify asset locations, conditions, and maintenance records. This collaboration ensures that the data entered the CMMS accurately; reflecting field conditions and supports the County's efforts of asset inventory. The goal is to have a more collaborative structure by ensuring our on-field crew has the proper tools to aid our community.
Through the integration of Geographic Information Systems (GIS), engineering records, and field data collection, this internship has provided hands-on experience in applying geospatial technology to real-world civil engineering challenges. The implementation of the CMMS will provide maintenance personnel with accurate, up-to-date asset information and interactive GIS maps that precisely identify the locations of County infrastructure. By improving the accessibility and reliability of asset data, the system will streamline maintenance operations and support more informed decision-making. The system will enhance the County's ability to efficiently manage and maintain critical public infrastructure for the communities it serves.

Daniel Gonzalez Cuevas

Major: Civil Engineering



Link Seeker: Low-Cost Aerial Plant Scout (LCAPS)

Intern: Daniel Gonzalez Cuevas

Team Members: Joshua Torres, Socrates Figueroa

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Link Seeker LCAPS (Low-Cost Aerial Plant Scout) is a precision agriculture project that combines aerial imaging, artificial intelligence, and autonomous robotics to provide an affordable solution for crop health monitoring. The system is designed to detect plant stress early, enabling growers to identify problem areas before they become widespread.

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To validate the aerial analysis, the coordinates of areas identified as unhealthy are transmitted to a remotely operated ground rover. An operator then uses these coordinates to manually drive the rover to the affected location, where it collects additional sensor and soil data to verify the drone's findings. By combining aerial scouting with targeted ground-based inspection, the system provides a more complete assessment of crop health while reducing the time and effort required to identify and investigate problem areas.

Link Seeker LCAPS demonstrates how low-cost commercial drone technology, autonomous robotics, and AI-powered image analysis can be integrated into a scalable precision agriculture platform. The project aims to provide farmers and researchers with actionable crop health information, improve resource management, and support more efficient and data-driven agricultural decision-making.

Daniel Gonzalez Cuevas

Major: Civil Engineering



Organization of Water Molecules in Microsolvated Ion Pairs of Ammonium Salts

Intern: Virgilio Hernandez Cruz

Dr. Arun K. Sharma and aerie Michaella Ibanos

Opportunity: CSUMB UROC iCARE

When looking at a salt like ammonium chloride, water molecules tend to arrange themselves into specific patterns connected by weak attractions called hydrogen bonds. It can help us understand how these ions play a role in cloud formation and in how nerve cells send signals in our bodies. Quantum chemical simulations were used to build hydrated ammonium chloride ion-pair clusters. Hydrogen bond connectivity was mapped as a network. Network analysis was used to study the structural organization and stability. This approach can be applied to salts found in nature and biological systems.Gaussian 16 and GaussView 6 were used to model contact pairs and water-bridge structures. The simulations were run using Density Functional Theory with the wb97xd functional and 6-311+g(d,p) basis sets and implicit solvation. Multiple contact pairs and water bridge structures were analyzed.NH4+ was paired with Cl-, NO3-, HSO4-, and SO42- to evaluate anion-dependent effects. Only fully converged structures without imaginary frequencies were analyzed. Water molecules were added sequentially. Preliminary results indicate that hydrogen bonding increases with water content for all anions. NH4+ and HSO4- distances increased with more water, while other anions changed less.NH_4 bending tends to occur upon the addition of water molecules, with Cl as the anion. Based on the preliminary results, it shows that with an increase in water, there does seem to be a change in their frequency and the distance based on the anion that is present. These results provide an insight into ion-pair behavior under microsolvation conditions.

Virgilio Hernandez Cruz

Major: Biology



Field Surveys, Inventory, and DNA Barcoding of Natural Enemies Associated with Key Alfalfa Pests in Southern Europe

Intern: Jimena Hernandez-Tejeda

Mentor: Dr. Marie Bon-Claude, Javid Kashefi

Opportunity: USDA-EBCL, France

Alfalfa (*Medicago sativa* L.) is a crucial crop in the United States due to its economic, agricultural, and environmental impact. Alfalfa provides a habitat for many beneficial insects and pollinators, reduces erosion, and is drought-resistant due to its long root system. Alfalfa is a top feed crop for dairy industries worldwide, with exports from the United States valued at $1.2 billion yearly (Putnam, 2019). However, production and its economic return are threatened by several invasive aphid pests: pea aphid (*Acyrthosiphon pisum*), spotted alfalfa aphid (*Therioaphis maculata*), and cowpea aphid (*Aphis craccivora*). These pests are actively affecting crop yield and quality in two major alfalfa-producing states (California and Arizona). Aphids attack alfalfa plants by extracting plant sap and simultaneously injecting toxins to weaken the plant. In addition, they secrete honeydew sap to promote sooty mold growth that weakens the alfalfa.

Currently, scientists are investigating natural enemies, parasitoid wasps, for the potential use in classical biological control due to their host-specific association with aphid species. This internship focused on alfalfa field surveys across southern Europe to collect aphids and determine if they were parasitized by rearing the specimens. We then performed DNA barcoding to confirm species identities and determine possible cryptic species. Parasitoids were analyzed using a non-destructive DNA extraction protocol for future taxonomic reference, while aphid mummies were processed using destructive DNA extraction. DNA was amplified using polymerase chain reaction (PCR), visualized by gel electrophoresis, and sufficient PCR products were sent to the lab for DNA sequencing. The resulting sequences were checked and then compared with the NCBI GenBank and BOLD databases to support species identification. A total of five parasitoid species were identified from aphid collections: *Aphidius ervi, Aphidius eadyi, Lysiphlebus aff. fabarum, Aphelinus varipes, and Praon exsoletum*. Two parasitoid species associated with the aphids were classified as biological control agents: *Aphidius ervi, Aphidius eadyi*. Several parasitoid species were associated with multiple aphid hosts; however, others had more restricted host associations, providing an initial record of parasitoid diversity in southern European alfalfa fields. A handful of aphid mummy samples could not be identified because of insufficient PCR amplification or contamination by associated parasitoid DNA. The research provides initial data to support future projects evaluating parasitoids as biological control agents against invasive aphid pests in the United States.

Jimena Hernandez-Tejeda

Major: Biology



Safety Internship at Joby Aviation

Intern: Emma Herrera

Mentors: Brittany Blessie & Abby Lacheur

Opportunity: Joby Aviation

The importance of safety can never be overstated. Jagged concrete, a loose extension cord, and even lifting a box the wrong way can have a serious impact on someone's health. Having a way to report incidents and potential hazards accurately is essential to maintaining a safe workplace. At Joby Aviation, I've been tasked to work on the Joby Safety Reporting System, or JSRS. On the back of each employee's badge is a QR code that takes them to JSRS to file a report if anything safety related happens - from cuts, nicks, slips, and falls, to tripping hazards, improperly labeled hazardous material, and bird strikes on training aircraft. It's important to ensure that the system is effectively laid out so that reporters can properly document what occurred. Reporters need to select which location the incident happened at, which building, which area of that building, and as accurate a description of the incident itself as possible. For the past two months, I have been working on revamping the taxonomy of JSRS. I've helped update the locations so that it can be as specific as possible, as well as added various codes so that reporters can navigate the system and select the event that is most applicable to their circumstances. I've also assisted in mapping previous incidents by assigning them the new codes that have been introduced to JSRS. Doing such has tested my typing skills, time management capabilities, and organization tactics. I have had to analyze previous reports and decide which code is best fitting based on available information. The system needs to be arranged in such a way so that preventative measures can be taken. A Safety Management System consists of four main components: Safety Policy, Safety Risk Management, Safety Assurance, and Safety Promotion. Having Joby's Safety Reporting System be well mapped out and easy to work with helps with safety promotion. JSRS allows the Safety Team to ensure that safety reports are handled in strict confidentiality. It also allows reporters the option to report anonymously. Having these assurances helps promote reporting and fosters a good safety culture. Ensuring that the safety reporting system is well organized and easy to navigate promotes the safety culture within Joby, as well as furthers ways to keep improving safety conditions in the workplace.

Emma Herrera

Major: Engineering



Addictive social media use partially mediates the prospective association between social media time and eating disorder symptoms in early adolescents

Intern: Henry Huynh

Mentor: Jason Nagata

Opportunity: UCSF SSRP

Eating disorders (EDs) are a major public health concern, especially during adolescence, a developmental period characterized by heightened body image concerns and disordered eating. As social media becomes increasingly embedded in adolescents' daily lives, concerns have emerged regarding its potential influence on ED risk. Prior research has linked greater social media use and problematic screen use with subsequent ED symptoms, yet few studies have examined the mechanism underlying the relationship. Addictive social media use is characterized by compulsive engagement, emotional dependence, and difficulty disengaging that may serve as a key mediator linking social media to ED symptoms.

The objective was to examine the prospective association between time spent on social media and eating disorder symptoms in early adolescents, and the extent to which addictive social media use mediates the association. We hypothesized that addictive social media use would partially mediate the prospective association between time spent on social media and ED symptoms in early adolescents.

We analyzed prospective data from the Adolescent Brain Cognitive Development (ABCD) Study. Generalized structural equation modeling was used to assess the mediating role of addictive social media use (Year 3) in the association between social media time (Year 2) and ED symptoms (Year 4), adjusting for potential covariates. ED symptoms included: binge eating symptoms, distress about binge eating, worry about weight gain, self-worth tied to weight, and inappropriate compensatory behaviors to prevent weight gain. We expect that greater social media time will be associated with higher levels of addictive social media use, which in turn will predict greater odds of ED symptoms. We further anticipate that addictive social media use will mediate approximately 50% of the association between social media time and ED symptoms. Understanding the mechanisms linking addictive social media use to ED symptoms is essential for informing prevention strategies. Identifying addictive social media use as a mediating factor highlights the need for interventions that promote healthier digital engagement, parental monitoring, and family media plans. These findings may guide public health efforts aimed at reducing ED risk among adolescents.

Henry Huynh

Major: Biology



Learning Through Clinical Shadowing: An Orthodontic Internship

Intern: Kayla Kennamore

Mentor: Dr. Ronconi

Opportunity: Matthew Ronconi Orthodontics

MATTHEW RONCONI orthodontics

During my internship at Matthew Ronconi Orthodontics, I had the opportunity to shadow Dr. Ronconi while working alongside his orthodontic assistants. As I became more familiar with the office and its daily workflow, I was trusted with more responsibilities and was able to assist with patient care under supervision. Some of the procedures I performed included placing separators (spacers) to create room between teeth before orthodontic bands were placed. I also helped replace archwires during adjustment appointments and completed re-ties using both individual ties and power chains. These experiences gave me a better understanding of how orthodontic treatment progresses and the purpose of different appliances used throughout treatment.

Beyond the hands-on experience, I got to observe the daily operations of a successful orthodontic practice. I watched Dr. Ronconi and the assistants treat both routine and more complex orthodontic cases, giving me a better understanding of the planning, problem-solving, and communication involved in patient care. Overall, this internship strengthened my interest in dentistry and gave me valuable clinical experience while allowing me to see what it takes to run an efficient and patient-centered orthodontic practice.

Kayla Kennamore

Major: Biology



Streamlining Astronomical Observations

Intern: Keily Lepiz-Rangel

Mentor: Dr. Jean Perkins

Opportunity: MIRA

Modern astronomical observations often require astronomers to switch between multiple software programs to perform tasks such as image acquisition, instrument control, and data analysis during a single observing session. This can make the research process less efficient. The goal of this project was to begin developing a Python-based graphical user interface (GUI) that combines commonly used tools into a single streamlined interface. The software was developed using Python, Tkinter, and Astropy. During the internship, four graphical interfaces were designed to support different stages of the observation workflow. Development involved studying existing astronomy software, identifying commonly used features and implementing those features through Python programming and astronomy specific libraries. The initial prototype successfully demonstrates the foundation of a unified interface for astronomical observations. Four functional interfaces were implemented, providing an organized framework for camera control, image display, and data interaction. Preliminary testing showed that the interfaces function as intended and support workflows like those found in existing astronomy software while providing a platform for future expansion. This project demonstrates the potential of Python and modern GUI development to simplify astronomical research software by reducing the number of separate applications required during observations. Future work will focus on integrating additional observing tools, expanding instrument support, and creating a more comprehensive interface for simultaneous astronomical observations.

Keily Lepiz-Rangel

Major: Engineering



Comparing Pollen Preference of Thrips and the Effects on Reproduction

Intern: Julia Lewis

Mentors: Daniel Hasegawa, Deena Husein

Opportunity: USDA – ARS Entomology

Western flower thrips (WFT), *Frankliniella occidentalis*, are pests that cause detrimental damage on many crops. WFT act as vectors carrying and spreading viruses such as impatiens necrotic spot virus (INSV). In the Salinas Valley, where 70% of the nation's lettuce production occurs, high incidence rates of INSV can cause 100% yield loss in the lettuce industry, resulting in $150 million in losses. Though WFT feeds on leafy greens, it is highly attracted to flowers, specifically pollen. Thus, understanding the ecological factors that influence the abundance and behavior of WFT in its native region, provides insight on management strategies. To address this gap in literature, we conducted a bioassay to determine the pollen preference of WFT across three local pollen types (iceplant, strawberry, shortpod mustard) with one literature-based pollen source (pine). The experiment included two parts: 1) choice and 2) no-choice assay. In the choice assay, WFT females had the option of which pollen they prefer to consume for 24 hours from the list mentioned above. Whereas, in the no-choice assay, WFT females were randomly assigned a pollen type and then relocated to feed and reproduce on a green bean where their fecundity was measured 7 days later. Preliminary choice assays show that WFT prefers iceplant. Results from the no-choice assays suggest shortpod mustard and iceplant produce slightly higher reproduction than strawberry. This work provides insight into WFT host preference in local flowering species, especially if they are adjacent to crops susceptible to INSV, which can be implemented into pest management programs.

Julia Lewis

Major: Biology



TerraDAK

Intern: Aaron James Lomboy

Team Members: Daniel Cruz, Hezekiah Gonzalez

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

With the exponential growth of technology, we have seen the potential to explore other planets and establish a sustained human presence beyond Earth. It becomes critical that crew members verify that the surrounding terrain and atmospheric conditions are safe before exiting the habitat for extravehicular activity. Our custom-built project, the TerraDAK, is a remote-controlled reconnaissance rover that collects environmental data across a diverse set of surface conditions and monitors whether the surrounding terrain is safe for crew deployment. All collected data is transmitted wirelessly and presented through a user-created web application for real-time analysis using safety thresholds derived directly from the NASA Spaceflight Human-System Standard, NASA-STD-3001, governing crew health and performance standards for spaceflight systems. The rover is built using an Arduino Mega 2560, which houses every sensor and motor driver onboard, and a Raspberry Pi 4, which serves as a server which hosts a user-generated web dashboard. The sensors measure parameters including carbon dioxide concentration, humidity, temperature, carbon monoxide, flammable gas presence, and dust particulates. A NEO-6M GPS module provides UTC timestamping for every data point collected. Controlling the rover is an Arduino Uno paired with a joystick shield, communicating wirelessly via NRF24L01+ radio modules. The controller cycles between all-wheel, front-wheel, and rear-wheel drive modes with an active emergency brake. All parameters are continuously evaluated against NASA thresholds.

Aaron James Lomboy

Major: Engineering



Project OASIS: Operational Aerial Search and Irrigation System

Intern: Juan Lopez Naranjo

Team Member: Juan Martinez, Camilo Ramos

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Agriculture in the Salinas Valley depends on efficient irrigation and constant monitoring of field conditions, and drones offer a promising way to do both from the air. Project OASIS (Operational Aerial Search and Irrigation System) converts a manual F550 hexacopter drone into an agriculture platform that senses field conditions and supports irrigation. During this internship, our team worked on two connected systems. The first was the drone: an F550 hexacopter with a Pixhawk 2.4.8 flight controller running ArduCopter, controlled by a FlySky FS-i6 radio and configured through Mission Planner. Preparing it for flight required binding the radio, flashing firmware, and completing the accelerometer, compass, radio, and ESC calibrations, as well as diagnosing real hardware problems, including a persistent barometer/GPS altitude error we traced to a cloned flight controller and resolved by replacing the GPS module and adjusting the barometer configuration, along with a motor thrust-loss issue we identified from the flight controller's motor-output data and corrected on the affected motor. The drone achieved stable flight both indoors and outdoors, and propeller protectors broken during testing are being redesigned and 3D printed for added durability. The second system was a smart water pump built on an Arduino Uno R4 Wi-Fi with a relay, a water level sensor, and a DHT11 temperature and humidity sensor, giving the platform reliable, automated control over watering while continuously reporting the surrounding environmental conditions.

Juan Lopez Naranjo

Major: Engineering



Development of an eDNA-Based Public Health Index for Assessing Potential Health Risks in Streams across California

Intern: Brianna Martinez

Mentors: Rachel Meyer, Dora Rasch

Opportunity: UCSC Genomics Pathway

UNIVERSITY OF CALIFORNIA SANTA CRUZ

Environmental DNA (eDNA) has become an increasingly valuable tool for monitoring biodiversity, but I wanted to explore how it could also be used to address questions in public health. In this project, I investigated whether eDNA metabarcoding data could be used to identify microorganisms of public health importance in freshwater streams and whether these detections could be used to develop a Public Health Index that evaluates potential health risks associated with different waterways.

The laboratory I worked in collected freshwater stream samples across California and generated eDNA sequencing data to identify bacterial and eukaryotic organisms present within each ecosystem. Using these results, I conducted an extensive literature review for detected organisms to evaluate their potential impact on human health. I classified organisms based on factors including whether they are known human pathogens, opportunistic pathogens, or naturally occurring environmental microorganisms. I also considered disease severity, common sources of contamination, environmental persistence, transmission routes, and seasonal occurrence when developing a risk assessment framework.

This information was used to assign each organism a relative risk level and develop an overall Public Health Index for each stream.

My findings show that while many detected microorganisms are naturally occurring and pose little concern to human health, others have been associated with diseases ranging from mild infections to serious illnesses. By evaluating the collective health significance of all detected organisms rather than focusing on a single pathogen, the Public Health Index provides a more comprehensive assessment of potential public health concerns within freshwater ecosystems.

Through this project, I demonstrate how existing eDNA datasets can be transformed into a practical environmental public health tool. I hope this framework can support future water quality monitoring by helping researchers and public health professionals identify waterways that may warrant additional investigation or long-term surveillance.

Brianna Martinez

Major: Biology



Project OASIS: Operational Aerial Search and Irrigation System

Intern: Juan Martinez Montesino

Team Members: Juan Lopez Naranjo

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Agriculture in the Salinas Valley depends on efficient irrigation and constant monitoring of field conditions, and drones offer a promising way to do both from the air. Project OASIS (Operational Aerial Search and Irrigation System) converts a manual F550 hexacopter drone into an agriculture platform that senses field conditions and supports irrigation. During this internship, our team worked on two connected systems. The first was the drone: an F550 hexacopter with a Pixhawk 2.4.8 flight controller running ArduCopter, controlled by a FlySky FS-i6 radio and configured through Mission Planner. Preparing it for flight required binding the radio, flashing firmware, and completing the accelerometer, compass, radio, and ESC calibrations, as well as diagnosing real hardware problems, including a persistent barometer/GPS altitude error we traced to a cloned flight controller and resolved by replacing the GPS module and adjusting the barometer configuration, along with a motor thrust-loss issue we identified from the flight controller's motor-output data and corrected on the affected motor. The drone achieved stable flight both indoors and outdoors, and propeller protectors broken during testing are being redesigned and 3D printed for added durability. The second system was a smart water pump built on an Arduino Uno R4 Wi-Fi with a relay, a water level sensor, and a DHT11 temperature and humidity sensor, giving the platform reliable, automated control over watering while continuously reporting the surrounding environmental conditions.

Juan Martinez Montesino

Major: Engineering



Adaptive Resource Allocation for Efficient Genome Assembly on High-Performance Computing Systems

Intern: Montserrat Mata-Vargas

Mentor: Dr. Sheina Sim

Opportunity: USDA ARS, Hawaii

Genome sequencing provides valuable information for understanding organisms, their evolution, and their interactions with agricultural ecosystems. However, converting raw sequencing data into complete genome assemblies requires significant computational resources. Selecting too few resources increases processing time, while selecting too many can waste valuable computing capacity. My project investigated how CPU resource allocation affects genome assembly performance and developed an adaptive approach to improve computational efficiency for genomic research. DNA was extracted from Belonocnema kinseyi (also known as the Kinsey gall wasp), a gall-forming wasp species associated with live oak trees (Quercus virginiana and Quercus fusiformis). The genome was assembled using PacBio HiFi sequencing data with different CPU configurations (4, 8, 16, 24, and 28 cores) on a high-performance computing system. Assembly performance was evaluated by measuring processing time, computational efficiency, and genome quality metrics. Results showed that increasing CPU resources reduced genome assembly time, with the greatest improvements occurring between 4 and 16 cores. However, additional resources beyond 24 cores provided smaller performance gains, while genome quality remained consistent across all tested configurations. The results demonstrated that increasing computational power improves speed but does not necessarily improve genome assembly quality. During the project, a major challenge was identified: a single CPU configuration cannot efficiently support all genome assemblies because different organisms and sequencing datasets vary in size and complexity. To address this limitation, an adaptive genome assembly pipeline was developed to analyze new sequencing datasets, compare them with previous benchmark results, and recommend efficient computing resources based on genome characteristics. This approach reduces unnecessary computational testing and improves access to efficient genome analysis for biological and agricultural research. By optimizing how computing resources are used, this work supports faster genomic studies of organisms that influence ecosystems, agriculture, and biodiversity. The adaptive pipeline provides a scalable framework for future genome projects involving crop-associated species, beneficial organisms, and other agriculturally important organisms.

Montserrat Mata-Vargas

Major: Biology



Observing the correlation between gene and TE density in Hydra

Intern: Fatima Mendez

Mentors: Ayanna Mays, Kelso Cochran, Aide Macias-Munoz

Opportunity: UCSC Genomic Pathway

Transposable elements (TEs) commonly referred to as "jumping genes" are areas of DNA on a gene that get cut and then pasted to a different gene. They cause mutations which in turn can lead to illnesses and thus are generally seen as bad. Previous research in *Drosophila*, has found an inversely correlated relationship between TE density and gene density, meaning that areas with a lot of genes express a lower abundance of TEs and areas with a lot of TEs show low density of genes within that area (Mérel et al. 2021). Our guiding question of this project was are we able to see this same inversely correlated relationship between gene and TE density in species of Hydra? Hydras are close relatives to jellyfish; they are freshwater organisms with the ability to regenerate full body structures under good living conditions. They are of interest to our lab for this reason and what this regeneration can reveal about genetics and evolution. In Hydra, T's make up 60% of their genome and some are being dynamically expressed during regeneration. The goal of this research is to investigate whether areas of TE density in Hydra are limited to areas that have low gene density. To investigate this, I used bioinformatic tools to characterize gene density and percent TE coverage across 4 Hydra species and an outgroup Hydractinia. We found that both the outgroup and 1 Hydra species, *Hydra viridissima*, followed the inversely correlated pattern of gene and TE density. Whereas 3 of the 4 Hydra species did not follow this trend and did not demonstrate a particular correlation of gene and TE density. Vincent Mérel, Patricia Gibert, Inessa Buch, Valentina Rodriguez Rada, Arnaud Estoup, Mathieu Gautier, Marie Fablet, Matthieu Boulesteix, Cristina Vieira, The Worldwide Invasion of *Drosophila suzukii* Is Accompanied by a Large Increase of Transposable Element Load and a Small Number of Putatively Adaptive Insertions, Molecular Biology and Evolution, Volume 38, Issue 10, October 2021, Pages 4252–4267, https://doi.org/10.1093/molbev/msab155

Fatima Mendez
Major: Biology



Robotic Integrated Field Tester (R.I.F.T.)

Intern: Flavio Mora

Team Members: Samuel Valencia, Janai Orozco

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

We developed R.I.F.T. (Robotic Integrated Field Tester), a rover designed to evaluate the suitability of lunar environments for future human missions, as part of our summer internship with the California Space Grant Consortium (CaSGC) at Hartnell College. Our goal was to create a mobile platform capable of collecting comprehensive environmental and terrain data to inform decisions about potential lunar habitats. Using Arduino microcontrollers and multiple sensors, including those for air quality, temperature, humidity, soil moisture, dust, ultrasonic ranging, gyroscope, GPS, and Bluetooth. R.I.F.T. can assess air and soil conditions, terrain safety, and environmental suitability in real time.

The project involved the full engineering process, from hardware assembly and sensor integration to software development. We built onto the rover's chassis, carefully mounted and calibrated each sensor, and overcame numerous technical challenges related to data collection and communication. A major milestone was the development of a custom mobile app using MIT App Inventor, which allowed us to visualize live sensor data and monitor the rover remotely.

Throughout this internship, we collaborated closely as a team, leveraging our combined problem-solving, coding, and communication skills to troubleshoot obstacles and improve our design iteratively. Our work highlights how accessible technology and collaborative engineering can help address critical questions in lunar exploration and support the future of human space missions.

Flavio Mora

Major: Engineering



USDA Legume Nutritional Testing

Intern: Samuel Ochoa

Mentor: Dr. Timothy G. Porch

Opportunity: USDA ARS, Puerto Rico

USDA ARS
United States Department of Agriculture
Agricultural Research Service

The common bean *(Phaseolus vulgaris*) is the most consumed legume in the world that tends to have a high iron content, which is an important nutritional trait to improve for human health. This research focused on the elemental seed composition of common bean to improve upon its nutritional content and nutrient bioavailability. The slow dark (SD) trait found in beans tends to increase the bioavailability of iron. This is important due to the fact that as beans age, they tend to darken due to phenols, which make the available iron no longer bioavailable. In this project we identified the contents of pinto beans, including SD types, through Inductively Coupled Plasma (ICP) analysis using the Titan Microwave Sample Preparation System (MPS), and the Kjeldahl method to evaluate nitrogen. Results showed significant variability in boron, manganese, and calcium in the pinto breeding lines evaluated. Using these findings, we can pave a path for the improvement of breeding efforts and eventually improve the nutritional composition of this seed class *Phaseolus vulgaris*.

Samuel Ochoa

Major: Biology



Robotic Integrated Field Tester (R.I.F.T.)

Intern: Janai Orozco

Team Members: Flavio Mora & Samuel Valencia

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

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Janai Orozco

Major: Engineering



AgroNova

Intern: Jesus Ortiz Ramos

Team Members: Salma Rodriguez, Maria Santibanez Calderon

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

This project, sponsored by NASA through the California Space Grant Consortium (CaSGC), presents AgroNova, an autonomous environmental monitoring system designed to show how compact robotic platforms and integrated sensor technologies can support field analysis in agricultural environments. AgroNova combines a multi sensor rover, embedded electronics, and a mobile data interface to deliver real time environmental information in a simple and accessible way. The system measures key variables such as air quality, soil moisture, wind speed, temperature, humidity, gas concentration, pH levels, and particulate matter (PM2.5), creating a detailed snapshot of field conditions that can support decision making and resource management. The rover is built around an Arduino Mega, and a full suite of environmental sensors mounted on a lightweight chassis capable of short-range autonomous movement. As it travels across the field, the onboard system collects distributed measurements and sends them wirelessly to the AgroNova Field Monitor app. The mobile interface, developed in MIT App Inventor, displays live sensor readings through a clean and organized layout, making it easy for users to access environmental data directly from a smartphone. The system focuses on reliability, low-cost components, and straightforward operation, making it suitable for educational, research, and community based agricultural projects. AgroNova demonstrates the practicality of combining autonomous mobility, distributed sensing, and mobile visualization in a single environmental monitoring platform. The completed system provides stable data acquisition, consistent wireless communication, and dependable performance under field conditions. Overall, AgroNova offers a scalable foundation for future work in precision agriculture, autonomous field robotics, and environmental monitoring technologies.

Jesus Ortiz Ramos

Major: Computer Science



Structural Steel Estimating Internship

Intern: Erick Oviedo Terrazas

Mentors: Anselmo Aviles and Mike Henson

Opportunity: Steel Estimator at Ciarra Construction

CIARRA CONSTRUCTION

As a Steel Estimator at Ciarra Construction, I support the preconstruction phase of commercial construction projects by reviewing drawings, performing quantity takeoffs, and assisting with cost estimates for structural steel systems. Working with project plans and industry software has allowed me to gain hands-on experience in construction estimating while developing a stronger understanding of blueprint reading, project planning, and bid preparation. The highlights of this internship included the estimating process, tools used, and key skills developed through my experience in the structural steel industry.

Erick Oviedo Terrazas

Major: Civil Engineering



Aircraft Production and Maintenance Internship at Joby Aviation

Intern: Adolfo Ramirez

Mentor: Loren Meisser

Opportunity: Joby Aviation

During my internship as an Aircraft Production and Maintenance Intern with the Joby Aviation Air Operations team, I worked at the Watsonville Municipal Airport. There, I had the opportunity to work alongside and learn from pilots, aircraft technicians, engineers, instructors, and students participating in Joby Academy, a program that provides flight and aircraft maintenance training to the public. Their willingness to share their knowledge and experience made every day a valuable learning opportunity and helped me grow both personally and professionally. One of the most important skills I developed during my internship was learning how to work effectively in a team environment. Working alongside technicians, instructors, and students taught me the importance of communication, teamwork, and being able to rely on one another throughout the aircraft assembly process. I learned that the Van's RV-12 is built from three primary assemblies: the empennage, wings, and fuselage. I developed practical skills using a wide variety of industry standard tools, machines, and manufacturing equipment used throughout the aircraft assembly process. As I gained more experience, I became a reliable member of the team by helping technicians and students assemble major aircraft components while also organizing and maintaining the inventory of parts and hardware used throughout the build. I helped complete the flaperon and wing assemblies before transitioning to work on the fuselage. This was my first experience working for an aerospace company, so I learned something new every day. In addition to assembling aircraft components, I gained exposure to aircraft avionics and developed a better understanding of the electrical systems that help aircraft operate safely and efficiently. This internship gave me a much better understanding of how different engineering disciplines come together during aircraft production and maintenance while strengthening my technical, communication, teamwork, and problem-solving skills. The experience reinforced my passion for electrical engineering and the aerospace industry while confirming my desire to pursue a career in aircraft manufacturing.

Adolfo Ramirez

Major: Electrical Engineering



Internship at Fremont Peak Observatory

Intern: Rafael Ramirez

Mentor: Rob Hawley

Opportunity: Fremont Peak Observatory

FPOA

Interning at the Fremont Peak Observatory help me gain more knowledge about Astronomy and public viewing of the night sky. We learned to operate various telescopes at the observatory and operated them during multiple Saturday night viewing events open to the public. We showed key objects in the sky such as galaxies, globular or open clusters, nebulas, planets, and the Moon. For example, I helped operate a telescope named “Big Orange”. With this telescope, I was able to show the public various objects such as the Moon, Jupiter, Venus, and clusters of stars. In addition, I got more insight about how to navigate the night sky. For example, I learned more about where celestial objects were in the sky and more about the constellations in our night sky. There are video presentations shown at the observatory where the public can learn about many celestial objects such as the properties of galaxies, Sun, and more.

Rafael Ramirez

Major: Astronomy



Project OASIS: Operational Aerial Search and Irrigation System

Intern: Camilo Ramos Polo

Team Members: Juan Lopez, Juan Martinez Montesino

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Agriculture in the Salinas Valley depends on efficient irrigation and constant monitoring of field conditions, and drones offer a promising way to do both from the air. Project OASIS (Operational Aerial Search and Irrigation System) converts a manual F550 hexacopter drone into an agriculture platform that senses field conditions and supports irrigation. During this internship, our team worked on two connected systems. The first was the drone: an F550 hexacopter with a Pixhawk 2.4.8 flight controller running ArduCopter, controlled by a FlySky FS-i6 radio and configured through Mission Planner. Preparing it for flight required binding the radio, flashing firmware, and completing the accelerometer, compass, radio, and ESC calibrations, as well as diagnosing real hardware problems, including a persistent barometer/GPS altitude error we traced to a cloned flight controller and resolved by replacing the GPS module and adjusting the barometer configuration, along with a motor thrust-loss issue we identified from the flight controller's motor-output data and corrected on the affected motor. The drone achieved stable flight both indoors and outdoors, and propeller protectors broken during testing are being redesigned and 3D printed for added durability. The second system was a smart water pump built on an Arduino Uno R4 Wi-Fi with a relay, a water level sensor, and a DHT11 temperature and humidity sensor, giving the platform reliable, automated control over watering while continuously reporting the surrounding environmental conditions.

Camilo Ramos Polo

Major: Engineering



Machine Learning Classification of Rare Stars in APOGEE Spectra

Intern: Denise Regalado Ramos

Mentor: Dr. S. Drew Chojnowski

Opportunity: MIRA

The APOGEE survey has collected millions of stellar spectra, making it difficult for astronomers to manually identify rare and unusual stars. The goal of this project was to develop a machine learning model that can automatically identify and classify these stars, helping speed up the process for new rare stars. During my internship, I built a binary classification model that distinguishes normal stars from hydrogen-emission stars using APOGEE spectra. To do this, I learned how to read and process astronomical FITS files, organize and clean large datasets, and prepare training, validation, and testing datasets. I then trained and optimized a convolutional neural network (CNN) using PyTorch. The final binary model achieved an accuracy up to 96% with ~3500-star spectra. After completing the binary classifier, I expanded the project by developing an 11-class CNN capable of identifying several types of rare stars, including HgMn, B[e], Be-shell, WR, YSO, and other peculiar star classifications. This required preparing larger datasets, addressing differences in the sizing of said datasets for each star type, and improving the training process so the model could better recognize the unique patterns found in different star spectra. Through this project, I gained experience applying machine learning to real astronomical research by working with large scientific datasets, training deep learning models, and evaluating their performance. By automating the classification of stellar spectra, this project helps to reduce the amount of manual inspection required by astronomers, allowing them to identify rare stars more quickly and spend more time on scientific discovery.

Denise Regalado Ramos

Major: Computer Science



Spacecraft Pose Estimation using HRNet Keypoint Detector

Intern: Christopher Rodriguez

Mentors: Agrawal Brij, Herrera Leonardo, Bhattacharjee Shambo

Opportunity: Naval Postgraduate School

With the rise and development of AI models that only keep getting better, the Department of Defense has begun to research potential applications to improve our military's capabilities. A promising area of research involves using deep learning models integrated within radar systems to automatically detect the orientation, distance, or make of an aircraft. The goal for this project was to develop and train my own deep learning model to identify spacecraft and aircraft poses. A core component for developing a deep learning model is the training data, which is where the first issue arose: obtaining hundreds of thousands of spacecraft images is simply not possible. So, the data utilized was synthetic, created using Unreal Engine 5 to model the orbit of a CubeSat satellite. The data depicted the satellite within varying distances, orientations, backgrounds, lighting, etc. The data included eleven 3D key points for the satellite. And the camera intrinsics, which determine how the 3D real life scene is converted into a 2D picture. Those camera intricacies were used to convert the provided 3D points to 2D u and v coordinates for every image, this served as the ground truth. After training the models multiple times the object detection confidence was 100% and the key point detection confidence / pck was 90%+ across all distances. Using these trained models, untouched separate scenes were fed through the trained models for the final pose prediction, the mean angular error was 9 degrees, while the positional error was 0.21 meters. 75% of the predictions fell below 5 degrees and 1 meter of error. Though this was achieved after multiple runs, in which I tweaked the training options. It was determined that to obtain the best results the following must be done randomizing the order of images with each epoch and using the best previous epoch to update the weights instead of simply the one right before. These changes resulted in a 40% accuracy increase, though I'm sure there's still room for improvement through increasing batch size or number of epochs.

Christopher Rodriguez

Major: Mechanical Engineering



Astronomy Internship: Not Like the Pictures

Intern: Christopher Rodriguez

Mentors: Rob Hawley, Eric Egland

Opportunity: Fremont Peak Observatory

FPOA

'When you look at the stars, you're seeing the past". — unknown

Humans have been looking up at the sky for hundreds of thousands of years, sparking questions about the universe which have yet to be solved. Through generations the night sky has inspired us to innovate, serving as a visual goal post. This year I got the chance to partake in this generational exploration for answers we know as astronomy. Throughout this internship I was able to get hands-on experience with amateur telescopes such as the Big Orange which is a 10-inch Newtonian telescope. My main tasks involved adjusting the telescope and picking out suitable objects to improve the public's science education. Along the way I learned important skills and knowledge such as telescope operation, astronomy and telescope fundamentals, public speaking - or even just how different galaxies look compared to the pictures we see every day. Instead of these extremely bright objects with beautiful spirals I'd seen in photos, the galaxies through the telescope looked like fog, or a stain on the lens. I would often wonder if I was seeing a galaxy or nebula, or if I was starting to imagine things. Nonetheless, this experience was eye-opening. This year I was able to look at the same night sky that our ancestors looked at with wonder, and just like them I made my own observations and discoveries.

Christopher Rodriguez

Major: Mechanical Engineering



Investigating Candidate Genes Involved in Spinosad Resistance in the Melon Fly

Intern: Karolina Rodriguez

Mentor: Dr. Chan Heu

Opportunity: USDA ARS, Hawaii

Zeugodacus cucurbitae, commonly known as the melon fly, is a major agricultural pest that damages many fruit and vegetable crops. Spinosad is commonly used to control melon flies, but the development of insecticide resistance threatens its long-term effectiveness. This research project at the Pacific Basin Agricultural Research Center (PBARC) investigated whether each of three candidate genes contributes to Spinosad resistance in the melon fly. The three candidate genes were LOC105210526 (0526), Cadherin-related tumor suppressor fat (CRTS), and Proton-coupled zinc antiporter (PZA). These genes were identified through previous research comparing gene expression and single nucleotide polymorphisms (SNPs) between Spinosad-resistant and susceptible melon fly populations.

To investigate the function of these candidate genes and their potential roles in Spinosad resistance, RNA interference (RNAi) and CRISPR/Cas9 gene editing were used to reduce or disrupt gene function, followed by Spinosad exposure when viable adult flies were available. Polymerase Chain Reaction (PCR) was used to amplify target DNA sequences, followed by DNA purification and quantification. Double-stranded RNA (dsRNA) was then synthesized for RNAi experiments targeting PZA. Adult melon flies were injected with PZA dsRNA to reduce gene expression, while flies injected with eGFP dsRNA served as controls.

CRISPR/Cas9 gene editing was used to target 0526 and CRTS. Melon fly embryos were injected with Cas9 mRNA and guide RNA to disrupt the function of each target gene. In the CRTS CRISPR experiment, edited flies failed to emerge from the pupal stage and therefore could not be exposed to Spinosad to evaluate resistance. Dissection of the pupae revealed fully developed adults inside the pupal cases, suggesting that CRTS may play an important role in development or adult emergence.

Adult flies injected with PZA RNAi and eGFP control RNAi were exposed to Spinosad concentrations of 0, 7, and 20 ng/mL to evaluate survival. Preliminary results are promising, with PZA-targeted females showing approximately 15% greater resistance compared with controls under Spinosad exposure. However, larger sample sizes and additional replicates are needed to determine whether this difference is consistent and statistically significant. CRISPR-edited 0526 flies are also being raised for Spinosad exposure experiments.

By evaluating each candidate gene individually, this research improves our understanding of the genetic basis of Spinosad resistance in *Z. cucurbitae*. These preliminary findings provide direction for further investigation of PZA, 0526, and CRTS and may ultimately contribute to the development of more effective and sustainable pest management strategies.

Karolina Rodriguez

Major: Biology



AgroNova

Intern: Salma Rodriguez

Team Members: Maria Santibanez Calderon, Jesus Ortiz Ramps

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

This project, sponsored by NASA through the California Space Grant Consortium (CaSGC), presents AgroNova, an autonomous environmental monitoring system designed to show how compact robotic platforms and integrated sensor technologies can support field analysis in agricultural environments. AgroNova combines a multi sensor rover, embedded electronics, and a mobile data interface to deliver real time environmental information in a simple and accessible way. The system measures key variables such as air quality, soil moisture, wind speed, temperature, humidity, gas concentration, pH levels, and particulate matter (PM2.5), creating a detailed snapshot of field conditions that can support decision making and resource management. The rover is built around an Arduino Mega, and a full suite of environmental sensors mounted on a lightweight chassis capable of short-range autonomous movement. As it travels across the field, the onboard system collects distributed measurements and sends them wirelessly to the AgroNova Field Monitor app. The mobile interface, developed in MIT App Inventor, displays live sensor readings through a clean and organized layout, making it easy for users to access environmental data directly from a smartphone. The system focuses on reliability, low-cost components, and straightforward operation, making it suitable for educational, research, and community based agricultural projects. AgroNova demonstrates the practicality of combining autonomous mobility, distributed sensing, and mobile visualization in a single environmental monitoring platform. The completed system provides stable data acquisition, consistent wireless communication, and dependable performance under field conditions. Overall, AgroNova offers a scalable foundation for future work in precision agriculture, autonomous field robotics, and environmental monitoring technologies.

Salma Rodriguez

Major: Computer Science



Composite Manufacturing Intern at Joby Aviation

Intern: Roberto Ruelas Guevara

Mentors: Priyank Nandu, Zenith Star & David Herrera

Opportunity: Joby Aviation

My internship at Joby Aviation provided valuable insight into the manufacturing processes behind electric vertical takeoff and landing (eVTOL) aircrafts. As a Composite Manufacturing Intern, I was introduced to the production of aerospace composite parts and observed how advanced manufacturing techniques are used to create lightweight, durable components that meet the industry standards.

Throughout the internship, I supported the manufacturing processes by assisting with composite material preparation, handling finished parts, and observing CNC (Computer Numerical Control) machining and trimming operations. I also gained exposure to the manufacturing steps involved in producing composite components, from the design on a computer to the part being trimmed. Working closely with engineers and machinists allowed me to see how communication across different departments is essential for maintaining efficiency and quality throughout the manufacturing process.

Every machining operation, measurement, and inspection must be completed with accuracy to ensure that each component satisfies strict requirements. I learned how different types of errors can compromise the functionality and safety of aircraft parts. This experience gave me a better understanding of what it takes to manufacture future aircrafts.

Roberto Ruelas Guevara

Major: Mechanical Engineering



Using a recombinant expression system in E.coli to biosynthetically produce Melectin as a potential therapeutic alternative for Lyme Disease

Intern: Elizabeth Ruiz-Gonzalez

Mentor: Dr. David Bernick

Opportunity: UCSC iGEM

Lyme disease has been a major public health issue for many years now, as the number of reported cases has risen, especially in North America. This vector-borne illness comes from the pathogenic bacterium, *Borrelia Burgdoferi* that is transmitted to individuals through tick bites. If diagnosis is delayed and the condition progresses, standard antibiotics become ineffective. Consequently, lyme disease patients must self-administer themselves with Bee Venom Therapy (BVT) to manage their condition. New research shows antimicrobial peptides (AMPs) as a promising alternative due to their antimicrobial properties and destroying bacterial cells resistant to antibiotics. With our project, focusing specifically on AMPs Melectin and Melittin, naturally found in bee venom. The chemical properties of reduced cytotoxicity to human cells and antimicrobial capability in Melectin makes this peptide the better choice compared to Melittin. In our project, we aimed to synthesize AMP Melectin with a fusion partner, using a recombinant expression system in *E.coli* C41 cells, while reducing the barriers to access and cost. To achieve this, I worked on the wet lab aspects of this project by reading literature on fusion proteins, melittin, and its applications to lyme disease.

In addition, I researched and wrote with my peers meaningful, detailed protocols such as Inverse PCR. In parallel, I helped perform protocols including 50 µg SOB Agar plates with Kanamycin and many Agarose Gels for gel electrophoresis needed to confirm our DNA fragments were at the correct sizes. Since this project was research and hands-on-based, critical skills I've used and continue to use include strong communication, team collaboration, continuous learning, asking questions, expanding my biology vocabulary, and core lab techniques. Currently, we are in the late stages of building our plasmid construct, after receiving confirmation of our target protein sequence. This work matters because research on lyme disease and antimicrobial peptides has been limited, so we are proposing a method to synthesize Melectin and make it more accessible to lyme disease communities. Moreover, we hope that our findings inspire more research on antimicrobial peptides and in the future possibly get a clinical trial for Lyme disease.

Elizabeth Ruiz-Gonzalez

Major: Biology and Public Health



Joby Aviation Intern

Intern: Kevin Ruiz Hernandez

Mentors: Eric Dungan & Alek Parolari / Travis Welch

Opportunity: Joby Aviation

At Joby Aviation, I supported cross-functional engineering efforts spanning tooling design, quality systems, and manufacturing process qualification for eVTOL aircraft production. I collaborated with engineers, technicians, and fellow interns in a fast-paced, high-rate manufacturing environment. Using SolidWorks and CATIA, I designed and manufactured custom fixtures to support the handling, alignment, and dimensional inspection of aircraft components by 3D printing and creating engineering drawings to have them fabricated into metal fixtures while being engineered with attention to GD&T principles and manufacturability. These fixtures improved repeatability, reduced setup time, and streamlined assembly operations across multiple stations. Alongside fellow interns, I conducted systematic root cause analysis on dimensional non-conformances across every work center on the production floor. Applying statistical and process-based methods, our team traced variation back to upstream tooling, fixturing, and process parameters, compiling findings into corrective action recommendations that informed workflow optimization and reduced recurring quality escapes. Our team executed qualification testing on a Hot Bonder unit under a compressed timeline, validating its thermal profile, cure cycle accuracy, and compliance with aerospace bonding specifications required for structural aircraft applications. Coordination with supporting engineers allowed the qualification to be completed thoroughly and on schedule. This internship provided hands-on experience in fixture design, root cause/corrective action (RCCA) methodology, and equipment qualification within a real-world aerospace manufacturing setting. Beyond technical skills, it reinforced how disciplined, ground-level engineering work — often accomplished under time pressure and through close teamwork — is what transforms an ambitious vision of electric vertical takeoff and landing (eVTOL) flight into a certifiable, mass-producible reality.

Kevin Ruiz Hernandez

Major: Mechanical Engineering



Airframe Assembly Intern at Joby Aviation

Intern: Carlos Sanchez

Mentors: Eric Dungan, Airframe Assembly and Paint Production Lead

Opportunity: Joby Aviation

This report summarizes my experience as an Airframe Assembly (AFA) Intern, where I gained firsthand exposure to the work of both technicians and engineers in an aircraft manufacturing environment. During my first week, I worked directly with technicians on fixtures and assemblies, assisting the leads with hands-on tasks such as applying Teflon tape to a wing fixture, taping off "No PPE" areas, and making vacuum lines for the fuselage fixtures. Once I gained computer access, I shifted to engineering-focused work, starting with compiling an Excel datasheet of 156 Non-Compliance Reports (NCRs) alongside the other AFA interns and identifying the root cause of each one. I then assisted Jordan Lowe, a Manufacturing Engineer, in qualifying heat blankets with a Hot Bonder for use in Post Cures, a process that involved baking the blankets at up to 350°F to remove oils before testing. In addition, I designed three rib supports in SolidWorks for Manufacturing Engineer Alek Parolari and 3D printed them myself. These supports clamp onto the rib at the tail end and hold it in place while technicians fillet the adhesive edges. Developing them took multiple design iterations to achieve the proper fit and clearance, teaching me how much trial and error goes into even small production parts. Overall, this internship strengthened my design, problem-solving, and manufacturing skills while showing me how engineers and technicians work together on the production floor.

Carlos Sanchez

Major: Mechanical Engineering



AgroNova

Intern: Maria Santibanez Calderon

Team Members: Salma Rodriguez, Jesus Ortiz Ramos

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Agricultural regions face challenges related to soil health, air quality, water availability, and safe pesticide application. Many growers rely on limited environmental information, which can lead to inefficient chemical use, resource waste, and long-term impacts on crop productivity. This project, sponsored by NASA through the California Space Grant Consortium (CaSGC), presents AgroNova, a mobile environmental monitoring rover designed to show how distributed sensing and real time visualization can support more informed agricultural decision making. AgroNova integrates sensors that measure soil moisture, pH, particulate matter (PM2.5), air quality, wind speed, temperature, humidity, and gas concentration. These variables influence pesticide drift, soil nutrient balance, and overall field conditions. By providing real time data, AgroNova helps identify unsafe wind conditions for spraying, irrigation needs, and air quality factors that may affect crops. The rover uses an Arduino Mega, and a suite of environmental sensors mounted on a lightweight chassis. As it moves across the field under joystick control, it collects measurements and sends them wirelessly to the AgroNova Field Monitor app. The mobile interface, developed in MIT App Inventor, displays live sensor readings through a simple and accessible layout, allowing users to monitor field conditions from a smartphone. The system emphasizes reliability, low-cost components, and ease of use, making it suitable for educational, research, and community based agricultural projects. AgroNova helps bring environmental information closer to growers by collecting clear, real-time data as it moves through the field. This makes it easier to decide when to spray, when to irrigate, and how to respond to changing conditions.

Maria Santibanez Calderon

Major: Computer Science



Improving Adult Mouse Ventricular Cardiomyocyte-Substrate Adhesion for Cardiomyocyte Force Measurement

Intern: Jeriel Sevilla

Mentors: Adithan Kandasamy, PhD, Sarah L. Sturgill, PhD, Mark Mercola, PhD

Opportunity: Stanford CVI

Stanford Cardiovascular Institute

Heart disease remains the single largest cause of mortality in the US and is rapidly growing. While major risk factors such as obesity and hypertension drive this rise, the effects of these systemic factors on the heart's fundamental contractile unit, cardiomyocytes, remain poorly understood. Murine models are useful for capturing the effects of these risk factors at the organism level, and ex vivo studies of isolated cardiomyocytes can therefore enable mechanistic studies of dysfunction of cellular contractility. Traction force microscopy (TFM) is a powerful technology for measuring single-cell cardiomyocyte systolic and diastolic function by seeding cells on deformable hydrogels and imaging the cell-induced deformations of the hydrogel. However, adapting TFM to isolated murine cardiomyocytes has been challenging due to difficulty with attachment to the hydrogel and prolonged culture. To address this gap, we hypothesized that laminin or Geltrex (5 µg/mL) coatings on polyacrylamide gels would improve cardiomyocyte attachment enough to generate measurable gel displacement while preserving rod-shaped morphology and contractile function. In this study, we isolated adult mouse ventricular cardiomyocytes using a Langendorff-free protocol optimized by Sturgill et al. and plated the cells onto laminin- or Geltrex-coated gels in a 96-well format. We assessed attachment strength, viability, and morphology microscopically and quantified contractile force via TFM to determine which coating enables reliable force measurements. This study establishes a platform for single-cardiomyocyte modeling and therapeutic screening of acquired cardiac dysfunction such as heart failure with preserved ejection fraction.

Jeriel Sevilla

Major: Chemistry



Composite Materials and Process Intern

Intern: Christopher Talavera

Mentor: Audrey Shanks

Opportunity: Joby Aviation

For every experimental company, studies and tests need to be run for every aspect of the product to assure performance, safety, and overall trust. As a Material & Processing intern, I used my skills to aid the engineers and technicians in charge of conducting the necessary procedures to pass projects needed for FAA compliance. My skills included excel work, dimensioning, strain gauging, 3-D modeling, data filing, and microscope analysis. These skills spanned throughout multiple projects and subdivisions of the department, in which each was required to be approved. This approval is needed for the company to move on to its next step and that means every test and action needs to be recorded and explained thoroughly. I had little room for error and had to follow and execute my operations flawlessly. Strain gauging was a prime example of this where the strain gauge area had to be prepped and neutralized perfectly along with the installation being within a millimeter of tolerance. Data recording must be down to the spec in order to be accepted and that is what the M&P department is about. With a product this new and revolutionary, every step of the way must be perfect to move on as an aviation company.

Christopher Talavera

Major: Engineering



Identifying the characteristics of a mechanically accessible motorcycle in the off-road setting

Intern: Hailey Thomas

Mentors: Tom Weinmayr, Rob Armstrong, TWT Moto Enduro Park Hechlingen

Opportunity: TWT Motors, Germany

In my experience as a mechanic, there are a lot of places where mechanics and engineers step on each other's toes concerning the design of a machine. The field of engineering is constantly seeking more complex systems that can suit the needs of a modern, persistently complexifying world—yet, the field of mechanical repair favors more simplified systems that can be maintained, rather than replaced. In my pursuit of a degree in mechanical engineering, I have always considered it of the utmost importance to enter the field of design with prior experience as a mechanic. In this pursuit, I intended to spend two months learning how to be a mechanic at the largest BMW Enduro—off-road, long distance motorcycle—park in the world, to see what breaks first, what lasts longest, and what mechanics need to be able to access with relative ease. My process consisted of preparing, repairing, and maintaining a fleet of ~140 motorcycles. I learned how to perform services, replace parts, identify the correct tools, differentiate fasteners, identify when to use, and how to select, certain processes over others, how to handle and move motorcycles of varying sizes, interact with and/or redirect customers in a foreign language, and perform repairs quickly and properly. I have had to learn how to navigate product details on a brand-specific technical information page, and online with publicly available information, make quick changes of direction and focus, properly handle hand, mechanical, and hydraulic tools, and how to disassemble and reassemble parts. I have gathered that independently accessible parts are a notable characteristic of a mechanically accessible motorcycle; turn signals, exterior protection (i.e. engine protection bars, skid plates), and tires are the most common things replaced. Examples exhibit consistent and easily removable fastener designs, easily removable wheels, easily removable external paneling, a detailed diagnostics process, and an external construction that is revealing and immediately telling of internal damage.

Hailey Thomas

Major: Mechanical Engineering



Designing and Evaluating Robotic Boom Sprayer Configurations for Agricultural Pesticide Application

Intern: Joshua Torres Cepas

Mentors: Maxwell S. Ollivier, Jeffrey J. Boggs, Prashanta Pokharel, Ph.D.

Opportunity: CSUMB UROC Program

In agriculture, most crops require fertilizer for nutrients, and pesticides to keep the crop healthy, and are often applied using sprayers in an overhead boom configuration. Some of the limitations with current sprayers systems are that they only provide blanket, uniform application of the product, with no control of the application rate. Additionally, boom sprayers spray from above, meaning that lower parts of the crop get little to no coverage. Robotic sprayers can offer solutions to these limitations, by using cameras, AI computer vision models, and pulse width modulated (PWM) solenoids to precisely and variably control the application rate of product on the crop. This study was created to determine the most optimal sprayer configuration for the crops. Two sprayer configurations are to be built. One traditional top-down boom sprayer, with three nozzle bodies, each fitted with a PWM solenoid. The alternate configuration will consist of three hoop sprayers with 5 nozzle bodies each. The nozzle bodies were arranged such that there is one directly above the crop, two at 45 degrees on either side of the crop, and two at 90 degrees on either side of the crop. Both the boom sprayer and hoop sprayer use readily available parts, and require little to no manufacturing. Spray coverage will be determined using water sensitive spray cards. Testing will be performed in the field on romaine lettuce crops and will determine whether a hoop sprayer, with well selected nozzles, produces a better spray coverage than an overhead boom sprayer.

Joshua Torres Cepas

Major: Mathematics



Link Seeker: Low-Cost Aerial Plant Scout (LCAPS)

Intern: Joshua Torres Cepas

Team Members: Daniel Gonzalez Cuevas, Socrates Figueroa

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

Link Seeker LCAPS (Low-Cost Aerial Plant Scout) is a precision agriculture project that combines aerial imaging, artificial intelligence, and autonomous robotics to provide an affordable solution for crop health monitoring. The system is designed to detect plant stress early, enabling growers to identify problem areas before they become widespread.

The project utilizes a DJI drone to capture high-resolution aerial images of agricultural fields. These images are uploaded to a custom Python-based web application, where they are analyzed using computer vision and image segmentation techniques to classify crops into three health categories: Healthy, Stressed, or Dead. In addition to crop classification, the application generates an annotated image overlay, segmentation masks, and health statistics that summarize the condition of the surveyed field. The platform also produces map-based visualizations that identify the locations of unhealthy crops, allowing users to quickly locate areas requiring further inspection.

To validate the aerial analysis, the coordinates of areas identified as unhealthy are transmitted to a remotely operated ground rover. An operator then uses these coordinates to manually drive the rover to the affected location, where it collects additional sensor and soil data to verify the drone's findings. By combining aerial scouting with targeted ground-based inspection, the system provides a more complete assessment of crop health while reducing the time and effort required to identify and investigate problem areas.

Link Seeker LCAPS demonstrates how low-cost commercial drone technology, autonomous robotics, and AI-powered image analysis can be integrated into a scalable precision agriculture platform. The project aims to provide farmers and researchers with actionable crop health information, improve resource management, and support more efficient and data-driven agricultural decision-making.

Joshua Torres Cepas

Major: Mathematics



Learning Technology Intern at Joby Aviation

Intern: Bryanna Valdez

Mentor: Nicole Kyine Lain

Opportunity: Joby Aviation

During my internship at Joby Aviation, a leading developer of commercial electric vertical take-off and landing (eVTOL) aircraft, I worked as a Learning Management Intern supporting the company's training infrastructure as it prepares for FAA Type Certification of the S4 eVTOL. My main project was the Lift Catalog Audit, where I was responsible for reviewing and validating over 400 courses as Joby transitioned learning management systems. I ensured each course met accuracy and consistency standards by reviewing and grading content using a rubric my mentor and I designed. Through this experience, I learned to use agentic software tools to accelerate the process. I also played a key role in rolling out a new Governance Update, a company-wide initiative to bring more structure and accountability to course access and permissions within the LMS. Before this update, access to courses and records was not consistently standardized across teams, creating both security and compliance risks. I helped implement a more organized permissions structure by assessing what different roles across the company needed to view, edit, and complete, then translating those needs into clearly defined access tiers. Central to this effort was applying the cybersecurity principle of least privilege, ensuring every user—whether an admin, evaluator, learner, or manager—had access only to the courses, records, and functions required for their job responsibilities. This involved auditing existing permissions, identifying overly broad or inconsistent access, and correcting it to align with each role's responsibilities. Beyond improving security, this governance overhaul standardized access across Joby's California sites, ensuring consistent expectations regardless of location or team. With Joby preparing for FAA Type Certification, maintaining accurate, well-controlled, and defensible training records is essential. A governance structure based on least privilege not only protects confidential information but also strengthens the integrity of training records by ensuring the appropriate personnel complete and approve the correct tasks. Another major project I worked on was User Acceptance Testing (UAT) for the LMS. Using a staging site that mirrored the live system, I tested features and settings from the perspectives of admins, evaluators, and learners to verify that permissions functioned correctly. This process allowed us to identify and resolve issues, such as completion reporting errors, before they affected users. UAT was especially important for On-the-Job Training (OJT) tasks, which are completed in person but documented and signed off within the LMS. Ensuring these workflows met acceptance criteria was essential to preserving the integrity of every submission and providing a reliable experience for all users. Through this internship, I gained hands-on experience with LMS administration, data governance, and quality assurance testing, while developing a deeper appreciation for how effective training management supports aerospace safety and regulatory compliance.

Bryanna Valdez

Major: Computer Science



Robotic Integrated Field Tester (R.I.F.T.)

Intern: Samuel Valencia

Team Members: Flavio Mora, Janai Orozco

Mentor: Tito Polo

Opportunity: California Space Grant Consortium

We developed R.I.F.T. (Robotic Integrated Field Tester), a rover designed to evaluate the suitability of lunar environments for future human missions, as part of our summer internship with the California Space Grant Consortium (CaSGC) at Hartnell College. Our goal was to create a mobile platform capable of collecting comprehensive environmental and terrain data to inform decisions about potential lunar habitats. Using Arduino microcontrollers and multiple sensors, including those for air quality, temperature, humidity, soil moisture, dust, ultrasonic ranging, gyroscope, GPS, and Bluetooth. R.I.F.T. can assess air and soil conditions, terrain safety, and environmental suitability in real time.

The project involved the full engineering process, from hardware assembly and sensor integration to software development. We built onto the rover's chassis, carefully mounted and calibrated each sensor, and overcame numerous technical challenges related to data collection and communication. A major milestone was the development of a custom mobile app using MIT App Inventor, which allowed us to visualize live sensor data and monitor the rover remotely.

Throughout this internship, we collaborated closely as a team, leveraging our combined problem-solving, coding, and communication skills to troubleshoot obstacles and improve our design iteratively. Our work highlights how accessible technology and collaborative engineering can help address critical questions in lunar exploration and support the future of human space missions.

Samuel Valencia

Major: Civil Engineering



Airframe Assembly Intern at Joby Aviation

Intern: Isaac Virgen

Mentor: Eric Dungan

Opportunity: Joby Aviation

Engineering carries a weight of responsibility few professions match — each engineer a single cog whose precision keeps the larger machine of a company running. Though every engineer has a specific department and area of concentration, one key takeaway often gets overlooked: the diversity of skill and thought engineers bring to a company. I had the opportunity to work alongside talented and skilled engineers, staff, and technicians at Joby Aviation as an Airframe Assembly intern. Joby Aviation is an electric vertical takeoff and landing (eVTOL) air taxi company, making flight more innovative, cleaner, and more sustainable through electric propulsion. I spent my summer on Joby Aviation's Airframe Assembly (AFA) team, working hands-on with the S4 aircraft under the mentorship of Eric Dungan. My placement put me directly on the shop floor alongside engineers, technicians, and staff — giving me a firsthand view of how every position's responsibilities connect to the larger goal of building a certified aircraft. Over the course of the summer, I supported the AFA team across a wide range of hands-on and technical work — prepping and protecting wing fixtures, tracing dimensional issues back to their root cause, authoring a crane operating procedure, qualifying the hot bonder for post-cure use, and modeling metallic brackets in SolidWorks. Each task drew on a different skill set, yet all of them worked toward the same goal: moving the S4 closer to a certified, flight-ready aircraft, and leaving me with sharper problem-solving, communication, and hands-on engineering skills.

Isaac Virgen

Major: Mechanical Engineering



Astronomy Internship: Not like the Pictures

Intern: Isaac Virgen

Mentors: Rob Hawley, Eric Egland

Opportunity: Fremont Peak Observatory

FPOA

'When you look at the stars, you're seeing the past". - unknown

Humans have been looking up at the sky for hundreds of thousands of years, sparking questions about the universe which have yet to be solved. Through generations the night sky has inspired us to innovate, serving as a visual goal post. This year I got the chance to partake in this generational exploration for answers we know as astronomy. Throughout this internship I was able to get hands-on experience with amateur telescopes such as the Big Orange which is a 10-inch Newtonian telescope. My main tasks involved adjusting the telescope and picking out suitable objects to improve the public's science education. Along the way I learned important skills and knowledge such as telescope operation, astronomy and telescope fundamentals, public speaking - or even just how different galaxies look compared to the pictures we see every day. Instead of these extremely bright objects with beautiful spirals I'd seen in photos, the galaxies through the telescope looked like fog, or a stain on the lens. I would often wonder if I was seeing a galaxy or nebula, or if I was starting to imagine things. Nonetheless, this experience was eye-opening. This year I was able to look at the same night sky that our ancestors looked at with wonder, and just like them I made my own observations and discoveries.

Issac Virgen

Major: Mechanical Engineering



Manufacturing Training Development for Joby Aviation

Intern: Aurora Webeck

Mentor: Ken Burleigh

Opportunity: Joby Aviation

My role as an intern focused on supporting the development of manufacturing training for the aerospace organization Joby Aviation. I contributed to the implementation of an updated manufacturing training system by creating and organizing training courses within a structured framework designed to improve training assignment, tracking, and completion efficiency while reducing unnecessary repetition for employees. My primary responsibilities included creating and organizing more than 200 manufacturing training courses within the company's Learning Management System (Lift) using existing instructional materials. This involved creating and formatting the courses in Lift, creating quizzes, and supporting the implementation of the updated training framework. Separately, I contributed to drafting training reference materials and assisted with various documentation and other course creation projects that supported the team's broader training initiatives. I also utilized AI tools to improve the efficiency of documentation and course development workflows by assisting with content drafting and streamlining portions of the course creation process. One of the most valuable aspects of this internship was learning how to manage a large-scale project with many interconnected tasks and evolving priorities. It required balancing multiple deliverables, deadlines, revisions, and dependencies while maintaining organization and attention to detail. I developed stronger skills in project coordination, communication, adaptability, and problem-solving by tracking milestones, identifying outstanding tasks, and helping ensure important project requirements were addressed throughout the development process. I strengthened my abilities in technical documentation, instructional design, learning management systems, and collaboration. I gained a deeper understanding of how effective manufacturing training programs are designed, organized, and maintained. More importantly, this experience showed me the importance of thoughtful system design, clear communication, and adaptability when contributing to complex technical projects.

Aurora Webeck

Major: Mathematics



Social Network Analysis for Disaster Resilience and Developing Response Networks in Oregon Communities

Intern: Aurora Webeck

Mentors: Chad Machiela, Seth Gray

Opportunity: Naval Postgraduate School

The Cascadia subduction zone located off the Pacific Northwest coast poses significant hazard due to its potential to generate megathrust earthquakes and tsunamis. In Oregon, diverse harsh terrain increases the risk of community isolation following a Cascadia event, as damage to infrastructure and communication networks may prevent access to emergency resources and responders. This project, conducted through the Naval Postgraduate School's CORE (Common Operational Research Environment) Lab in partnership with Oregon's Office of Resilience and Emergency Management (OREM), applied social network analysis to model local Oregon community resilience networks. Research was done to figure out connections between individuals in local communities that have access to resources that could be needed in time of disaster, and the model then shows us where gaps in connections are that prevent resources and information from efficiently moving through the network. The data was then passed on to OREM where they will go out in the local communities to confirm ties and develop new connections to create a more robust response network.

I contributed to this project by conducting research on communities and creating new network models that tied together individuals based on communication paths and resources. Through this experience, I developed skills in data analysis, research methodology, and technical communication, and I gained insight into how quantitative modeling can support real-world disaster preparedness and response.

Thank you to my mentors who both supported me during this project, encouraging me to ask questions and learn as much as I could; and thank you to MESA for connecting Hartnell students to internships. I am incredibly grateful for this opportunity.

Aurora Webeck

Major: Mathematics



Dual internship with the CED & Public Works Department

Intern: Soraya Alina Zuniga

Mentors: Juan D. Huerta & Alex Ramos

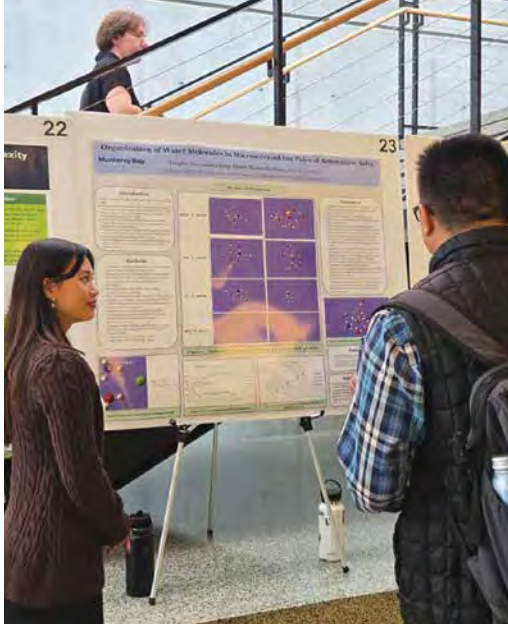
Opportunity: City of Soledad

The City of Soledad has provided hands-on experience as to what it means to be an engineer in the Public Works Department and their Community Economic Development. As a Civil Engineering student this experience has given me an insight as to how my future career may look. Through this internship I have been given the privilege of connecting with various professionals such as contractors, planners, project managers, and engineers. As well as assisting in various projects like the following; conducting field inspections on roads and sidewalks, ensuring traffic safety, implementing road diets, enhancing landscape, creating ordinances, and a citywide recycle water conveyance. This exposure has given me a better understanding as to how different factors influence the job of a city engineer as we are constantly taking into consideration the safety of the public, their necessities and wants. Overall, this has bridged the gap between the present classroom learning and the future possibilities as an engineer.

Soraya Alina Zuniga

Major: Civil Engineering


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MICRO-INTERNSHIP MENTORS

Jeffrey Hughey

Chloroplast genome of the Menzies' wallflower *Erysimum menziesii*

and

Complete plastid and mitochondrial genomes of the red algae *Chiharaea americana*

Dr. Rosser Panggat

Effectiveness of Anatomy Visualizing Tables in mapping the Human Body

Tito Polo

Arduino, Electrical Soldering, and Oscilloscope



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MICRO-INTERNSHIP

Complete chloroplast genome of the federally endangered Menzies' wallflower *Erysimum menziesii* (Brassicaceae, Anthophyta) from California, USA

Mentor: Dr. Jeffery R. Hughey

STUDENTS:

Alondra G. Aguilar
Pilar Arreguin
Isabel Bejar
Alejandra Castro
Millo D. Chavarria
Oscar Chavez
Jacqueline Cruz-Martinez
Ruby J. De la Cruz-Ortiz
Paloma L. Degrandis-Figueroa
Kaleigh Gonzalez
Mayra E. Gutierrez-Vargas
Mason Hill
Cameron M. Jones
Kayla Kennamore
Vanessa Lopez
Madry M. Nelson
Itzel Lopez Magana
Jasmine Magana-Zavala
Brianna S. Martinez
Vanessa Mendez Gutierrez
Brayan Mendoza
Jorge E. Morales
Sarahi Ochoa
Rosalie Perea-Lopez
Judith Perez-Rizo
Dalyla Quiroz-Contreras
Emily C. Ramirez
Fidel Ramirez III
Izes Ramirez
Tatiana Rozin
Maria G. Salazar
Paulina Saldana-Landeros
Joel Sosa
Joana Vega-Valencia
Andrea Villanueva
Ruby Villicana
Janet Zambrano, *on behalf of Hartnell College Genomics Group†*

THE ABSTRACT:

Erysimum menziesii is a flowering plant distributed from southern Oregon to central California where it grows on coastal dunes, headlands, and cliffs. It was originally common on the Monterey Peninsula, California, but by the 1980s the population size of *E. menziesii* from the peninsula had declined significantly due to residential development and competition from non-native plants. As a result *E. menziesii* was placed on the federally endangered species list in 1992. Despite its endangered status, published genomic data from *E. menziesii* is lacking. In this study we performed whole genome Illumina 150 bp sequencing on a specimen of *E. menziesii* from Pacific Grove, California to contribute to the bioinformatics and conservation genetics of this extremely rare species. The sequencing data was assembled and resulted in a complete circular chloroplast genome that is 154,668 bp in length and displays a characteristic flowering plant quadripartite structure. The genome contains a large 83,863 bp single-copy region, 17,847 bp small single copy region, and two 26,479 bp inverted repeats. The *E. menziesii* chloroplast genome has 130 genes including 85 protein-coding, 37 tRNA, 8 rRNA genes. Four of its ribosomal genes (rrn4.5S, rrn5S, rrn16S, rrn23S) and seven protein-coding genes (ndhB, rpl2, rpl23, rps7, rps12, ycf1, ycf2) occur in duplicate. Twelve of the tRNAs occur singly, four in duplicate, three in triplicate, and two in quadruplicate. This data documents the chloroplast genome of *E. menziesii* and provides valuable genetic information for future management efforts of this federally endangered species.



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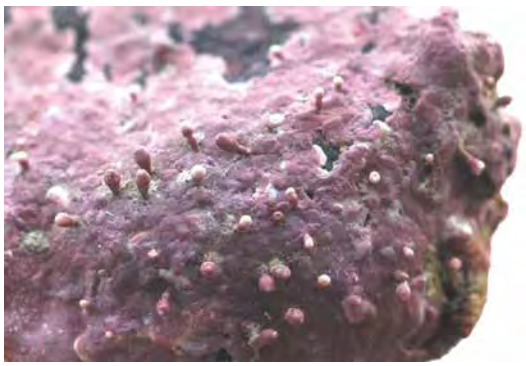
Complete plastid and mitochondrial genomes of the *coralline marine red algae Chiharaea americana* f. *americana* and *C. americana* f. *bodegensis* (Corallinaceae, Rhodophyta)

Mentor: Dr. Jeffery R. Hughey

STUDENTS:

Jose J. Aceves-Saldana
Aurpita Ahmed
Kimberly Alonzo
Moises Alvarez
Leilani M. Arroyo
Gisselle Avila
Lilly C. Baez
Kaeley N. Barbosa
Emily Bautista
Alfred Becerra
Aundrea Boykin
Aaron Braasch
Aaliyah Burton
Angelique A. Cabrera
Angelica Rosemarie F. Canque
Rafael Cantu
Diego Castaneda-Fuentes
William J. Clark
Jennifer De Jesus
Elizabeth De Lira
Ixchel C. Flores-Aranda
Moises Funtila
Paul W. Gabrielson b
Julianna M. Gonzalez
Jadah S. Gustus
Hayli Hernandez-Celestino
Dain Hong
Aiden Ishimaru
Jamilah Ahmed Joseph
Hyemin Lee
Adrian I. Lopez
Mariah I. Marquez-Gonzalez
Angelita Martinez-Montesino
Carlosemilio Moreno
Ashley A. Ortiz
Leylani B. Ortiz
Emily A. Palomares
Fatima Pamatz-Angel
Max Payne
Marlen Pichardo
Naomi E. Pressey
Kennedy B. Rios Barragan
Genesis Rios Bustamante
Ulises Rios
Halie R. Roberts
Oscar L. Rodriguez
Destiny Sanchez
Lizbeth M. Sandoval
Jasmin Serrano
Aiden Valdez
Jaskaran S. Walia
Emma L. Winningham, *on behalf of Hartnell College Genomics Group†*

THE ABSTRACT:



Chiharaea americana and C. bodegensis (Corallinaceae, Rhodophyta) are two marine coralline red algae distributed in the northeastern Pacific Ocean. Originally these corallines were recognized as distinct species, however recent multigene phylogenetic analyses support the conclusion that they represent ***formae*** of a single species, as *Chiharaea americana* f. *americana* and *Chiharaea americana* f. *bodegensis*. To date, no organellar genomes of f. *americana* and f. *bodegensis* have been published. The purpose of this investigation was to characterize the plastid and mitochondrial genomes of these two *formae* as well as document their intraspecific differences at the chromosome-level. Here, the complete plastid and mitochondrial genomes of f. *americana* and f. *bodegensis* were assembled and analyzed using 150 base pair paired-end Illumina DNA sequencing. We found that the plastid and mitochondrial genomes of f. *americana* and f. *bodegensis* were highly similar in gene number (plastid 233 vs. 234; mitochondrial 50), length (plastid 180,947 vs. 180,756; mitochondrial 25,923 vs. 25,942), organization, and pairwise identity (plastid 99.36%; mitochondrial 98.85%). The plastid genomes differed between the two *formae* by 1097 single nucleotide polymorphisms (SNPs) and 16 indels and the mitochondrial genomes differed by 272 SNPs and 12 indels. We anticipate that the findings of this analysis will serve as a reference to future researchers for defining species, varieties, and forms of coralline red algae.

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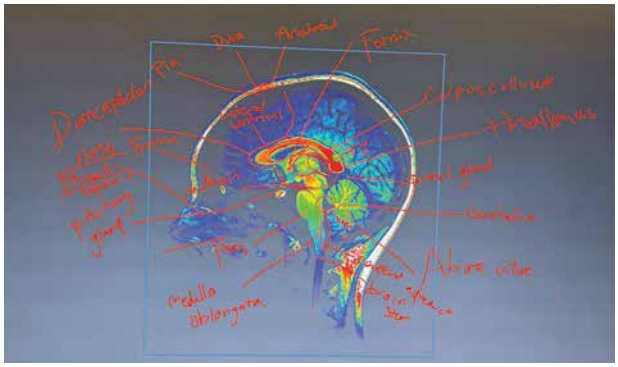
The Effectiveness of Anatomy Visualizing Tables (Body Viz Anatomy Tables and software) in mapping the Human Body by utilizing actual diagnostic imaging studies in facilitating learning of Human Anatomy of among Hartnell College Biology Students

Mentor: Dr. Rosser Panggat

STUDENTS:

Pilar Arreguin
Samantha Avila Gomez
Anya Carrillo
Dean Florez
Destinee Garcia
Kaliyah Gonzalez
Gloria Jaimez
Angela Martinez
Yareli Meza
Daniel Ndubisi
Priscilla Nunez
Laura Pascua
Alyssa Pendo
Darlene Quiros
Aaileen Ramirez
Jayleen Rodriguez
Daniela Ruiz-Mendez
Samantha Salvador
Paolo Sandoval Brennan
Cecilia Santos
Kathy Tanner
Shayna Tomas
Joshua Valencia Romo
Raquel Vega
Camila Vides

THE PROJECT:



Technology has been paving its way into human anatomy and medical instruction by infusing diagnostic imaging (2D CT and MRI scans) into interactive fully rendered 3D models. This has allowed the improvement of how lessons are delivered and enhance the student learning experience. It also allows increased student engagement and encourages student collaboration by the interactive softwares available in the market. One of these softwares is the Body Viz visualization software which was integrated into an interactive virtual dissecting human anatomy table.

This proposal aims to enable 30 Hartnell College Biology students to get in-depth and hands-on learning by training them in the following skills: Body Viz Software introduction, demonstration, installation and implementation for student participants, Body Viz Anatomy Table introduction, demonstration and interactive activity exercises. The project will involve thoroughly studying the Body Viz software and Body Viz Anatomy Table, live hands-on training with a well-experienced and knowledgeable Body Viz Table user, taking assessments and evaluation surveys, managing and analyzing diagnostic images and creating a Body Viz tutorial video for students together with the creation of a selected diagnostic image to annotate.

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Arduino, Electrical Soldering, and Oscilloscope

Mentor: Tito Polo

STUDENTS:

Aaron James Lomboy
Arshdeep Cheema
Carlos Sanchez
Daniel Cruz
Demetrio Lopez
Devin Dominguez
Emma Herrera
Gabriel Bello
Isaiah Elliott
Janai Orozco
Jorge Garcia
Joshua Torres
Juan Lopez Naranjo
Karla Chavez
Marc Anthony Jimenez
Marcus Hernandez
Maria Santibanez
Richard Morales
Samuel Valencia
Saul Soto
Sebastian Velarde
Socrates Figueroa
Sofia Beltran Espino
Tomas Calusdian

THE PROJECT: Arduino design has been at the forefront of user-friendly software and hardware development, especially in solving real-world problems. Students will work on Arduino projects such as programming a blinking LED, creating a temperature and humidity sensor circuit, building a water-level detection device, controlling DC motors via Bluetooth with an Arduino, wiring up and using an alphanumeric LCD display, an analog Joystick module, and several other sensors. Students will also learn the concepts of and how to implement different electronic components, Digital and Analog circuits, and Arduino boards. Also, students will learn to solder electronic components and use electrical measuring equipment, including a voltmeter, an ammeter, a function generator, and an oscilloscope.





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For more information about the
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contact Joel Thompson
(831) 770-6106 • jothompson@hartnell.edu
or visit: www.hartnellstem.org

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