HARTNELLCOLLEGE

STEM

15th Annual Hartnell College Virtual STEM Internship Symposium November 12, 2021

Summer STEM Internship Program

For more information contact:
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HARTNELLCOLLEGE

15th Annual Virtual STEM Internship Symposium

STEM

SCIENCE • TECHNOLOGY • ENGINEERING • MATH

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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 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.

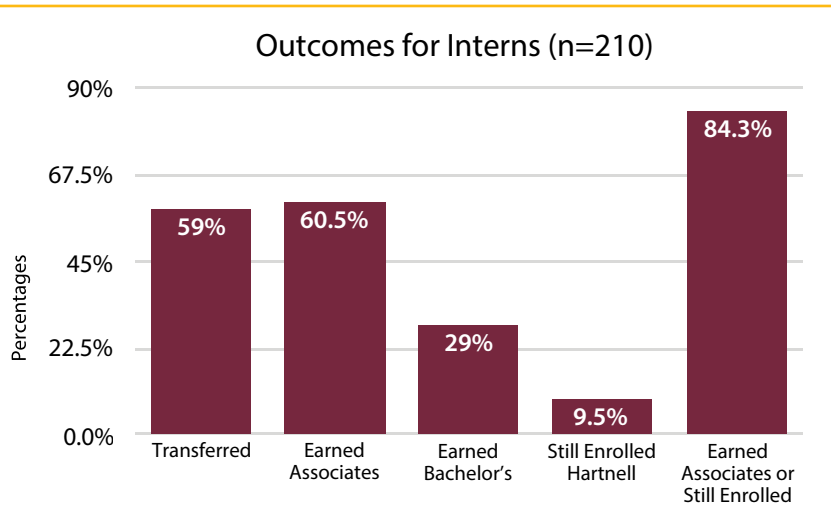
Hartnell is strengthening diversity in STEM while taking on the challenge of meeting our nation's skilled workforce needs. The program is creating a new legacy of opportunity for the families of the Salinas Valley by producing future generations of bright young scientists through innovative and comprehensive STEM programs and initiatives. For the past 15 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.

The STEM Internship Program began in 2006 with the placement of six student interns. Since then, the program has placed more than 1,200 students in undergraduate research and professional internship opportunities. In addition to its growth over the 15-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 271 interns from cohorts 2017 through 2021, **84% have transferred, earned their Associate of Science, or still enrolled at Hartnell College**. Of the interns who have transferred, **69.5% have earned their bachelor's degree or are still in progress**. 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**
- **Hispanic Serving Institutions STEM Title IV Grants**
- **Hartnell College Foundation**
- **National Science Foundation**
- **ACCESS Program (National Institutes of Health)**
- **California State University, Monterey Bay**

Thank you!



STEM INTERNSHIP PROGRAM TEAM

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

Moises Almendariz
Director of Academic Affairs, Hispanic Serving Institution Initiatives

Scott Faust
Director of Communications & Marketing

Joel Thompson
Director of Academic Affairs, Science and Math Institute

Belen Gonzales
Job and Internship Placement Coordinator

Anely Meneses
Program Assistant

Leda Polio
Program Assistant

Hartnell College Mentors
Dr. Sewan Fan
Dr. Pimol Moth
Tito Polo
Brian Palmer

Micro Internship Mentors
Shannon Bliss
Dr. Jeffrey Hughey
Victoria Hutchins
Michael McCarthy
Brian Palmer

University Collaborative Support
University of California, Santa Cruz
Dr. Gabriella Amberchan
Dr. David Bernick
Carmen Robinson

California State University – Monterey Bay
Dr. Sathya Narayanan
Dr. Corin Slown
Mindy Sanchez-Ryan

Naval Postgraduate School
Alison Kerr
Dr. Andy Nieto

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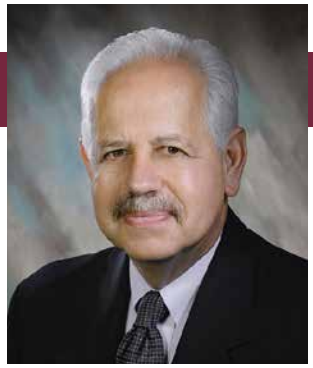

WELCOME

Dear students and friends,

Hartnell College has many things to be proud of, and the STEM Internship Program and its student participants are definitely among them. As the largest of its kind among all U.S. community colleges, this program offers a life-changing opportunity for experiential learning while strengthening Hartnell's relationship with the valued partners who host our interns. Our students' skills and dedication help ensure that these companies and institutions remain eager to stay involved year after year.

A student's decision to become a STEM intern, whether through a micro-internship or traditional-length experience, offers downstream benefits that are hard to overstate. Students are able to apply knowledge acquired in the classroom in a real-world context. They also are able to work with others and within time constraints to complete a research-related task. Often they gain insight into whether they will incorporate a particular field into educational and career goals. Finally, the experience prepares them to pursue future internships during their undergraduate and possibly post-graduate studies.

With these many rewards in mind, I offer my congratulations to all who completed internships over the past year and my gratitude to our faculty, staff and valued internship partners. Even amid the pandemic, you have sustained a great Hartnell tradition!

Sincerely,

Raúl Rodríguez, Ph.D.
Superintendent/President, Hartnell College

HARTNELLCOLLEGE

Hartnell College Vision

Hartnell College students will be prepared to contribute as leaders to the intellectual, social, cultural, and economic vitality of our communities and the world.

Hartnell College Mission

Focusing on the education and workforce development needs of communities in the Salinas Valley, Hartnell College strengthens communities by providing opportunities for students to reach career and/or academic goals (associate degrees, certificates of achievement, transfer to four-year institutions) in an environment committed to student learning, achievement and success.

STEM Internship Partnership & Mentors

California Space Grant Consortium
Dr. John Kosmatka

California State University, Monterey Bay
Dr. Sathya Narayanan

County of Monterey, Division of Public Works
Chad Alinio

Elkhorn Slough Foundation Elkhorn Slough National Estuarine Research Reserve
Dash Dunkel
Ariel Hunter

Food Origins

Fremonta Corporation
Garth Hoffmann

Hartnell College
Dr. Sewan Fan
Dr. Jeffrey Hughey
Victoria Hutchins
Dr. Pimol Moth
Brian Palmer
Tito Polo
Dr. Mohammed Yahdi

Mann Packing Company Inc. Del Monte Fresh Produce
Sandra Bravo

Naval Postgraduate School
Dr. Andy Nieto

National Science Foundation*

Seed4STEM
Shannon Bliss

SmartWash Solutions
Dr. Eric Wilhelmsen

United Genetics
Dr. Raquel Salati

University of California, Berkeley (SSL)
Trevor Bowen
Dr. Roger Roglans

University of California, Santa Cruz (IGEM)
Dr. David Bernick

University of California, Santa Cruz (ACCESS)
Dr. Gabriella Amberchan

United States Department of Agriculture – APHIS
Dr. Juan Alvarez
Dr. Greg Simmons

*Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation. This material is based upon work supported by the National Science Foundation under Grant No. 1832446.

Special thank you to our

ANDY NEWTON STEM INTERNSHIP PARTNER AWARD WINNER

Seeds 4 STEM

HARTNELLCOLLEGE

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STEM

NOVEMBER 12, 2021

WELCOME

Dr. Raul Rodríguez

OVERVIEW OF THE PROGRAM

Dr. Mohammed Yahdi

STUDENT PANEL DISCUSSION

Maria Diaz Angel
Javier Lopez
Yesenia Magallanes

PRESENTATION OF ANDY NEWTON STEM INTERNSHIP PARTNER AWARD

STUDENT INTERNSHIP PRESENTATIONS

Jose Lomeli
Jesus Delgadillo Ponce
Citlally Lopez-De Leon

PRESENTATION OF NEW WEBSITE

CLOSING

HARTNELL COLLEGE

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INTERNSHIP PROGRAM 2021

STUDENT INTERNS

Gricel Aguilar Quiroz
Rodrigo Andrade
Samantha Avina
David Cardenas
Gabriel Coria
Nayeli De Jesus
Jesus Delgadillo Ponce
Maria Diaz Angel
Adriana Michelle Duran
Ruben Esqueda
Gabriela Flores
Ashley Garcia
Aldo Jarvio
Arturo Jarvio
Kimberly Jarvio
Robin Keire
Archie Noel Lleva
Jose Emilio Lomeli-Vega
Javier Lopez
Julio Lopez
Norma Citlally Lopez-De Leon
Yesenia Magallanes
Jeremy Meharg
Ivan Mendoza Ojeda
Matthew Montgomery
Dustin Moore
Jonathan Nachazel
Junnin Palima
Edgar Peralta
Frank Perez
Elizabeth Pinedo
Michael Velasquez

Developing an Environmental Quality Monitoring System

Gricel Aguilar Quiroz

Team Members: Archie Noel Lleva, Yesenia G. Magallanes, Gricel Aguilar Quiroz

Mentor: Tito Polo

Location: Hartnell College

The process of inhabiting a specific environment requires that organisms be able to maintain certain conditions for their survival. As it is, the moon's environment is barren and incapable of sustaining terrestrial life on its own. The construction of a moon base will pose several challenges to adapting to life on the moon such as maintaining temperature and air quality levels. The inability to control such variables may prove lethal, if not addressed immediately.

This project aims to address this concern by producing an environmental quality monitoring system. The product itself will contain a variety of sensors that determine the environmental quality of a certain space. Furthermore, the system will be programmed to present notifications regarding the environmental quality and emergency alerts when conditions fall under desirable levels. Its construction will require the use of the following components: a Raspberry PI 4, a Raspberry PI Sense HAT, and an air quality detection sensor. Moreover, the Raspberry PI Sense HAT contains a combination of the following sensors: temperature sensor, accelerometer, pressure sensor, and a humidity sensor. Through the Raspberry PI, the data collected will be analyzed and saved periodically. An external monitor will display and provide access to the different types of data collected. In the event that the data collected at any period in time falls under normal conditions, the system will trigger a warning using the Sense HAT's LED matrix.

Gricel Aguilar Quiroz

Major: Electrical Engineering

Web Application for Surveying 3D Objects

Rodrigo Villifana Andrade
Mentor: Omar Shehata

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There is a huge community of people scanning 3D objects. However, each of those models is isolated without any way to compare them with each other or in the perspective of the real world. Our web application fixes this issue by using a combination of multiple technologies to be able to have a real-world environment that allows the user to import 3D models from Sketchfab (a platform with 3D models). Those imported 3D models are then placed on the 3D world in a location of the user's choice. The location of the model is determined by longitude and latitude to be more precise of where the model is being placed. For the map, we used a technology called Mapbox. Mapbox is a great modern map API (Application Programming Interface) that helps with mapping, navigating, and search. However, Mapbox alone cannot be used to deal with the 3D models. Three.js is a 3D library that we used to load the models onto the map and also to manipulate those models such as moving them from place to place. Our app still has a lot of room to grow, however, users are able to upload multiple models onto the map and move them around anywhere on the map.

Rodrigo Villifana Andrade
Major: Computer Science

Building an Online Presence for Seeds4STEM

Samantha Avina
Mentor: Shannon Bliss
Location: Seeds4STEM

Over 67% of the US economy is dependent on workers in STEM (science, technology, engineering, math) careers. Unfortunately, youth often lose interest in STEM during their formative years, third to eighth grade, and will not pursue a STEM career. The start-up company Seeds4STEM aims to provide facilitated STEM experiences to 3rd to 8th graders to keep them involved and interested in STEM. The purpose of this project was to support Seeds4STEM in aspects of early non-profit development, particularly in building an online presence through using social media and their webpage. Building an online social media presence entailed thirteen posts on Instagram and Facebook, focusing on the company's message. Best practices show engagement increases when posts have a uniting theme; we found engagement increased when posts had a similar look. We also found that using STEM-related hashtags boosts the number of views. Work on the website incorporated learning website development techniques and researching website practices to make the website appealing to children and parents. Other contributions included putting together a spreadsheet of grants opportunities and working with Seeds4STEM's Executive Director on the steps for forming a non-profit. Seeds4STEM has now reached over 1,400 people with their message.

Samantha Avina
Major: Economic/Business Administration

Studying the Cyanobacterial Circadian System

David Cardenas

Mentors: Jeff Swan and Carrie Partch

Location: UCSC/ACCESS

KaiABC is a gene cluster that regulates the circadian system of cyanobacteria. Regulation of KaiABC expression and KaiABC phosphorylation is essential for cyanobacteria circadian rhythmicity and is particularly important for regulating cyanobacteria processes such as nitrogen fixation, photosynthesis, and cell division. Our aim was finding a fluorescent dye that would allow us to measure and find the oscillations of KaiC without directly labeling KaiB as previously done before. The methods employed included making solutions that included the Kai ABC proteins to reconstitute the cyanobacteria circadian rhythm in vitro. We studied the solutions with the qPCR machine using Quantstudio 6 and the Synergy 2 plate reader.

David Cardenas

Major: Political Science

Survey Rover

Gabriel Coria

Team Members: Gabriel Coria, Kimberly Jarvio

Mentor: Tito Polo

Location: Hartnell College

Astronauts have a difficult time entering caves on the moon to analyze their surroundings. This Arduino 4 Wheel Drive Remote Control Car Rover's main purpose would be to travel into tight spaces and allow itself to be controlled with the simplicity of joysticks. The Humidity/Temperature sensor helps distinguish the difference between the exposed surface terrain and the hidden areas that would be explored. By measuring the temperature, it can provide clues to what type of element the area is covered by checking specific heat. Whereas the Humidity data records if there is any humidity in the rocks, which can indicate if there are traces of water. The Light sensor would analyze which areas get the most sunlight on the moon. The Rover uses an Arduino, Arduino codes, a variety of sensors, and motors. It uses a 5V power supply and runs on a 4 Wheel Drive Smart Robot Car Chassis Kit. The Rover overall surveys the landscape and records the temperature, humidity, and light.

Gabriel Coria

Outreach Project

Nayeli De Jesus

Team Members: Nayeli De Jesus and Padyn Riddell

Mentor: Shubham Naik

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Our objective for this project is to build a service that allows people to create initiatives, for any cause of their choosing, that can allow people to visit their web page and create prefilled emails that send some message to their local politician and allows them to manage and monitor the progress of that initiative. The user can create an initiative for some cause (Repaint a crosswalk in my neighborhood). Interface where people who want to help the initiative can enter in some information and get a prefilled email that they can send to a local politician. Web app can track initiative stats (anonymous data, no names/emails collected). Stretch Goals: Initiative owners add info like phone numbers, links to go fund and videos to their initiative page. Initiative owners can monitor social media and trends to see how their initiative is going outside the page.

Nayeli De Jesus

Major: Computer Science

Testing Novel PETG Boron Carbide Composite Filaments for 3D printers

Jesus Delgadillo Ponce

Mentor: Dr. Andy Nieto

Location: Naval Postgraduate School

The main goal of this research is to improve the mechanical properties of 3D printed parts by creating novel composite filaments. These filaments were made of common polymers (either PETG or ABS) and ceramics with varying concentrations of boron carbide (B4C) and/or Graphene Nanoplatelets (GNPs). The concentrations of B4C and GNP varied from 0.5% to 1% by volume and the remainder is composed of the polymer matrix. Batches where the concentration of B4C reached 10% were made but were not tested. The first task was to determine if it was viable to produce and successfully print these composite filaments. To successfully complete this task, a cryogenic grinder, a Felfil Evo Extruder, and a 3D printer, Lulzbot Mini 2, was used. A cryogenic grinder was used to create powder that mixed the polymer and ceramic uniformly. The powder form would also increase the surface area of the polymer therefore allowing for a uniform distribution of ceramic. Trials with ABS and PETG powders resulted in successful filament extrusions, while all the composite filaments using PETG printed successfully. All the composite filaments using ABS, however, failed to stick to the print bed resulting in failed prints. The wear tests using a ball on disc tribometer are in progress.

Jesus Delgadillo Ponce

Major: Civil Engineering

Shiga Toxin: The Enemy

Maria Elena Diaz Angel

Mentor: Dr. David Bernick

Location: UCSC/IGEM

Shiga Toxin-producing E. coli (STEC) is one of the three main causes of food recalls in the United States. Living in a very agricultural centered area this is a project that attracted my interest. STEC tends to live in cattle gut and can contaminate leafy greens as well as water and soil. If it is contacted from a contaminated food one can have diarrhea, vomiting, stomach cramps, fever. Extreme cases end up leading to kidney failure and possibly death. Even with the CDC's preventative measure put into place, there are still about 265,000 STEC outbreaks per year.

We are creating a model that could be applied to silence the STEC gene in vivo with the hope that it would stop outbreaks through sequence specific elimination. We used the CRISPR-Cas system to add bacteriophages (conjugation) by transient bacteria. Once the plasmid has been delivered it will express RNA guided machinery, and will take out the stx2 gene. Only if it's present. After all of this, the system can grow through a mixed culture and conjugation

getting rid of the bacterial stx2. This will help local farmers as well as distributors to keep outbreaks from happening. This can also help with food waste.

While I was working on this project there was a recall in a meat packing facility in Omaha, Nebraska. Where 295,000 pounds of raw beef was recalled.

Scraping out colonies of chemi competent cells in order to test if they needed to be diluted or not

Maria Elena Diaz Angel

Major: Biology and Chemistry

Quality Assurance at Fresh Leaf Farms/Mann Packing

Adriana Michelle Duran

Mentor: Silvia Lopez

My internship is with Fresh Leaf Farms and Mann Packing. I am working at Fresh Leaf Farms from July till November and will move to Mann Packing in November and finish my internship in late January 2022. I will forever be grateful for this amazing experience. I have learned so much. To start off, I learned the principal defects of the various products we package. They are, CO2, light / severe pink, decay, fringe burn, tip burn, rib discoloration, torn leaves, mechanical damage, etc. I have learned this by working on Shelf Life, every day we check the produce stored in our facility to annotate how our customers are viewing our products from stores. I have also learned about the QA Water Tech position. It is a fast-paced environment. You are checking the pH, Chlorine, Turbidity, PTW, and EMP 200 water. Either every one or two hours depending on the task. There are some days that something rises to a high level, and everyone is calling me because the machine stopped. It is my job to go fix the problem and get the machine back up and running. There is many more position for me to learn throughout these next four months. I am taking into consideration Mann Packing for a permanent position once I complete my Plant Science degree.

Adriana Michelle Duran

Major: Plant Science

CodeDay Labs – Fair Air

Ruben Esqueda

Mentor: Eric Hui

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We worked on this project as CodeDay Labs interns with the help of our mentor Eric Hui. During this project, our team considered the fact that more people are concerned about air quality, especially during the upcoming fire season. Because of this, we decided to create Fair Air, a webpage that allows users to view current AQI levels and a forecast for the next couple of days based on the zip code the user enters.

The web app can run on multiple devices and in different formats. The items on the navbar can lead us to the different pages to get the desired information. Currently, we allow the user to log in with their Google accounts to our webapp. You do not need to register in order to use the Fair Air Project webapp. It makes it easier for you to just use your Google account to log in so that you can look up AQI data for your area by typing in your zip code. The website will respond and display the current and future AQI data for the current day and next few days depending on the data.

As a group, we had lots of different learning outcomes. The biggest being, learning to create a high-level design for our projects. We spent a lot of time researching and sorting through data to create our project design. With this we also were able to strengthen our software design principles. Expanding our tools and different programs we can use was another big learning outcome, as we used React, Devops and Build automations. None of us have actually used or built an application on react, we did have a learning curve to adapt to, but we were able to get through and we now feel comfortable and more than able to build an application on React. Although we all have worked on AWS, we were able to get more comfortable working with AWS. We also were able to learn to work as a team and collaborate to accomplish a goal from beginning to end.

Ruben Esqueda

Major: Computer Science

Investigation of Endocrine-disrupting Chemicals

Gabriela Flores

Location: UCSC/ACCESS

Adipogenesis is the formation of adipocyte cells from stem cells. Our aim was to understand how environmental agents affect adipogenesis, an important marker for metabolic disruption. More specifically, we want to analyze how endocrine-disrupting chemicals contribute to metabolic alterations, such as obesity, using an in vitro approach. In this project we study three different chemicals that are threats to human health; arsenic, nicotine, and chemicals derived from microfibers. To understand the impact these chemicals, have on our body we implemented an adipogenesis assay to measure lipid accumulation and gene expression of FSP 17 (Fat-specific protein 27) and FABP4 (Fatty acid binding protein 4) of mouse bone marrow mesenchymal stem cells (mBMSCs).

Gabriela Flores

Major: Political Science

Open-Source Compiler for IEC 61131-3 Structured Text using C++

Ashley Garcia

Team Members: Ashley Garcia-Arellano, Riley Gale, Max Finn

Mentor: Seth Itow, Engineer at Tesla

HARTNELL COLLEGE

In computing, a compiler is essential for translating one programming language into another. Computers work with machine code and the general public is most likely unable to read or write in machine code. Therefore, the compiler is a great tool that allows for communication with specific machines. The compiler is responsible for taking the source code from a high-level programming language to creating an executable program in lower-level language. Although there are a variety of compilers available for numerous purposes, not every programming language, such as IEC 61131-3 Structured Text, has a compiler. Only a few people know how to build a compiler, resulting in limited resources online on how to do so. Our project goal is to build a compiler for IEC 61131-3 Structured Text using C++, so people run their programs with ease. After conducting extensive research on existing compilers and collecting information on all the common structures of a compiler, we were able to figure out the main tasks performed by compilers. The team was able to complete the beginning steps in the conversion of ICE 61131-3 Structured Text source code to machine code. This is significant progress because as previously stated, there is no compiler for this programming language. The next step would be to continue working on the main tasks until the compiler is complete.

Ashley Garcia

Major: Computer Science

The Public Works, Facilities, and Parks Department Internship

Aldo Jarvio

Mentor: Chad S. Alinio, P.E., Civil Engineer

Location: County of Monterey

The Public Works, Facilities, and Parks Department, offers professional and essential services to the residents of Monterey County ranging from the maintenance of infrastructure to Engineering traffic studies. Throughout the Internship, various Civil Engineering assignments were conducted with the purpose of ensuring safety to the public. The Crossroads Software Program was used to input and validate collision data along County roads. Data analysis of collisions can benefit Traffic Engineers and help determine alternative solutions to provide safer travel along roads. In addition, a collision diagram is a tool used to give a visual representation which helps display accident patterns. It also helps determine the causes of unsafe collision factors that helps Engineers find solutions to minimize collisions along County roads.

Aldo Jarvio

Major: Civil Engineering

Updating Monterey County Public Works' database to increase efficiency

Arturo Jarvio

Mentor: Chad Alinio

Location: County of Monterey

The Monterey County Public Works has kept a vast record of surveys and maps that have been in existence for more than 100 years. These maps are very useful to county surveyors and engineers as it gives them insight as to whether they have the right of way, or property, for a project or rehabilitation of county roads. With the increase of technological advances everywhere, Monterey County has been attempting to move forward with storage of these historic maps and surveys. I was tasked with updating the Monterey County database of all the recent maps that have been used and those that will be in the upcoming future. Updating the database included using Adobe Pro to add identification numbers and clean up blemishes for the maps and plans to be readable. I also helped to categorize these maps according to whether they were a record of surveys, parcel maps, or plans for bridges. With this help, county surveyors and engineers alike will be able to access these map files easily and efficiently without having to pullout a five-foot-long map and use a magnifying glass to see where the right of way is. The work I assisted in doing will also help by having them ready to be inputted into the GIS, or the Geographic Information System, for the maps to be geographically pinned to their according location. This will also create better efficiency by just needing to search for the designated location, then all associated maps and surveys will appear.

Arturo Jarvio

Major: Civil Engineering

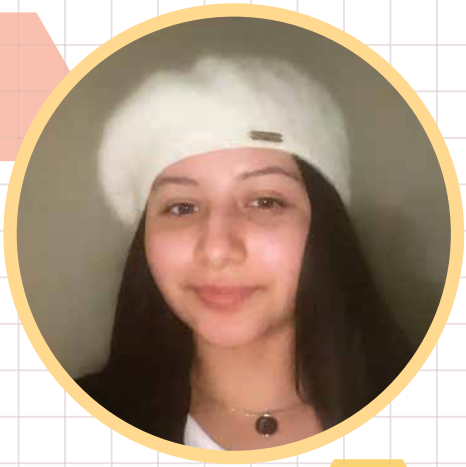
Survey Rover

Kimberly Jarvio

Team Members: Gabriel Coria, Kimberly Jarvio

Mentor: Tito Polo

Location: Hartnell College



Astronauts have a difficult time entering caves on the moon to analyze their surroundings. This Arduino 4 Wheel Drive Remote Control Car Rover's main purpose would be to travel into tight spaces and allow itself to be controlled with the simplicity of joysticks. The Humidity/Temperature sensor helps distinguish the difference between the exposed surface terrain and the hidden areas that would be explored. By measuring the temperature, it can provide clues to what type of element the area is covered by checking specific heat. Whereas the Humidity data records if there is any humidity in the rocks, which can indicate if there are traces of water. The Light sensor would analyze which areas get the most sunlight on the moon. The Rover uses an Arduino, Arduino codes, a variety of sensors, and motors. It uses a 5V power supply and runs on a 4 Wheel Drive Smart Robot Car Chassis Kit. The Rover overall surveys the landscape and records the temperature, humidity, and light.

Kimberly Jarvio

Major: Electrical Engineering

LBAM Trap Project

Kimberly Jarvio

Mentors: Greg Simmons, Eugenia Bejarano, Liliana Pimentel Monroy

Location: USDA-APHIS, Salinas

The light brown apple moth (LBAM), *Epiphyas postvittana* (Walker), is a member of the Tortricidae family and was first detected in Berkeley, California, in 2007. LBAM is an invasive species that damages plants by using their silk-webbing to make leaf roll nests and by feeding on the surface of leaves and fruit. LBAM is a pest of grapes, pome fruits, citrus, and a variety of other plants in California. This leads towards the incentive to manage this pest by using delta traps with a 4-component pheromone lure which is attractive to adult male moths. For pest monitoring programs, it is important to evaluate the trapping systems used to optimize the detection system. For this project, we conducted an experiment to evaluate which trap base adhesive is more effective for capturing LBAM. ISCA Technologies, Scentry Biologicals (both sticky glue), Trece and Alpha Scents (both hard glue), are the four adhesives that were used in the delta traps to evaluate and determine their relative trapping efficiency to capture LBAM moths and of non-target species. The experimental design used was Random Complete Block (RCB) and was replicated three times with each treatment occurring in each replicate block. The study was conducted from July 8 to August 12, 2021 on the grounds of the Salinas USDA station with traps hung in either *Cotoneaster* shrubs or *Prunus* species trees; two host plants that are attractive to LBAM adult moths. The results for the four different base adhesives are as follows: ISCA Technologies (sum: 88, avg: 10); Scentry Biologicals (sum: 88, avg: 10); Trece (sum: 67, avg: 7) and Alpha Scents (sum: 91, avg: 10). This indicates that Alpha Scents had the highest amount of LBAM that was captured. Overall, the three treatments, Alpha Scents, ISCA Technologies, and Scentry Biologicals, had a similar sum and average towards the total LBAM captured.

Kimberly Jarvio

Major: Electrical Engineering

Building a Surveying Rover for Space Exploration

Robin Keire

Team Members: Junnin Palima and Robin Keire

Mentor: Tito Polo

Location: Hartnell College

Space rovers provide an economical and safe means to explore space. Manually controlled wheeled rovers in the past have explored the Moon and Mars. Current rovers are being equipped to be autonomous. We constructed a manually controlled rover with caterpillars around the Arduino Uno and Raspberry Pi Model 4 B. The Raspberry Pi controls the rover's sensory system. The Raspberry Pi camera module v2 lets the user see where the rover is going, and the user can capture 8-megapixel images and 1080p video. The DHT-11 sensor allows the rover to measure the humidity and surface temperature. The photoresistor measures luminosity. Data gathered by the camera and DHT-11 can be viewed on the web or through an app. The Arduino Uno controls the rover's drive system, and another Arduino-based board controls the arm. The user connects with these two systems via Bluetooth. Two Parallax continuous rotation motors drive the caterpillars. An arm powered by five servo motors has its own Arduino board that comes with potentiometer manual controls and allows the user to grab and hold a specimen. Batteries power both systems. We can further modify the number of sensors for future operations and include an object-detection for the camera to detect and name objects and allow for an autonomous drive feature. Enlarging the rover will allow space to collect more than one sample.

Robin Keire

Major: Engineering

Developing an Environmental Quality Monitoring System

Archie Noel Lleva

Team Members: Archie Noel Lleva, Yesenia G Magallanes, Gricel Aguilar Quiroz

Mentor: Tito Polo

Location: Hartnell College

The process of inhabiting a specific environment requires that organisms be able to maintain certain conditions for their survival. As it is, the moon's environment is barren and incapable of sustaining terrestrial life on its own. The construction of a moon base will pose several challenges to adapting to life on the moon such as maintaining temperature and air quality levels. The inability to control such variables may prove lethal, if not addressed immediately.

This project aims to address this concern by producing an environmental quality monitoring system. The product itself will contain a variety of sensors that determine the environmental quality of a certain space. Furthermore, the system will be programmed to present notifications regarding the environmental quality and emergency alerts when conditions fall under desirable levels. Its construction will require the use of the following components: a Raspberry PI 4, a Raspberry PI Sense HAT, and an air quality detection sensor. Moreover, the Raspberry PI Sense HAT contains a combination of the following sensors: temperature sensor, accelerometer, pressure sensor, and a humidity sensor. Through the Raspberry PI, the data collected will be analyzed and saved periodically. An external monitor will display and provide access to the different types of data collected. In the event that the data collected at any period in time falls under normal conditions, the system will trigger a warning using the Sense HAT's LED matrix.

Archie Noel Lleva

Major: Electrical Engineering

INCAA Instrument and Testing

Jose Emilio Lomeli-Vega

Mentor: Roger Roglans

Location: University of California, Berkeley (SSL)

When particles from space encounter Earth, the Earth's magnetic field directs their energy towards the poles. INCAA (Ion-Neutral Coupling during Active Aurora) Is a sounding rocket that will be launching from Alaska in February of next year that will be flying through the aurora to measure how this energy dissipates into our atmosphere. Some of the scientific instruments that will be mounted on INCAA are designed and built at the Space Science Laboratory (SSL). Most of the work during this internship was directed towards learning basic electronic principles, circuit design, electronic lab instruments and testing the different voltage lines on the Low Voltage Power Supply (LVPS) and continuity and isolations on the Stacer Booms for the INCAA rocket. The LVPS is a power supply circuit that regulates voltage to the Stacer Booms. The LVPS also consists of a Voltage and Current monitors that check the behavior of these voltage lines when they are loaded. The Stacers Booms are antennas that are used to collect electrical fields during the flight and are crucial when collecting plasma data. After testing, the stacers continuity and isolation is performing as expected and are good for flight while the LVPS had issue with its -15V current monitor but was repaired and is also ready for flight.

Jose Emilio Lomeli-Vega

Major: Engineering

Exploring the Role of NHR-23-regulated Kinases and Phosphatases in C. elegans Spermatogenesis.

Javier Lopez

Mentor: James Matthew Ragle

Location: UCSC/ACCESS

While studying the Nuclear Hormone Receptor-23 (NHR-23) and its regulation during molting in Caenorhabditis elegans, we discovered a phenomenon. Via Green Fluorescent Protein (GFP) reporter, NHR-23 was seen being expressed in both the cuticle and in the immature germline of C. elegans. Our studies further explored the roles of NHR-23-regulated kinases and phosphatases and their effects on spermatogenesis in C. elegans. C. elegans rise from the phylum Nematoda and are types of, majority, hermaphroditic nonparasitic worms. In multicellular organisms like C. elegans, spermatogenesis is the process in which mature male gametes develop in the germline to mature in the spermatheca.

Using CRISPR/CAS9 technology, a series of stop codons were inserted to a gene in order to disrupt kinase and phosphatase activities, modifying gene expressions. Our findings helped emphasize the fact that NHR-23-regulated kinases and phosphatases are critical components of spermatogenesis in C. elegans in both hermaphrodites and in male worms.

Javier Lopez

Major: Molecular, Cellular, and Developmental Biology

Typing Speed Test

Julio Lopez

Team Members: Julian Diaz, Julio Lopez, and Jeremy Meharg

Mentor: Rafa Moreno Cesar

HARTNELLCOLLEGE

One of the most important skills to have, in the current day and age, is typing. Nearly everyone types at some point, and it is an increasingly needed skill in everyday life, whether for fun or work. Since it is an acquired skill, it is important to practice thereby getting better and faster.

Increasing your typing speed, measured in words per minute (wpm), may not seem like an easy task. However, when you turn the task of improving into a game, even the hardest of things can be easier to improve at. Our project follows this idea by being a simple game that you can play to practice your typing speed. It displays a paragraph and a text field where you type in the paragraph displayed and once the paragraph is completed, it displays your typing speed in words per minute. The paragraph to be typed is generated by the Metaphorpsum API, which creates a paragraph, or two, of sentences based on the number put into the sentence parameter of the URL.

We have coded the project's server side, or back-end, using Javascript. As for the front end, we coded it in React and JSX, which is a form of Javascript and XML combined.

Julio Lopez

Major: Computer Science

Stewardship and Outreach in Marsh Restoration

Norma Citlally Lopez-De Leon

Mentors: Ariel Hunter, Connor O'Hara-Baker, Dash Dunkell, Kari Olsen, Mary Paul

Location: Elkhorn Slough Foundation

Marshes, grasslands, chaparrals, and oak forests of coastal California serve as instrumental biomes to many living organisms. The basis of these communities is the plant populations under the unique challenge of heavy take-over by non-native competition and land development.

Conservation efforts focus on the difficult task of restoring a multitude of wildland environments to their historical plant ecology. The Elkhorn Slough Foundation (ESF) identifies and targets high-priority, non-native plant species for control and removal by acquiring land degraded by farming and land development. Plants targeted are those species that have outcompeted the native plant species and further degrade the land by removing nutrients from the soil, increase erosion risk, or negatively impact local freshwater resources. Non-native species are primarily removed by hand, and then the land is repopulated with hand-seeded or transplanted native species. The Elkhorn Slough National Estuarine Research Reserve (ESNERR) studies the phenology of native plant species and then applies this in large-scale restoration projects that span many years. Non-native species are removed, and then the site is treated and prepared for the hand seeding or transplantation of crucial native species. ESNERR also focuses on the long-term, large-scale project of eucalyptus tree removal, a critical species in decreasing plant diversity from the allelopathic ability of the trees and the detrimental effects to freshwater ecosystems. Frequent events are hosted to invite the public to learn about conservation efforts to form positive relationships with the communities around the central hub of ESNERR, a nature reserve in Watsonville, California. Educational public speaking is an extensively used skill to communicate the importance of coastal environments and garner support in restoration efforts.

In ten weeks, ESF and ESNERR applied these conservation techniques and ideas to multiple restoration projects. Results yielded included the reduction of fuel at the start of the fire season, reduction of encroaching invasive species, confirmation of maintenance status on a site used for outreach, application of outreach through public events, and outreach to the greater Californian public through a segment in the PBS KVIE series "Inside California Education."

Norma Citlally Lopez-De Leon

Major: Biology

Developing an Environmental Quality Monitoring System

Yesenia G. Magallanes

Team Members: Archie Noel Lleva, Yesenia G Magallanes, Gricel Aguilar Quiroz

Mentor: Tito Polo

Location: Hartnell College

The process of inhabiting a specific environment requires that organisms be able to maintain certain conditions for their survival. As it is, the moon's environment is barren and incapable of sustaining terrestrial life on its own. The construction of a moon base will pose several challenges to adapting to life on the moon such as maintaining temperature and air quality levels. The inability to control such variables may prove lethal, if not addressed immediately.

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Yesenia G. Magallanes

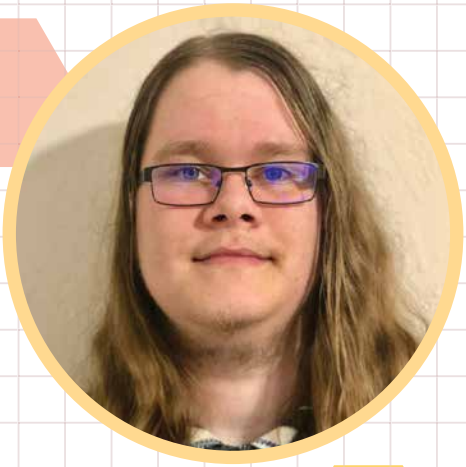
Major: Electrical Engineering

Typing Speed Test

Jeremy Meharg

Team Members: Julian Diaz, Julio Lopez, and Jeremy Meharg

Mentor: Rafa Moreno Cesar



HARTNELLCOLLEGE

One of the most important skills to have, in the current day and age, is typing. Nearly everyone types at some point, and it is an increasingly needed skill in everyday life, whether for fun or work. Since it is an acquired skill, it is important to practice thereby getting better and faster.

Increasing your typing speed, measured in words per minute (wpm), may not seem like an easy task. However, when you turn the task of improving into a game, even the hardest of things can be easier to improve at. Our project follows this idea by being a simple game that you can play to practice your typing speed. It displays a paragraph and a text field where you type in the paragraph displayed and once the paragraph is completed, it displays your typing speed in words per minute. The paragraph to be typed is generated by the Metaphorpsum API, which creates a paragraph, or two, of sentences based on the number put into the sentence parameter of the URL. We have coded the project's server side, or back-end, using JavaScript. As for the front end, we coded it in React and JSX, which is a form of JavaScript and XML combined.

Jeremy Meharg

Major: Computer Science

Capture the Flag (CTF): Cyber Range

Ivan Mendoza Ojeda

Mentor: Ken Price

Location: CodeDay Labs

In the world of computers, computer security is extremely important as no one wants their information stolen. Nowadays, hackers are attacking websites non-stop in an attempt to access valuable information ranging from bank passwords to site login information. Developers want to make sure they secure their programs and leave no gaps for hackers, however, many developers lack security experience and when they learn it's too late. A Capture the Flag game, or CTF for short, is a form of gaining experience in information security without having to put your product at risk. The aim of this project is to create a CTF game using Java Spring Boot and React, in which users can practice finding flags which are secrets hidden in the vulnerable site. By doing so, users gain experience in securing a machine, and conducting and reacting to all sorts of cyber attacks. The site we are working on simulates a school management system with two types of users, student and teachers. Students are able to view their grades and enroll into classes, while teachers are able to view students' grades and update student grades. Users then try to access information they are not supposed to be able to access and find the hidden flags. The more flags they find, the higher their score. This type of program helps developers understand the type of attacks they can encounter and teaches them how they can defend against them.

Ivan Mendoza Ojeda

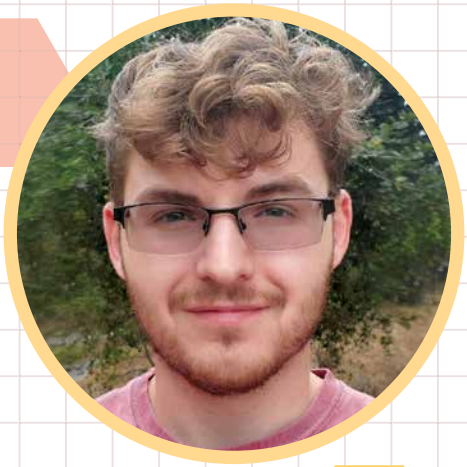
Major: Computer Science

Lunar Rover: a human following robot

Matthew Montgomery

Mentor: Tito Polo

Location: Hartnell College

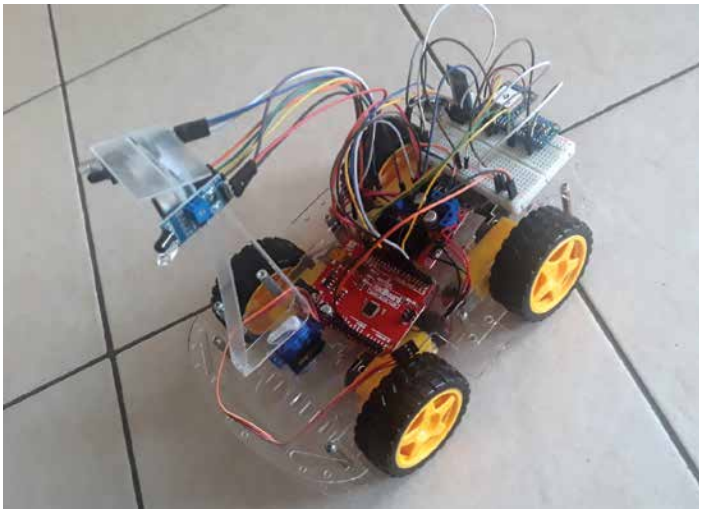


NASA's Artemis program aims to put humans back on the moon by 2023. From there, they plan to use that as a staging ground to access Mars. Our goal with this project is to build a rover that will be able to follow human astronauts, and carry their supplies. This will increase manpower without increasing the number of humans at risk.

Our rover will run off of Arduino code, and be powered by a 9 volt and AA batteries. It will include ultrasonic sensors, infrared sensors, a GPS module, and a Bluetooth module, all mounted to a chassis. The ultrasonic and infrared sensors will allow the rover to follow close signals, and the Bluetooth and GPS will allow for wider tracking. These two systems will enable it to follow the astronauts closely and accurately.

Matthew Montgomery

Major: Mechanical Engineering



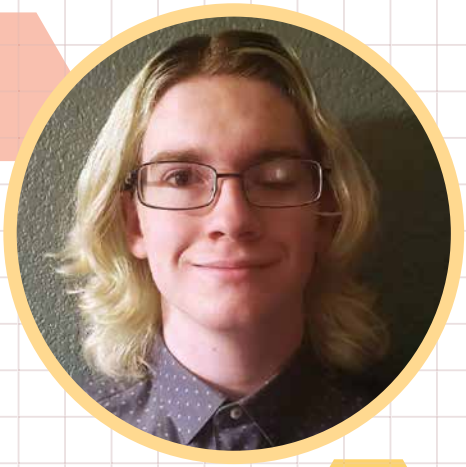
Lunar Survey Rover

Dustin Moore

Team Members: Dustin Moore and Jonathan Nachazel

Mentor: Tito Polo

Location: Hartnell College



For decades, various types of rovers have been used to advance humanity's knowledge of astronomical bodies outside of Earth, whether it be the Moon or even Mars. Rovers are used because they can be controlled remotely and can withstand the inhospitable environment of space. The goal of our project was to design and construct a Bluetooth-controlled rover that can collect and return data about temperature, humidity, as well as its spatial orientation and position. To do this, our design utilizes multiple sensors and a Bluetooth module connected to a 4-wheeled chassis. Through more extensive research and development, a similar rover could be used for the environmental data collection and exploration of outer space.

Dustin Moore

Major: Engineering

Lunar Survey Rover

Jonathan Nachazel

Team Members: Dustin Moore and Jonathan Nachazel

Mentor: Tito Polo

Location: Hartnell College

For decades, various types of rovers have been used to advance humanity's knowledge of astronomical bodies outside of Earth, whether it be the Moon or even Mars. Rovers are used because they can be controlled remotely and can withstand the inhospitable environment of space. The goal of our project was to design and construct a Bluetooth-controlled rover that can collect and return data about temperature, humidity, as well as its spatial orientation and position. To do this, our design utilizes multiple sensors and a Bluetooth module connected to a 4-wheeled chassis. Through more extensive research and development, a similar rover could be used for the environmental data collection and exploration of outer space.

Jonathan Nachazel

Major: Mechanical Engineering

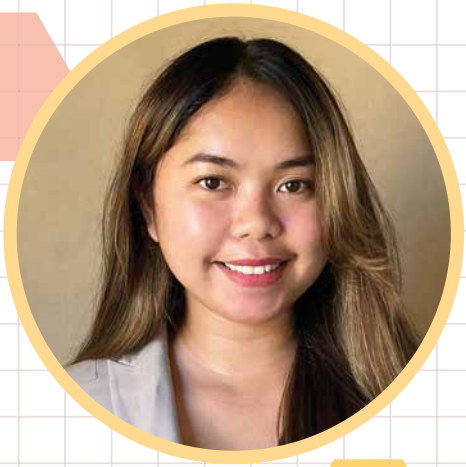
Building a Surveying Rover for Space Exploration

Junnin Palima

Team Members: Junnin Palima and Robin Keire

Mentor: Tito Polo

Location: Hartnell College



Space rovers provide an economical and safe means to explore space. Manually controlled wheeled rovers in the past have explored the Moon and Mars. Current rovers are being equipped to be autonomous. We constructed a manually controlled rover with caterpillars around the Arduino Uno and Raspberry Pi Model 4 B. The Raspberry Pi controls the rover's sensory system. The Raspberry Pi camera module v2 lets the user see where the rover is going, and the user can capture 8-megapixel images and 1080p video. The DHT-11 sensor allows the rover to measure the humidity and surface temperature. The photoresistor measures luminosity. Data gathered by the camera and DHT-11 can be viewed on the web or through an app. The Arduino Uno controls the rover's drive system, and another Arduino-based board controls the arm. The user connects with these two systems via Bluetooth. Two Parallax continuous rotation motors drive the caterpillars. An arm powered by five servo motors has its own Arduino board that comes with potentiometer manual controls and allows the user to grab and hold a specimen. Batteries power both systems. We can further modify the number of sensors for future operations and include an object-detection for the camera to detect and name objects and allow for an autonomous drive feature. Enlarging the rover will allow space to collect more than one sample.

Junnin Palima

Major: Electrical Engineering

Creating a Robot

Edgar Peralta

Mentor: Caitlin Stanton

HARTNELLCOLLEGE

During the internship at Code Day Labs, I was part of a team of three whose task was to create a robot. As a team we created a robot that not only turns on at a certain frequency but also detects objects that are in front of it. In response to detecting the object the robot will respond by turning left or right. Turning left or right, is dependent on which sensors detect the object and therefore will decide which clear direction to turn to. If the robot senses that it is "boxed in,'' the robot's response is to go in reverse until it senses that either its left or right side is clear and will turn towards that clear direction. This was achieved by using sensors on the front and sides of the robot's chassis. With sufficient time, the end goal for the team and I is to implement a microphone and a Wi-Fi shield to the robot. The microphone will be used to turn on the robot through voice command as well as be able to take simple commands such as "Spin". As for the Wi-Fi shield, it will allow the robot to connect to the Wi-Fi and therefore be able to remote control the robot on a desktop application or website.

Edgar Peralta

Major: Computer Science

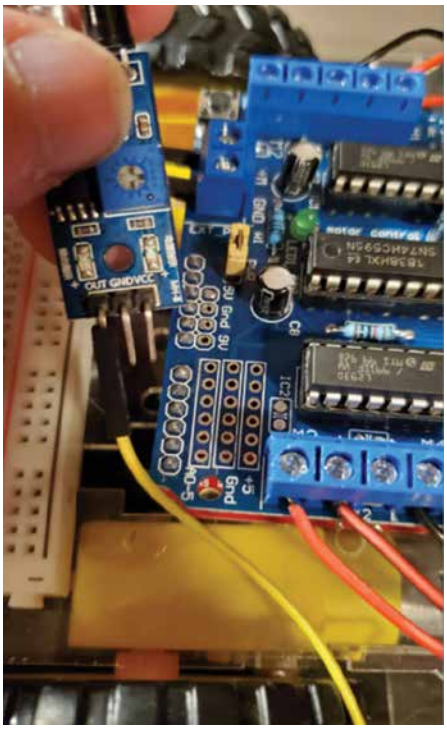
Lunar Rover: a human following robot

Frank Perez

Mentor: Tito Polo

Location: Hartnell College

NASA's Artemis program aims to put humans back on the moon by 2023. From there, they plan to use that as a staging ground to access Mars. Our goal with this project is to build a rover that will be able to follow human astronauts, and carry their supplies. This will increase manpower without increasing the number of humans at risk.



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Frank Perez

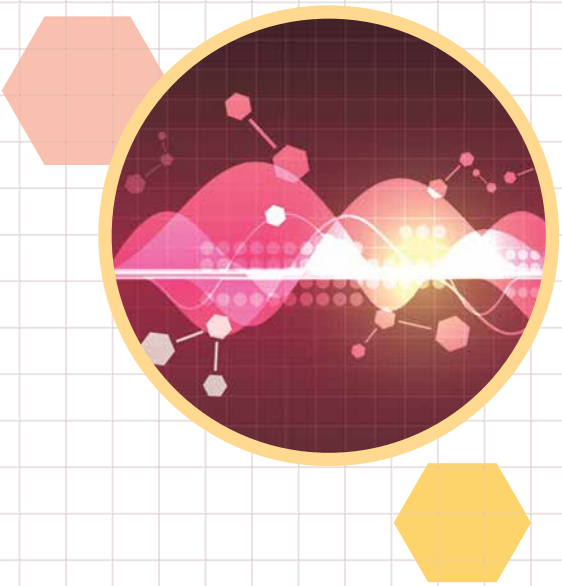
Major: Computer Science

Developing an A-mutant to Fluorescently Label and Elucidate the Endocytosis via the Prion Protein

Elizabeth Pinedo

Mentor: Amanda Smart

Location: UCSC/ACCESS



The human brain naturally produces the amyloid precursor protein (APP), which has been seen to have a connection to the development of Alzheimer's Disease (AD). In order to formulate a therapeutic that could help inhibit the progression of the neurodegeneration, it is imperative to better understand the factors of causation. The issue arises through the uptake of oligomeric forms, not so much the monomers of amyloid-beta. Uptake of amyloid-beta into the cell will be done by further examination into the uptake and mediation of amyloid beta via the prion protein. In this testing model, a non-toxic form of amyloid beta will be used to better understand its individual form and function. The objective of the project is to create a mutant amyloid-beta (A-) that is recombinantly expressed. The mutant protein can then be labeled with a fluorophore to make it elucidate the endocytosis mechanism of A- via the prion protein.

Elizabeth Pinedo

CodeDay Labs Internship: Intelligent Photo Gallery

Michael Velasquez

Mentor: James Ma

HARTNELLCOLLEGE

Online security has been a growing concern for many people recently. Especially when it comes to being able to store one's pictures, securely, without the worry that someone could hack into their account and either look through their pictures or even have them, potentially, leaked. The purpose of my internship at CodeDay Labs was to help develop a simple and effective solution to this problem via a web application. This web application allows users to upload pictures to the website and uses a machine learning algorithm to automatically label those pictures. What makes it unique in solving the aforementioned issue is that it is ran from a local server hosted by the user. Since the server is hosted locally and the pictures they upload are stored locally, users don't have to worry about any hackers getting access to their pictures. My involvement in the internship, specifically, was developing the backend server as well as the APIs managed by said server and helping develop the front-end server that users directly interact with.

Michael Velasquez

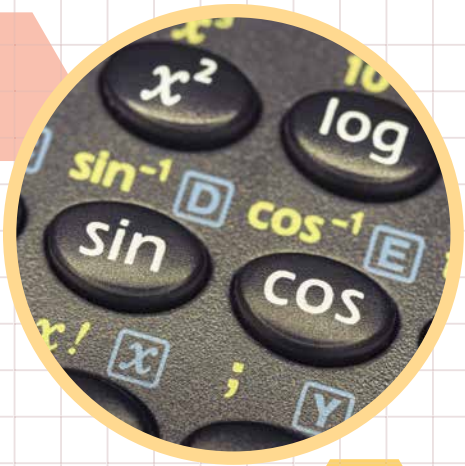
Major: Computer Science

MICRO-INTERNSHIP

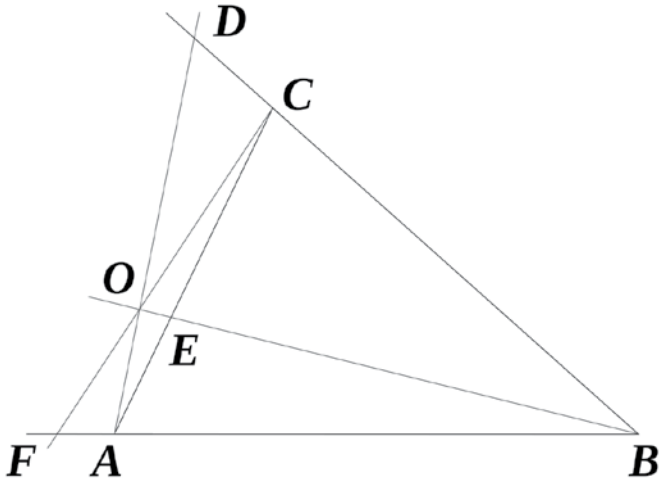
Topics in Advanced Trigonometry

Mentor: Brian Palmer

HARTNELLCOLLEGE



Trigonometry is one of the most useful branches of mathematics, and this internship sought to improve students' skills in trig by working with advanced topics that require full and creative use of a wide range of trigonometric skills. The Micro-Internship began an introduction to proof writing, which was used heavily throughout the experience. The students then worked with an old friend, the Pythagorean Theorem, and they were tasked with using their new proof writing skills to prove the Pythagorean Theorem. Later, students used Taylor series to write sine and cosine in terms of the exponential function, and used this relationship to prove all the basic trig identities. We then transitioned to the very new, challenging, but extremely useful Ceva's theorem, which relates points on the interior of a triangle to points on the boundary of the triangle. Finally, the experience finished with an amazing application of trigonometry in calculating distances between points on the earth using latitude and longitude.



Student Interns:

Raymundo Aguilar
Adrian DeAnda
Blanca Esparza
Leonel Espinoza
Manuel Hernandez
Mai Lynn Hunt
Silvia Pineda Jimenez
Seren Lara
Kimberly Manzano
Frank Perez

MICRO-INTERNSHIP

Yield Forecasting with Statistics

Mentor: Brian Palmer

HARTNELLCOLLEGE

As an ongoing project with Food Origins, Inc., a team of students this summer were tasked with testing a new protocol for counting boxes of strawberries harvested, based on a new system implemented in the field by Food Origins. Students began by learning the basics of R Programming and applied the basics of R programming to a rich, yet complicated data set from Food Origins. Students then learned the mathematics behind a machine-learning-styled algorithm (details withheld) and applied this technique to the Food Origins data set. Students applied this algorithm, classified portions of the word day by type (pre-work, active harvesting, breaks/lunches, post-work), and applied the box-counting technique during the working periods for harvesters. Additional boxes were estimated using an interpolation technique, and final box counts were compared to known box counts obtained from other sources. Box counts improved to within plus or minus 5%, over the original protocols that varied widely from person-to-person, and day-by-day.

Student Interns:

Mirella Baez
Christophe Essert
Ariel Galvan
Adrian Garcia
Daniela Lopez
Marissa Mares
Clarissa Medina
Elise Melchor
Yecenia Miranda
Paulina Morales
Allyson Olivas
Katherine Roman
Jose Rosales
Marilu Vivanco
Daisy Zamora-Pierrez

MICRO-INTERNSHIP

The complete mitochondrial genome of the strawberry aphid *Chaetosiphon fragaefolii* Cockerell, 1901 (Hemiptera: Aphididae) from California, USA

Mentor: Jeffrey Hughey

HARTNELLCOLLEGE

Chaetosiphon fragaefolii growing on a strawberry plant. The arrow indicates the specimens analyzed in this study.

The aphid *Chaetosiphon fragaefolii* Cockerell, 1901 is an agricultural pest and known vector of strawberry viruses. To better understand its biology and systematics, we performed a genomic analysis on C. *fragaefolii* collected from Quinalt strawberry plants from Pacific Grove, Monterey county, California, USA using Oxford Nanopore and Illumina sequencing. The resulting data was used to assemble the aphids complete mitogenome. The mitogenome of C. *fragaefolii* is 16,108 bp in length and contains 2 rRNA, 13 protein-coding, and 22 tRNA genes. The mitogenome is similar in content and organization to other Aphididae. Phylogenetic analysis of the C. *fragaefolii* mitogenome resolved it in a fully supported clade in the tribe Macrosiphini. Analysis of the cox1 barcode sequence of C. *fragaefolii* from California found exact and nearly identical sequences to C. *fragaefolii* and C. *thomasi* Hille Ris Lambers, 1953, suggesting the two species are conspecific.

Student Interns:

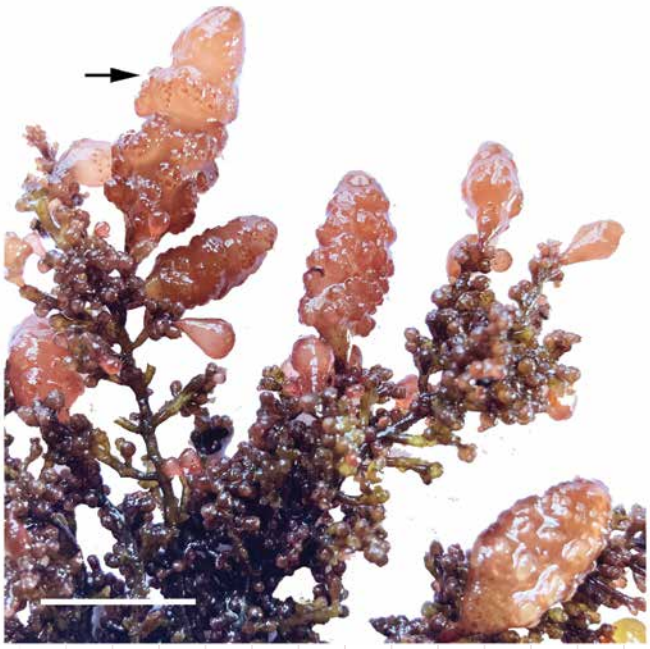
Miguel Acosta Banderas
Diana Alcantar
Ivan Alier-Reyes
Carlos Alvarez
Crystal B. Arroyo
David Cardenas
Alejandro R. Castro
Cristian Constante
Evelyn S. Diaz Telles
Gabriel Fletes
Fatima C. Gama
Abigail Garcia
Bailey J. Garcia
Celia Garcia Perez
Brandon S. Gutierrez
Karina L. Guzman
Cecilia Hernandez Cervantes
Monica Ibarra Flores
Adilene I. Jacobo-Ceja
Brianna Lopez
Norma C. Lopez-De Leon
Jaden D. Martinez
Nayelli Mendoza Garcia
Kimberly Perez
Lucio J. Perez
Milagros Perez-Moreno
Caitlin D. Pineda
Elizabeth Pinedo
Julissa G. Portillo
Anais Rico
Laura V. Ruiz
Genevie M. Serrano
Kalia M. Sheldon
Hiroki Terada
Victoria A. Trujillo
Clarissa Vazquez-Ramos
Frank Wang
Kordell J. Wilks
Felipe Zavala

MICRO-INTERNSHIP

Transfer of the marine red alga *Erythrocystis saccata* (Rhodomelaceae, Rhodophyta) to the tribe Streblocladieae inferred from organellar genome analysis

Mentor: Jeffrey Hughey

HARTNELL COLLEGE



Erythrocystis saccata growing epiphytically on *Laurencia pacifica* from Stillwater Cove, Pebble Beach, California, USA (UC 2085026). The arrow indicates the specimen analyzed in this study. White bar = 2 cm.

Erythrocystis saccata is a hemiparasitic marine red alga that grows on the branch apices of species classified in the tribe Laurencieae. Molecular evidence shows that the majority of red algal parasites are closely related evolutionarily to their hosts, however, very little is known about the phylogenetics of hemiparasitic red algae. To determine its genomic structure and genetic relationship to related host species and other Rhodomelaceae, high-throughput sequencing analysis was performed on a specimen from Pebble, Beach, California, USA. Assembly of the Illumina sequencing reads yielded the complete mitogenome and plastid genome. The mitogenome is 24,975 bp in length and contains 45 genes. The plastid genome is 165,292 bp and contains 224 genes. Comparison of organellar genome structure and content to other Rhodomelaceae revealed a high-level of gene synteny. Phylogenetic analysis of *E. saccata* resolved it in a fully supported clade sister to the genera *Carradoriella* and Leptosiphonia, and embedded in the tribe *Streblocladieae*. These genetic results support the transfer of *E. saccata* to the Streblocladieae and represent the first complete organellar genomes of a red algal hemiparasite.

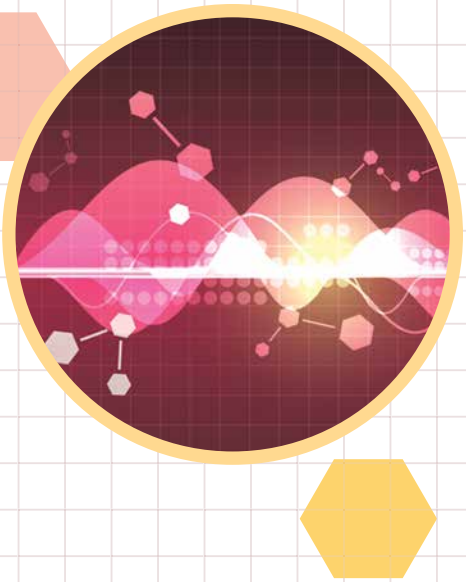
Student Interns:

Dee M. Amos
Kristin A. Barber-Scott
Roman Carrasco
Nancy Castro
Dalylah N. Celso
Stephanie M. Cortes Cedillo
Rodrigo Cortes Chavez
Long T. Dao
Sonia Desantos
Zachary W. Ebie
Luke Evangelista
Gabriela Flores-Hernandez
Linett Garcia
Eric J. Gonzalez
Alejandro Z. Hernandez
Mario O. Hernandez
Luis F. Luna
Karina Marquez
Vanessa R. Martinez Garcia
Lauren D. Mirassou
Cali J. Murillo
Michael A. Parr
Itzel Perez Santana
Horacio A. Perez-Anaya
Alynna Quezada
Sebastian K. Quizon
Shawn J. Sandberg
Ariana A. Santos-Chavez
Jessie M. Tapia
Mai N. Vang

MICRO-INTERNSHIP

The Teaching in STEM: Building Activities to Engage 3rd-8th Graders Micro-Internship

Mentor: Shannon Bliss



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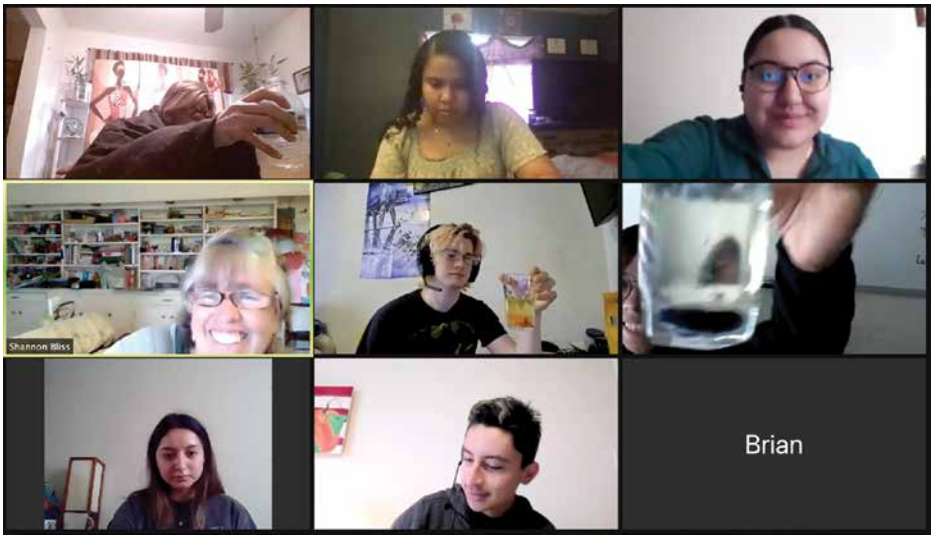
The Teaching in STEM: Building Activities to Engage 3rd-8th Graders Micro-Internship was open to students with a curiosity and/or interest in teaching at any K-12 level. The Micro-Interns discussed several papers on STEM pedagogy and worked through sample STEM activities modeling best-practice techniques. In small groups, they designed engaging, hands-on STEM activities to be used by groups of older elementary or middle school children as a part of STEM Clubs. The groups presented on activities including making your own compass, constructing brain hats, and exploring genetics. In a survey at the end, all the students that completed the experience reported that the Micro-Internship helped them learn about how to teach in STEM.

Student Interns:

Ana Alfaro-Garcia
Dee Amos
Adam Garcia
Seren Lara
Dustin Moore
Nancy Villalobos



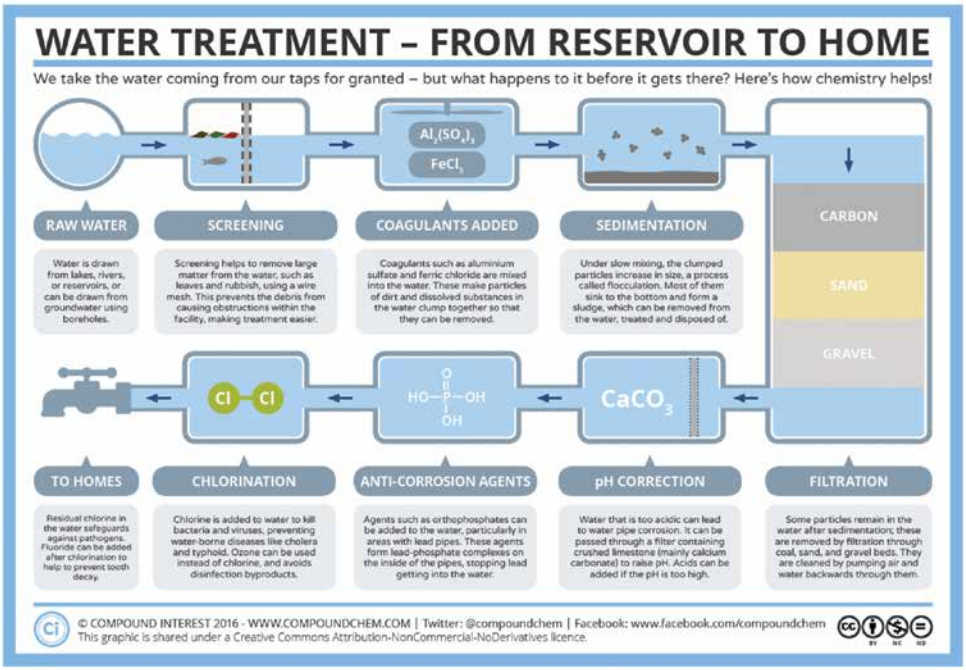
MICRO-INTERNSHIP

Investigation of Home Water Quality with Mail-Order Kits and a Comparison to Professional Lab Testing

Mentor: Michael McCarthy

MBAS
Monterey Bay Analytical Services

Home water quality is, of course, a concern that many households share. This micro-internship was designed to examine both the quality of each student's water at home, and the validity of a water testing kit that can be ordered online. A series of tests was performed by each student over a course of weeks and times during the day. The data was aggregated and analyzed by the group. A series of samples were sent off to local, professional, laboratories and those results were compared to the home kits. Purified, de-ionized water was used as the baseline.



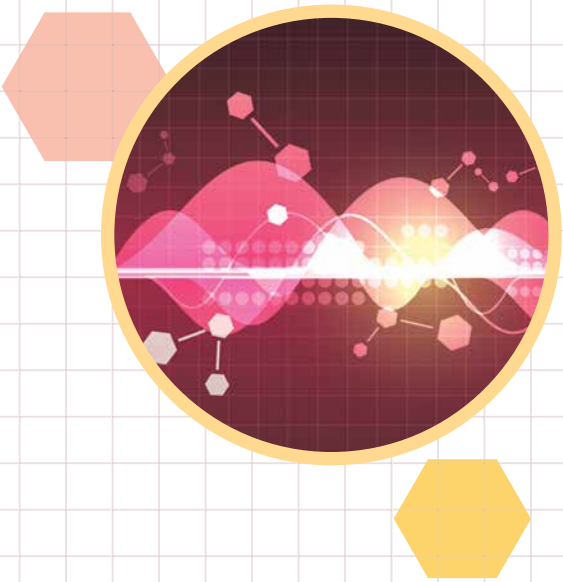
Student Interns:

Carlos Cienfuegos Garcia
Leonel Espinoza Camacho
Jamileth Figueroa
Gabriela Flores-Hernandez
Suzanne Frausto
Brandon Gutierrez
Karina Guzman
Sara Infante
Archie Noel Lleva
Danithza Magana
Juan Magana
Jaden Martinez
Vanessa Martínez Garcia
Rogelio Mendoza
Gerilynn Omictin
Elizabeth Pinedo
Ginger Rathweg
Elmer Remel Gloria
Sergio Rodriquez
Muchelle Vasquez

MICRO-INTERNSHIP

Analyzing Bacterial Growth Found in Homes

Mentor: Victoria Hutchins



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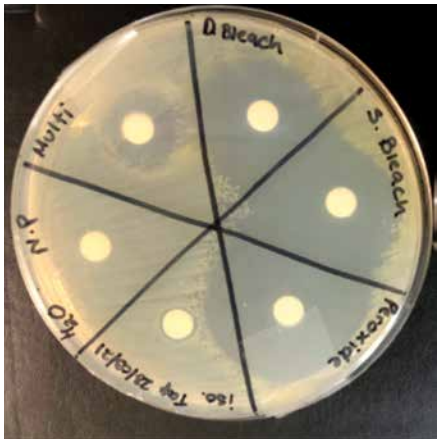
This Micro Internship allowed for students to bring the science to them and create their own experiment at home. They learned about bacterial growth and basic microbiology, researched properties of different disinfectants to explore how they work and received a crash course in safety. Using environmental sampling techniques, they grew bacteria from their bathrooms onto agar plates and tested different disinfectants by setting up plates to measure zones of inhibition. They analyzed which is the most effective against bacteria by measuring these inhibition zones and wrote a paper on their findings.



Student Interns:

Tania Ahumada
Jocelyn Avina
Erica Estamo
Gabriel Fletes Jr.
Abraham Garcia
Mayra Gutierrez-Vargas
Gabino Guzman
Nathan Gyan
Sara Infante
Jacqueline Marquez
Estefani Martinez
Naomi Medina
Anna Morales
Asmahan Muhrram
Maha Muhrram
Daisy Ortiz-Matias
Nandini Patel
Ulisses Peralta-Diaz
Mai Vang
Jessica Vidauri

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For more information about the
Hartnell College STEM Summer Internship Program visit
www.hartnell.edu/steminternship

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