AKAMAI WORKFORCE INITIATIVE

Summer Internship Symposium
Project Abstracts

Hilo **August 8, 2016**
Subaru Telescope

Waimea **August 10, 2016**
W.M. Keck Observatory Headquarters

Maui **August 12, 2016**
University of Hawai‘i, Maui College

UNIVERSITY OF CALIFORNIA SANTA CRUZ

ISEE
Institute for Scientist & Engineer Educators

Advancing Hawai‘i college students into science and technology careers

2016 Akamai Internship Program

Akamai = smart, clever

The Akamai Internship Program is a unique program that supports Hawai'i college students in completing an authentic science or technology project in a professional setting. Students are prepared through an intensive one-week short course, followed by seven weeks at an observatory or industry setting where they complete a project under the guidance of a mentor. Throughout the entire eight-week program, the students complete a communication course that begins in the short course and continues through weekly meetings and intensive coaching sessions. The Akamai program uses an internship model designed by the Center for Adaptive Optics (CfAO) originally funded by the National Science Foundation (NSF) Science and Technology Center. The goals of the Akamai program are to address the technical workforce needs in Hawai'i and advance students from diverse backgrounds into science, technology, engineering and mathematics (STEM) careers. Interns receive college credit from UH Hilo.

2016 Host Organizations

~ Hilo, Hawai'i Island ~
Gemini Observatory
Smithsonian Submillimeter Array (SMA)
Subaru Telescope
UH Institute for Astronomy
University of Hawai'i at Hilo

~ Kahului, Maui ~
HNu Photonics LLC

~ Kihei, Maui ~
Akimeka LLC
Air Force Research Laboratory (AFRL)
Maui High Performance Computing Center (MHPCC)

~ Kona, Hawai'i Island ~
Cellana, Inc.
Natural Energy Laboratory of Hawai'i Authority (NELHA)
National Oceanic and Atmospheric Administration (NOAA)

~ Pukalani, Maui ~
Daniel K. Inouye Solar Telescope (DKIST)
UH Institute for Astronomy

~ Waimea, Hawai'i Island ~
W.M. Keck Observatory
Canada-France-Hawaii Telescope (CFHT)

AKAMAI WORKFORCE INITIATIVE

ISEE
Institute for Scientist & Engineer Educators

Akamai Workforce Initiative 2016

Staff

Lisa Hunter, Director – Institute for Scientist & Engineer Educators at University of California, Santa Cruz (ISEE/UCSC)
Austin Barnes, Program Manager – ISEE/UCSC
Nicole Mattacola, Program & Event Coordinator – ISEE/UCSC
Jerome Shaw, Associate Director – ISEE/UCSC

2016 Akamai PREP Course Instructors

Austin Barnes, Lead Instructor – ISEE/UCSC
Michelle Consiglio – Univ. of California, Los Angeles
David Harrington, Co-lead Instructor – Daniel K. Inouye Solar Telescope
Lisa Hunter– ISEE/UCSC
Caitlin Johnson – UCSC
Anna Lowe, Team Leader – UCSC
Andrew Marsh – UCSC
Esra Mescioglu – UCSC
Jerome Shaw – ISEE/UCSC
Stacey Sueoka – Daniel K. Inouye Solar Telescope

2016 Communication Instructors

Austin Barnes, Lead Instructor – ISEE/UCSC
Lisa Hunter – ISEE/UCSC
Michael Nassir - Univ. of Hawai‘i at Manoa
Jerome Shaw, Co-lead Instructor – ISEE/UCSC

Special Thanks . . .

There are many people and organizations that have contributed to making Akamai a success. Below we note those that played a role in the 2016 Internship Program:

2016 Akamai Selection Committee
Joey Andrews (Akimeka), André-Nicolas Chené (Gemini), Pamela Madden (NELHA), Dennis Douglas (IAI), David Harrington (DKIST), Joseph Janni (Air Force), Peter Konohia (Akimeka), Mary Beth Laychak (CFHT), Tim Minick (Gemini), Lucio Ramos (Subaru), Kiaina Schubert (Subaru), Ranjani Srinivasan (SMA), Laura Ulibarri (MHPCC)

Air Force Research Laboratory
Joseph Janni, Paul Schumacher and Ryan Swindle. *Mahalo for mentoring.*

Akimeka LLC
Joey Andrews, Rob Bartlett, Cami Ichiki, and Desislava Iorgova. *Mahalo for mentoring and hosting our Maui selection committee meeting and weekly intern meetings!*

Canada-France-Hawaii Telescope
Steve Bauman, Greg Green, Windell Jones, Doug Simons, and Blaise Kuo Tiong
Mahalo for mentoring, providing housing for our interns, and hosting our weekly intern meetings!

Cellana Inc.
Johanna Anton and Marcela Saracco
Mahalo for mentoring.

Daniel K. Inouye Solar Telescope
Stephen Guzzo, David Harrington, John Hubbard, Sharon Loando-Monro, William McBride, Guillermo Montijo Jr., LeEllen Phelps, Valentin Pillet, Kevin Reardon, Thomas Rimmele,Tom Schad, Stacey Sueoka, and Steve Wampler. *Mahalo for being a sponsoring partner, mentoring, providing PREP instructors, and hosting our Project Introduction Talk practice!*

Gemini Observatory
Chas Cavedoni, André-Nicolas Chené, Steve Hardash, Michael Lundquist, Neal Masuda, Tim Minick, Chris Yamasaki, Peter Michaud, Markus Kissler-Patig and Adrienne Notley. *Mahalo for mentoring, participating in our PREP course, and hosting our Hawai'i Island selection committee meeting!*

HNu Photonics LLC
Michael Franklin, Kenichiro Kurihara, Mary Liang, Caitlin O'Connell, and Devin Ridgley
Mahalo for mentoring and hosting our weekly intern meetings!

W. M. Keck Observatory
Hilton Lewis, Maura Mastriani, Jeannette Mundon, and Truman Wold. *Mahalo for mentoring and hosting our annual Waimea Symposium & our weekly intern meetings!*

Maui High Performance Computing Center
Randy Goebbert, Adam Mallo, and Laura Ulibarri. *Mahalo for mentoring.*

NELHA
Pamela Madden and Keith Olson
Mahalo for mentoring and hosting our weekly intern meetings!

NOAA
Robert Warner. *Mahalo for mentoring.*

Smithsonian Submillimeter Array
Geoffrey Bower, Simon Radford, Ramprasad Rao, and Ranjani Srinivasan. *Mahalo for mentoring.*

Subaru Telescope
Nobuo Arimoto, Saeko Hayashi, Russell Kackley, Lucio Ramos and Kiaina Schubert.
Mahalo for mentoring, participating in our PREP course, and hosting this year's Hilo Symposium!

Thirty Meter Telescope International Observatory
Sandra Dawson, Gary Sanders, Warren Skidmore, and Gordon Squires. *Mahalo for being a sponsoring partner!*

University of Hawai'i at Hilo
Scott Kawachi, Donald Straney, Marianne Takamiya. *Mahalo for all of your help with PREP and the UHH course, mentoring, and for providing housing for our interns and classrooms for the PREP course!*

University of Hawai'i Maui College
Mark Hoffman, Lui Hokoana Mahalo for hosting this year's Maui Symposium!

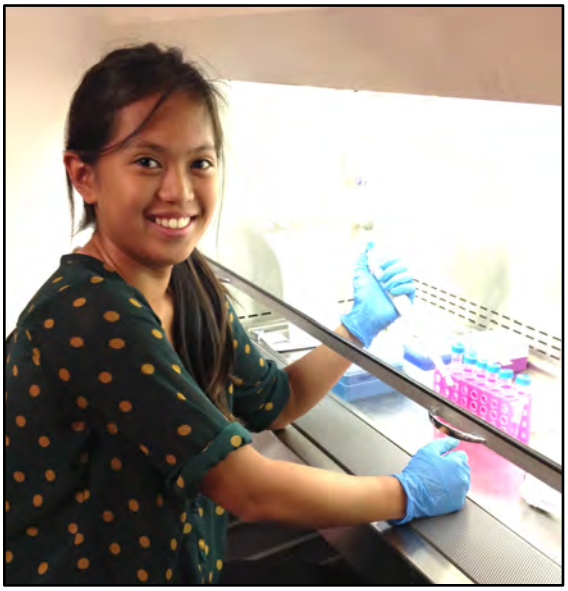
University of Hawai'i - Institute for Astronomy
Colin Aspin, Mark Chun, Marc Cotter, Günther André Fehlmann, Hasinger, Klaus Hodapp, Mark Hoffman, Jeffrey Kuhn, Pamela Lau, Michael Maberry, and Robert McLaren. *Mahalo for mentoring, hosting our intern meetings and practice sessions!*

Maveric Abella
Current School: Columbia University
Internship Site: HNu Photonics LLC
Mentor: Devin Ridgley

Project title: Characterizing an Immune System Cell Model for Space-Based Experimentation

Project Abstract:
NASA investigations have revealed that spaceflight has a detrimental effect on the immune system of crewmembers on the International Space Station (ISS). However, the underlying cellular mechanisms causing deficient immune responses remain largely unknown. We hypothesize that T-Lymphocyte (T-cell) dysfunction in the microgravity environment of space contributes to a reduced immune response of ISS crewmembers in the form of oxidative stress. Oxidative stress results from high amounts of reactive oxygen species (ROS) and causes a wide variety of effects on T-cell function. Prolonged exposure to ROS has been shown to inhibit T-cell proliferation and eventually lead to apoptosis. Alternatively, low levels of ROS exposure have improved T-cell function by inducing an inflammatory response. The objective of this study is to characterize the effect of oxidative stress on T-cell phagocytosis to develop a cell model for on-orbit immune cell dysfunction investigations. Cumene hydroperoxide is utilized to induce oxidative stress in T-cells in the presence of E. coli- and S. aureus-mimicking bioparticles that undergo a fluorescent shift upon T-cell phagocytosis. The results of this study demonstrate that oxidative stress has a profound effect on T-cell phagocytosis of microbe-like bioparticles. Thus, oxidative stress may contribute to microgravity induced immune system dysfunction. This study provides the foundation for future on-orbit T-cell investigations with HNu Photonics' on-orbit BioChip SpaceLab facility.

Biography:
Maveric was born and raised in Kapolei, Oʻahu. She graduated from Kamehameha Schools Kapālama Campus in 2015, and is a rising sophomore at Columbia University in the City of New York studying biomedical engineering. She was an intern at the University of Hawaiʻi Cancer Center and member of the Kamehameha Robotics Team. Now, she intends to be involved with start-up companies, especially in Hawaiʻi, developing new technological approaches to tissue and cell engineering to improve human health. Maveric loves anything to do with the outdoors, such as sports, surfing, and SCUBA diving. On Maui, she has been busy golfing, weight lifting, biking, hiking, and overall exploring.



Dutch Akana
Current School: University of Hawai‘i Maui College
Internship Site: University of Hawai‘i at Hilo
Mentor: Dr. Marianne Takamiya

Project Title: Construction of a Radio Telescope to aid in Student Learning Outcomes of a Purposed Class

Project Abstract:
The Department of Physics and Astronomy at the University of Hawaii at Hilo would like to develop its program to include elements of radio astronomy in the existing laboratory courses of General Astronomy Lab and Observational Astronomy Lab. Adding an experiment in radio astronomy to these classes will allow students to have firsthand knowledge of the use and operation of a radio telescope used in the field of astronomy. To meet the requirements, the astronomy department has purchased radio telescope kits from NASA's Radio JOVE project. To support students' attainment of these learning goals, we assembled, calibrated, tested, and built the antennae. The project was then tested at UH Hilo and the Smithsonian Submillimeter Array Headquarters to detect and record signals. The radio telescope is designed to operate over a narrow range of frequencies centered on 20.1 MHz, which is optimal for detecting radio emission from Jupiter, the Sun, and the Galactic Background. These signals will be recorded and analyzed by custom software provided by the JOVE project. Construction of these small scale radio telescopes and antenna will allow students to gain valuable hands on experience in the operation of a radio telescope and will aid faculty in fulfilling the student learning outcome of the theory and operation of a radio telescope in future classes.

Biography:
Dutch was born and raised on the island of Maui and graduated from H.P. Baldwin High School. He is currently pursuing his Bachelor of Applied Science in Engineering Technology from the University of Hawai‘i Maui College. His goal is to finish college and apply his knowledge by joining Hawai‘i's technological workforce. Dutch enjoys spending time with his wife and children between his studies and strives to inspire his children to pursue a college degree.

Daryl Albano
Current School: University of Hawai'i at Hilo
Internship Site: Canada-France-Hawaii Telescope (CFHT)
Mentor: Blaise C. Kuo Tiong

Project Title: Designing an Observatory Asset Management System for the Canada-France-Hawaii Telescope

Project Abstract:
The Canada-France- Hawaii Telescope (CFHT) is interested in developing an asset management system to improve inventory tracking of servers, computers, and peripherals at the Waimea headquarters and the summit of Mauna Kea. Currently, the location of these assets is managed by online wiki pages. As a result of having multiple wiki pages, reliable information can sometimes be inconsistent. The development of an asset management system is expected to reduce time searching for an item, decrease high replacement costs, and improve accountability of assets. Overall, the goals are to improve user experience, develop a method to quickly deploy the application, and to create a cohesive tracking system for CFHT. The system utilizes the application Snipe-IT, an open-source asset management system that uses a graphical user interface (GUI) to populate and manage CFHT's asset database. A web server was configured to host the application, which in turn allows the application to be accessed through a web browser, such as Google Chrome, from a smartphone, laptop, etc. Due to the simple configuration of the system, installation of extra packages/services are not necessary on the client's end in order to use the application. Finally, quick response (QR) codes were implemented as asset labels to allow database-access through QR code scanning applications with a smartphone or tablet.
Depending on the system's functionality and usability, the asset management system could potentially expand to other groups at CFHT and track assets besides computing systems.

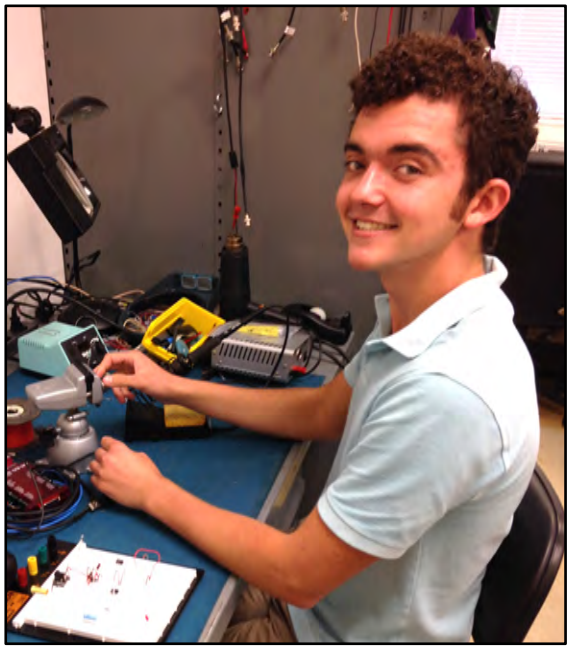
Biography:
Daryl was born and raised on the Big Island. After graduating from Kea'au High School, he is now attending the University of Hawai'i at Hilo, pursuing a bachelor's degree in computer science. Daryl is also the lead programmer and communications expert for the Vulcan Space Robotics Team. After completing his degree, Daryl plans on getting involved with engineering solutions in the robotics and networking communications field. During his free time, Daryl enjoys running, working on computers, and film/digital photography.

Jaren Ashcraft
Current School: University of Rochester
Internship Site: Institute for Astronomy, Maui
Mentor: André Fehlmann
Co-mentor: Jeffrey Kuhn

Project Title: Characterization and Testing of an Infrared Photodiode for Measuring Photon Flux in the Cryo-NIRSP Instrument

Project Abstract:
By examining the solar infrared radiation from the Sun, astronomers can gather important data regarding its physical properties. The Daniel K. Inoyue Solar Telescope will use the Cryo-NIRSP instrument for spectropolarimetric observations of the Sun's corona. The Cryo-NIRSP instrument is very sensitive to incoming solar radiation, so when examining the corona, it must not be exposed to the solar disk flux, which is almost 1 million times brighter than the corona. A safety shutter is being designed to detect the sudden photon flux should the telescope lose tracking and accidentally observe the solar disk while in coronal observing mode. When closed, this safety shutter will shield the Cryo-NIRSP instrument from damaging solar radiation. The purpose of this project was to calibrate a sensitive cryogenic infrared photodiode that will be used to detect radiation levels inside the instrument and trigger the shutter. This infrared photodiode will be used with an operational amplifier circuit in order to amplify the signal received by the detector inside the Cryo-NIRSP instrument. First, the photodiode was subjected to various tests in a cryogenic environment using a variable temperature "blackbody" to calibrate the expected photon flux from the infrared photodiode. From these tests, a known calibration curve was developed for observation of the radiation levels in the Cryo-NIRSP instrument. This circuit will later be incorporated into the greater safety shutter system, and then installed in Cryo-NIRSP once the mechanical shutter assembly is complete.

Biography:
Jaren is a graduate of Parker School, Class of 2015, and is now a rising sophomore at the University of Rochester pursuing a major in optical engineering with minors in mathematics and astronomy. Jaren was born and raised on the Big Island of Hawai'i, where he cultivated his love of sciences in the presence of the telescopes on Mauna Kea. He is primarily interested in the optical systems of telescopes and spacecraft, and is looking into expanding his interests in astronomy and integrated nanophotonics. Jaren is involved with his university's Optical Society (OSA) chapter and Makers Club, where he is able to work with others on various engineering projects throughout the year. Jaren hopes that one day, he will be able to return to Hawai'i to pursue a career in optics, as well as build up a STEM enrichment program to benefit the next generation of scientists from Hawai'i.



Christiana Bisquera
Current School: University of Hawai‘i at Mānoa
Internship Site: Subaru Telescope
Mentor: Lucio Ramos

Project Title: Subaru Telescope Interface Box for Monitoring Power Supply

Project Abstract:
The Subaru Telescope utilizes many different types of instruments and as a result, has a power supply that is nearing capacity. In order to maintain the functionality and efficiency of the site and instruments, a means of testing different power qualities, such as voltages and currents, is necessary. Data from this testing can then be used to make improvements to electricity distributions. To accomplish this, an interface box was built that connects between the instrument power distribution unit (PDU) and the power source. This interface box will be used to safely take measurements instead of opening up the circuit breaker panels, which is the current method of testing and requires the presence of a licensed electrician. The box was designed to be easily handled, carried during use, and easily replicated. Safety features were also added for emergencies, such as an emergency power off button and the ability to shut off if used under the wrong conditions. A SolidWorks model was constructed in order to make sure all the components fit properly and an electrical schematic was drawn. After these models were finalized, the chosen parts were ordered, assembled, and tested with a test PDU in the lab. After final testing, the box was taken to the summit to obtain the data to make adjustments. In the future, this box can be designed and implemented into new instruments so that data can be taken without the need to utilize an external interface.

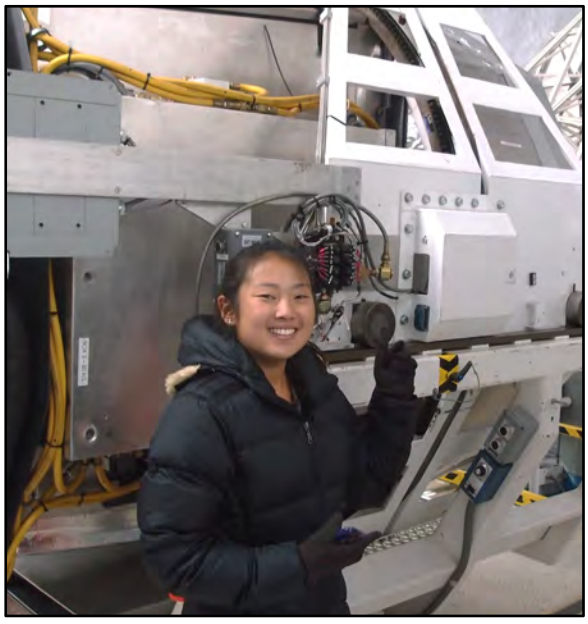
Biography:
Christiana was born and raised on the island of Maui. After graduating from Baldwin High School, she went on to pursue a Bachelor of Science degree in mechanical engineering at the University of Hawai‘i at Mānoa. She became interested in cars during high school and by learning more about and gaining experience working on them, her career goal became to work for the automotive industry and help improve its environmental impact. Eventually, she would like to live in Europe and continue working in automotive design there. In her spare time, Christiana enjoys studying foreign languages, going to the beach and playing music.

Katelyn Chagami
Current School: Worcester Polytechnic Institute
Internship Site: W.M. Keck Observatory
Mentor: Truman Wold

Project Title: Diminishing Shock on the Cassegrain Instruments

Project Abstract:
There are five different Cassegrain instruments that are used in the Keck observatories. Each instrument performs a different optical function so visiting scientists can choose the instrument that best suits their research needs. When these instruments are switched out they are moved on and off the Keck telescopes via a rail system. There is a mismatch in the rails that puts a shock load of up to 10 g's of acceleration on the instruments. The purpose of this project is to design solutions for three problem areas of the current system that have been determined as most damaging to the instruments: height differences of the floor rails, misalignments between the handler and Cassegrain rails, and binding of the tertiary mirror in the tower rails. These solutions aim to reduce or eliminate the potentially damaging shocks. In order to characterize the extent of this problem, various measurements of the rail system were taken, including rail misalignment measurements and shock loads during instrument moves. New designs for the rail system were created in SolidWorks to address each problem. Two to three different solutions were conceptualized with a recommendation for which solution would be the most effective and plausible to implement. The measurements and recommendations were compiled into a technical report, and will be reviewed and evaluated by Keck engineers to determine whether the solutions will be implemented to address the problem.

Biography:
Katie was born and raised in Waipahu, Hawai'i. Katie attended Punahou School from 6th grade until graduating in 2014. She now attends Worcester Polytechnic Institute in Massachusetts where she is currently pursuing her bachelor's degree in Mechanical Engineering and a minor in Electrical and Computer Engineering. She is currently playing for the varsity softball team at WPI. In her free time she enjoys volunteering at the local animal shelter. Katie has always had a love for math and science, which pushed her to look into a future in the STEM field. She hopes to pursue a career in Mechanical Engineering design and return home to work in Hawai'i.



Austin Corotan
Current School: Western Washington University
Internship Sites: Natural Energy Laboratory of Hawai'i Authority (NELHA)
& National Oceanic and Atmospheric Administration (NOAA)
Mentor: Robert Warner (NOAA)
Co-mentors: Keith Olson, Pamela Madden (NELHA)

Project Title: Assessing VIIRS as a Potential Water Quality Monitoring Tool

Project Abstract:
The NOAA US Coral Reef Conservation Program is concerned with how runoff from the state of Hawaii will affect coral reefs in the area. Sediment and algae can block light and absorb heat, which will increase ocean temperature, decrease photosynthesis and therefore decrease dissolved oxygen levels in water, stressing coral reefs and other aquatic life. The purpose of this research is to investigate statewide water quality field data and VIIRS (Visible Infrared Imaging Radiometer Suite) ocean color data in order to assess their potential as a water quality-monitoring tool for Hawaii's watershed managers. Tabular rainfall, chlorophyll-a and turbidity field data were organized and distributed into weekly, monthly, and yearly averages using Microsoft Excel and Java. Using ArcMap's spatial analyst toolbox, the plotted field data point values were interpolated into spatially resolved raster maps. VIIRS ocean color data were then imported, mapped and projected in ArcMap using the netcdf conversion tool. Once the data were successfully mapped for the state of Hawaii, closer scoping and mapping was done for a regional location off the Kona coast at NELHA. The low resolution of satellite data as well as the sparse state-wide field data indicate that the field data and the satellite data are both insufficient to be used as tools for monitoring runoff from the state of Hawaii. Comparable anomalies between the satellite data and field data were unidentifiable and therefore no conclusions could be made. In order to further assess the potential of VIIRS in monitoring runoff from the state of Hawaii, more field water-quality data must be collected at a higher frequency. Furthermore, higher resolution satellite data would provide a closer look along the coastline of Hawaii, where local runoff is typically identified. The minimum satellite resolution necessary to identify local runoff could be determined by sediment plume extent modeling conducted around the state.

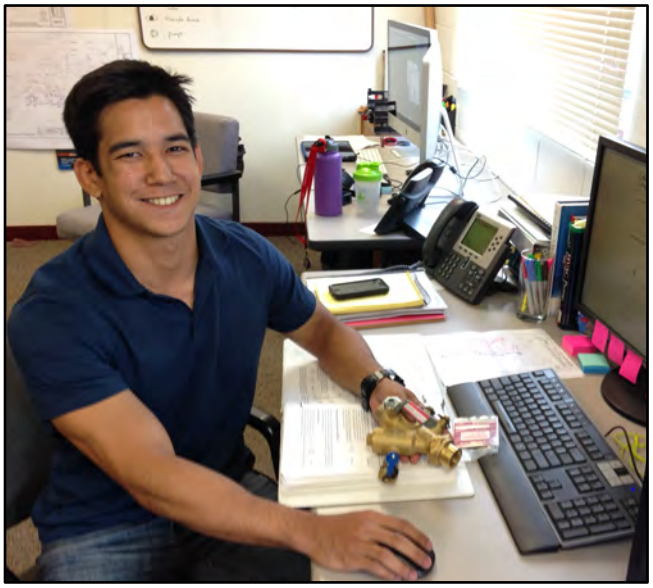
Biography:
Austin is a 2011 graduate of Kamehameha Schools Kapālama and currently a senior at Western Washington University, where he is studying as a Geophysics and Computer Science major. He will be continuing his education by pursing a graduate degree in Computer Science. His primary interests include big data, machine learning, and mobile application development. Austin's interests outside of academics are weight training, soccer, producing music and playing video games. He hopes to one day pursue a career in STEM in Hawai'i as well as become an advocate to the youth of Hawai'i for pursuing their passions in STEM.

Jordan Enos
Current School: University of Hawai'i at Mānoa
Internship Site: Gemini Observatory
Mentors: Chas Cavedoni , Steve Hardash

Project Title: Sizing a Variable-Frequency Drive Pump for Gemini North's New Glycol Cooling

Project Abstract:
Gemini North is in the process of designing and implementing a new glycol cooling system in the Gemini North Observatory. This new system is intended to reduce operating costs up to an estimated 30% by upgrading the existing cooling system. Upgrades to the system will require significant plumbing rearrangement, as well as installations of a new liquid-to- air Fluid Cooler and Variable-Frequency Drive (VFD) pumps. One of these VFDs in particular is designed to drive ethylene glycol through the Coating Plant of Gemini North, and is projected to operate at 40 gallons per minute (gpm). In an effort to save more energy, Gemini engineers want to resize this particular VFD from 40 gpm down to 32 gpm. To determine if this can be done, the hydraulic performance of the proposed upgraded cooling system was modeled and simulated using the application software PIPE-FLO Professional. To gain confidence that PIPE-FLO can effectively simulate the proposed system, the hydraulic performance of the existing cooling was first modeled and simulated. Results from the simulation were then validated with on-site measurements. The proposed system was modeled and simulated with confidence. Results and final recommendations on the appropriate VFD size will be presented.

Biography:
Jordan was born and raised in Hilo, Hawai'i. He is currently pursuing a Bachelor of Science degree in mechanical engineering at the University of Hawai'i at Mānoa. Upon graduation, Jordan plans to work on the Big Island of Hawai'i, preferably in Hilo. He is particularly interested in the fields of renewable energy, energy storage, and structural engineering. In his free time, Jordan enjoys coaching high school wrestling and being able to give back to the sport.

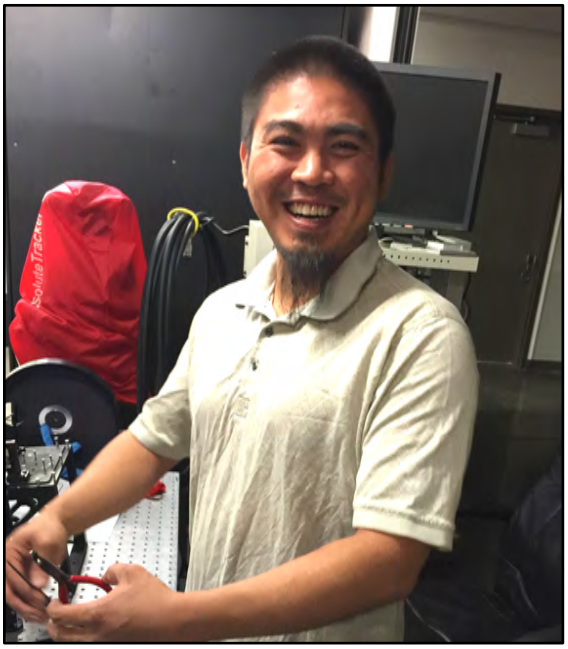


Joey Hashimoto
Current School: University of Hawai'i Maui College
Internship Site: Institute for Astronomy, Maui
Mentor: André Fehlmann
Co-mentor: Jeffrey Kuhn

Project Title: Verifying Defect Tolerances of the Cryo-NIRSP Beam-Splitter/Analyzer System Components

Project Abstract:
The Daniel K. Inouye Solar Telescope (DKIST) will be housing a Cryogenic Near Infrared Spectropolarimeter (Cryo-NIRSP) instrument to study solar coronal magnetic fields over a large field-of- view and at near- and thermal-infrared wavelengths of 1000 nm to 5000 nm. A major component that resides within the Cryo-NIRSP instrument is the beam-splitter/analyzer (BSA) system which first linearly polarizes light from a modulated source, and uses a detector to compare the values of the two polarized beams created. To perform this function properly, the BSA system requires a relative accuracy of 10 -4 meters. The purpose of this project is to assess a subset of BSA system components for defect tolerances on a variety of optimal performance measures, including polarization contrast and throughput, before being implemented into the completed design. Specifically, I will characterize the BSA's reflective wavefront performance of an externally reflective prism, plano-mirrors, and wire-grid polarizers. I will use a Zygo interferometer, Cary spectrophotometer, lab spectropolarimetric setup and associated cameras to perform the optical tests. If necessary, I will design and construct additional apparatuses and experimental setups in order to complete the required tests on the BSA system components. Results from my tests will be used to evaluate the ultimate performance of the BSA subsystem in Cryo-NIRSP.

Biography:
Joey is originally from Kapa'a, Kauai. He is a junior/senior at the University of Hawai'i Maui College pursuing a Bachelor of Applied Science degree in Engineering Technology. Upon completing his degree, Joey would like to use his acquired knowledge to help the people of Hawai'i through technological innovation. A major goal that he would like to accomplish is building a local startup, and using that startup to give back to the local people of Hawai'i through education in technology. He would like to further his education by getting a master's degree. In his free time, Joey enjoys pig hunting, surfing, and spending quality time with friends and family.



Alexander Hedglen
Current School: University of Hawai'i at Hilo
Internship Site: Air Force Research Laboratory (AFRL)
Mentor: Ryan Swindle

Project Title: Implementing a Differential Image Motion Monitor for the Maui Space Surveillance Site

Project Abstract:
The Maui Space Surveillance Site (MSSS) currently has no instrument solely dedicated to quantifying its observing conditions. The Differential Image Motion Monitor (DIMM) technique can be used to measure turbulence parameters such as the Fried parameter (r 0) and astronomical seeing (). By implementing a DIMM for the MSSS, the observing conditions will be characterized, giving information as to how the atmosphere affects a telescope's image quality.
The DIMM will also give insight as to how Haleakala compares to other astronomical sites. Our DIMM consists of a 12-in aperture Ritchey–Chrétian telescope and its necessary components (science camera, filter wheel, focuser). I wrote a MATLAB code to calculate turbulence parameters from images taken by the telescope. In preparation for the first observations, I generated simulated images with MATLAB to test r 0 and calculations and their uncertainties. The DIMM will be manually tested by August 10, 2016, and the first measurements will be made by then. Future work for this project will involve automating the DIMM so that it will continuously measure atmospheric parameters throughout the night and day.

Biography:
Alex is a Physics and Astronomy major at the University of Hawai'i at Hilo, hoping to impact the science community with the skills he is learning. Coming all the way from Rhode Island, Alex has been involved with the Institute for Astronomy for a couple of years, working in the machine shop on the UH 2.2-meter telescope under Colin Aspin. He has also been working as a 2015-2016 Hawai'i/NASA Space Grant Trainee learning data reduction with Dr. Kathy Cooksey, an assistant professor of physics and astronomy at UH Hilo. Alex found that he has developed an interest in instrumentation and observational astronomy. He plans to attend graduate school in a related field soon after he graduates within the next year.

Zachary Ifo
Current School: University of Hawai‘i at Hilo
Internship Site: Air Force Research Laboratory (AFRL)
Mentor*:* Paul W. Schumacher Jr., Ph.D.

Project Title: Definite-Integral Root-Finding Algorithm to Solve Kepler’s Equation

Project Abstract:
One mission of the United States Air Force is to conduct space surveillance of everything in orbit around the Earth. Predicting the position of a satellite on its orbit is essential to the operation of tracking every satellite. Kepler’s equation is the key analytical relation for predicting the position of a satellite because it relates the angular position of a satellite traveling on its orbital path with time. Kepler’s equation gives a great deal of analytical insight for the root-finding problem and serves as a foundation for many orbital mechanics problems. When the value of time is given, Kepler’s equation must be solved for the value of the angle variable with a numerical root-finding algorithm because the equation is transcendental. The purpose of this project is to investigate a particular and rarely used root-finding method in orbital mechanics involving a definite integral to solve for the angular variable in Kepler’s equation. The definite integral was selected because it is one of the few root-finding methods that can be parallelized. MATLAB was used to formulate the definite integral as a serial computational algorithm to verify the validity of the method. We compared our results with test cases constructed from known particular solutions of Kepler’s equation. Results will be presented. In the future, the definite integral method should continue to be investigated to understand its performance in a parallel algorithm.

Biography:
Zachary was born and raised in Hilo, Hawai‘i. He graduated from Kamehameha Schools Hawai‘i and is a senior mathematics major at the University of Hawai‘i at Hilo. After graduating with his B.A., Zach plans to apply to graduate school and is interested in pursuing a Ph.D. in applied statistics.

Kaimi Kahihikolo
Current School: University of Hawai'i at Mānoa
Internship Site: Gemini Observatory
Co-Mentors: André-Nicolas Chené & Michael Lundquist

Project Title: Developing Analysis Tools for Star Clusters Observed in VVV Survey

Project Abstract:
The stellar content of the inner part of our galaxy, the Milky Way, remains ambiguous in the visible spectrum due to high extinction by dust and to the interference of a high concentration of gas and stars. However, studying the region in near-infrared light with high spatial-resolution imaging allows astronomers to detect and explore hundreds of new objects in this region. VISTA Variables in the Via Lactea (VVV) is a near-infrared survey of the galactic bulge and part of the disk which seeks to generate a high-resolution 3-dimensional—or 4-dimensional including time—map of the Milky Way. Further study of this region will advance astronomers' understanding of the Milky Way's evolution and develop a population census of the area. The goal of my project was to create a list of roughly 10 to 30 star clusters for further spectral analysis. I worked on three components that are fundamental to reach this goal: the creation of tools to automatically (1) locate clusters within VISTA images, (2) detect comparable regions for background star decontamination, and (3) characterize star clusters based on age, distance and reddening. Based on the software's results and accuracy, select clusters will be added to an observation proposal for spectroscopic follow-up.

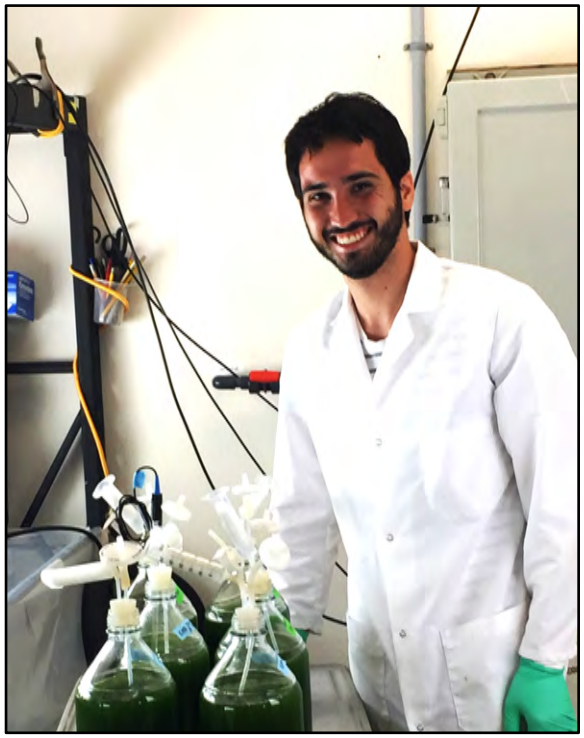
Biography:
Kaimi was born and raised on the island of O'ahu and graduated from Kamehameha Schools Kapālama. He is a freshman undergraduate at the University of Hawai'i at Mānoa, pursuing two BS degrees in Astrophysics and Mathematics. After attaining his BS degrees, Kaimi plans to pursue a doctorate degree within the field of cosmology. His goal is to further develop his understanding about how the universe works.

Kully Kekaula-Basque
Current School: Columbia University
Internship Site: Cellana Inc.
Mentor: Marcela Saracco

Project Title: Characterization of Six Microalgae Strains for Aquaculture Feed

Project Abstract:
Cellana strives to produce ideal strains of microalgae that will satisfy rapidly growing market demands for aquaculture feed for use in fisheries and bivalve farms. By harnessing cheap saltwater available at the Natural Energy Laboratory of Hawaii Authority, Cellana is exploring the potential of various saltwater microalgae strains for aquaculture production.
This project redefines the scope to six uncharacterized microalgae strains: two Tetraselmis, Chaetoceros, and Haptophyte strains. Each strain was chosen to target a specific market within the aquaculture industry – Tetraselmis, for example, was selected for its use in conjunction with Nannochloropsis as a feed for rotifers as well as a standard feed for bivalve mollusks. Beginning with isolated cultures, each strain was grown over the course of eight weeks to two 20-liter carboys and one 2-liter flask. The 2-liter flask was harvested to produce a mathematical relationship between dry weight and optical density, allowing for the determination of algae mass using a spectrophotometer. A 20-liter carboy was harvested for freeze drying to be sent to labs for lipid analysis and the remaining carboy was inoculated into a 200-liter production bag in an outside environment to test for the individual strain's resistance to the West Hawaii climate. During the growth process, growth rates and cell counts were recorded for use in determining the productivity of each microalgae strain. The final characterizations of each strain will then be compiled to determine their respective viabilities for production within the aquaculture industry, possibly influencing Cellana's production line strains.

Biography:
Kully attends Columbia University after having graduated from Kealakehe High School on the Big Island of Hawai'i where he was born and raised. He is a rising senior studying biological sciences and computer science with the intention of pursuing a career conducting biological research. When he is not studying, Kully enjoys traveling, trekking, and spending time outdoors.

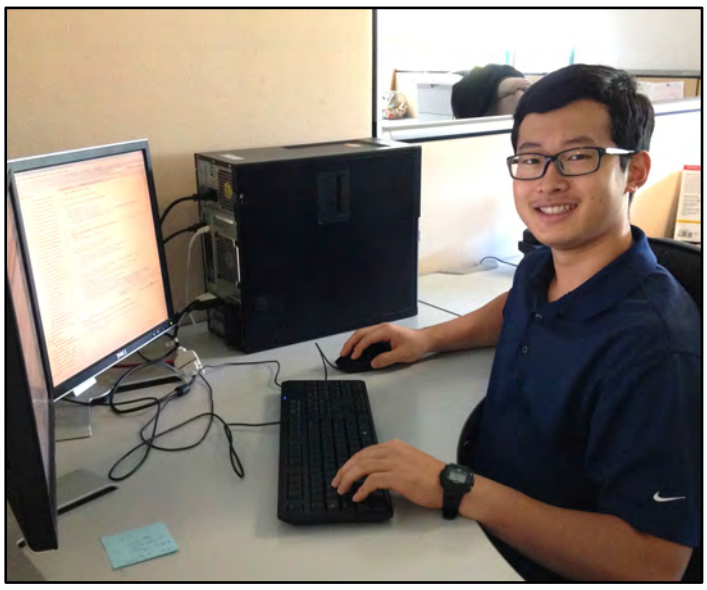


Christopher Kim
Current School: Yale University
Internship site: Akimeka, LLC
Mentor: Joey Andrews

Project Title: Automating Testing of the TMDS

Project Abstract:
The Theater Medical Data Store (TMDS) is a web-based application managed by the Department of Defense, used to track, analyze, and manage a soldier's medical treatment on the battlefield. Currently, there is a manual checklist for Akimeka test engineers to go through this application in order to validate its functionality. However, manual testing is tedious and error-prone, and therefore, it becomes increasingly important to create an automated method to complete this testing. The initial step in implementing this automation involved accessing manual testing steps housed in Akimeka's Quality Center to group the many pages of the TMDS application. These groupings were created to identify test requirement overlaps between pages that could be utilized to modularize testing components and were based primarily on test patient data needed to test individual pages in their entirety. Once these groupings were created, an approach was developed to create a testing environment that would holistically meet the requirements of the testing of the TMDS pages. This approach primarily focused on generating the necessary test patients, adding relevant health information that needed to be tested, and saving that data to a file to verify that the data remained unchanged. Once the approach was fully developed and implemented, automated input validation tests for individual pages were generated. This process involved writing XPath selectors to identify elements on the webpage and subsequently writing code in Java using the Selenium API to interact with these web elements. These tests and the development of these tests identified and reduced testing errors while improving coverage, improving the development process, and reducing testing time from 2-4 weeks (manual testing) to less than a day with automated testing. While the outline for input validation testing developed during this project streamlines the development process and contributes significantly to the automated testing process as a whole, creating automated tests to verify the validity of data imported from outside sources serves as the next key step in moving toward continuous integration testing and a completely automated testing system.

Biography:
Christopher is a Class of 2015 graduate of Maui High School and will be a sophomore student at Yale University in Fall 2016. He is working towards B.S. degrees in computer science and economics and is particularly passionate about the potential of computer science in opening new frontiers and hopes to utilize his higher education to pioneer advancements that will enrich the lives of others. His research interests include machine learning, data mining, and heliophysics. At Yale, Chris is involved with YHack, Yale's 36-hour student hackathon, and the Roosevelt Institute, a public policy think tank.

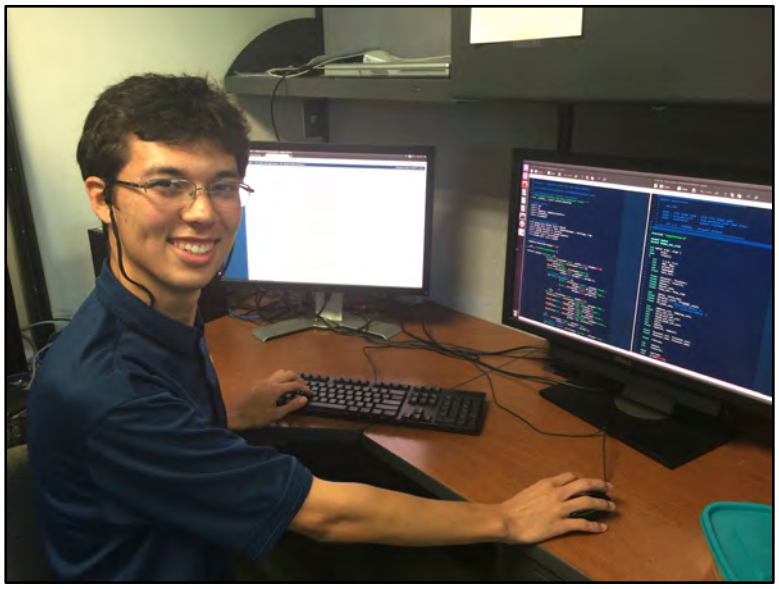


Justin Kunimune
Current School: Olin College of Engineering
Internship Site: Subaru Telescope
Mentor*:* Russell Kackley

Project Title: Updating and Improving the MOIRCS Acquisition Software for Subaru Telescope

Project Abstract:
Subaru Telescope possesses a unique instrument called the Multi-Object InfraRed Camera and Spectrograph, otherwise known as MOIRCS. MOIRCS uses telescope masks containing thin slits, which must be lined up very precisely with the targets of the spectrograph. The software that exists for this purpose, MOS Acquisition, is outdated and difficult to use. It uses PGPlot, a C library for displaying images that was last updated in 2001. The outdated nature of the software causes it to be unintuitive, as the cursor often teleports around the screen unexpectedly, and upon clicking, the user is often left with no indication as to whether the click registered or not. To rectify these issues, the MOS Acquisition software was rewritten in Python using Ginga, an astronomical image-display program written and maintained by Subaru's software division.
Because Ginga is more modern than PGPlot, it conforms to many of the standards expected from modern applications, such as buttons that visibly depress when you click on them, and a red 'X' in the corner that can be used to abort the program at any time. Many useful features were also added, such as undo and redo buttons, allowing actions to be revoked at any time. The final program is far more user-friendly than the original MOS Acquisition program. It will save astronomers on the summit significant amounts of time to be spent observing with, rather than aligning, the telescope.

Biography:
Justin is a rising sophomore at the Olin College of Engineering in the Greater Boston Area. Having grown up in Kailua, Hawai'i, he has always had a strong interest in the STEM fields, though he has still not decided what area of STEM he would like to pursue. His mains goals in life include contributing to the fields of sustainability and space travel, making a positive impact on the world, and growing old so that he can retire and play video games for the rest of his life.



Colleen Lau
Current School: University of Hawai'i at Mānoa
Internship Site: Gemini Observatory
Mentors: Neal Masuda, Chris Yamasaki

Project Title: Archiving Current Drawn from the Gemini Cassegrain Rotator and Wrap Motor System

Project Abstract:
The Gemini Observatory has a Cassegrain Rotator and Wrap system consisting of six individual pulsed width modulated amplifiers used to drive six three-phased motors that positions the Cassegrain Rotator and Wrap system located under the telescope's mirror cell. This system allows the instruments under the telescope to be rotated to a precise angle needed for planned observations. During conditions of extremely cold temperatures in the telescope's dome (especially in the winter months) the rotator and wrap system exhibits signs and symptoms of unresponsiveness observable from the lack of movement. These intermittent occurrences in rotator and wrap motor positioning could be attributed to varying levels of excessive bind-up in the rotator and wrap system, causing the motors to draw in an excessive amount of current. The objective was to measure and archive the currents being drawn by a single motor's three phases to prove that the design concept would be viable. In order to measure the current drawn from the motor, we have installed a current transducer to monitor each of the motor's individual phase currents. The transducer sends a corresponding output current signal with a proportional magnitude between 4-20 milliamps to the Programmable Logic Controller (PLC). The PLC then processes the data and makes the current measurements available to the Gemini Engineering Archive system (GEA) which will allow the data to be stored for reviewing at a later date and time. Comparisons of the current measurements from a hand held digital clamp meter to the current measurements produced and stored by the transducer in the GEA system have confirmed and proven that the current transducers provide accurate readings of the currents being drawn by each of the six motors. With the current transducers installed, GEA will be able to accurately archive the phase currents being drawn by each of the six motors. Engineers and technicians will then be able to utilize the data to interpret which motors are exhibiting unusual current demand discrepancies in the rotator and wrap system and to track anomalies in the system if they should occur.

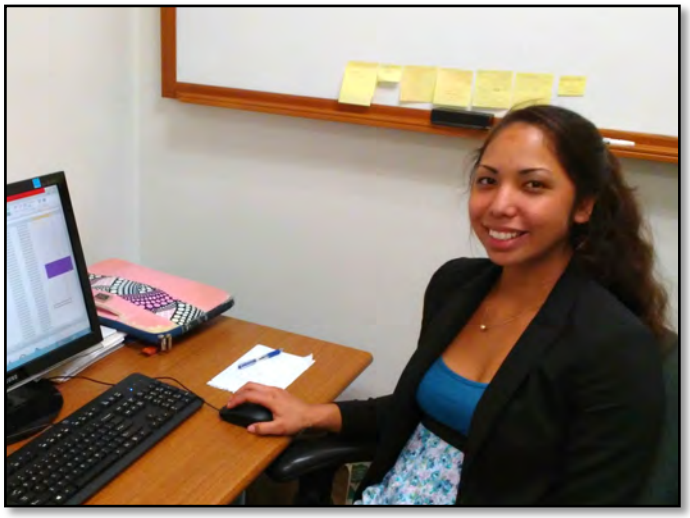
Biography:
Colleen was born and raised in Honolulu, O'ahu. She graduated from Roosevelt High School in 2015 and will be a sophomore in the fall attending the University of Hawai'i at Mānoa. Colleen is pursuing a BS degree in Electrical Engineering and intends to obtain a master's degree in Electrical Engineering. After graduation she hopes to either go into the app-making business or go into nanotechnology to explore water purification devices. When Colleen has free time she enjoys hiking with friends, spending time with family, and trying exotic ice creams.

Cheyenne Maio-Silva
Current School: Colorado State University
Internship Site: W.M. Keck Observatory
Mentor*:* Maura Mastriani

Project Title: Updating the Management of Hazardous Materials at W.M. Keck Observatory

Project Abstract:
On the summit, Keck stores and uses various materials that are both non-hazardous and hazardous. A hazardous material, as defined by the Institute of Hazardous Materials Management, is any item or agent that has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors. Some hazardous materials located on the summit have the potential to pose a threat, if not properly managed, to the safety of Keck employees as well as the environment. The management and documentation of hazardous materials was revisited and updated in order to meet compliance with company goals and standards. It was desirable to reduce the total volume of flammable liquids and flammable gas located on the summit by 10%. This was done by the disposal, transference, or substitution of hazardous materials. An inventory was completed to document all hazardous materials that were on the summit, and the ultimate disposition of each material was tracked. The Safety Data Sheets, formerly known as Material Safety Data Sheets, were then updated on the on-site and electronic databases and materials were categorized based on the type and severity of hazards they presented (e.g., flammability, health hazard). Both high-hazard and excess materials were determined and dealt with accordingly. As a result, there was an overall reduction in the volume of hazardous materials at the summit facility and substitutions were proposed for certain high-hazard materials. It is recommended that in the future, Keck implements a process to keep track of all materials on the summit in addition to maintaining the Safety Data Sheets, so that all hazardous materials are accounted for and proper safety information is readily accessible, if a hazardous event should occur.

Biography:
Cheyenne is originally from Wailuku, Maui and is currently a rising junior pursuing an environmental engineering degree at Colorado State University. She is involved with the CSU chapter of Engineers Without Borders and is currently working on the water systems for a project in Pine Ridge, South Dakota. With an interest in water systems and coral reefs, she hopes to return home to pursue a career in the STEM fields. During her free time, she enjoys hunting, spearfishing, and playing sports.

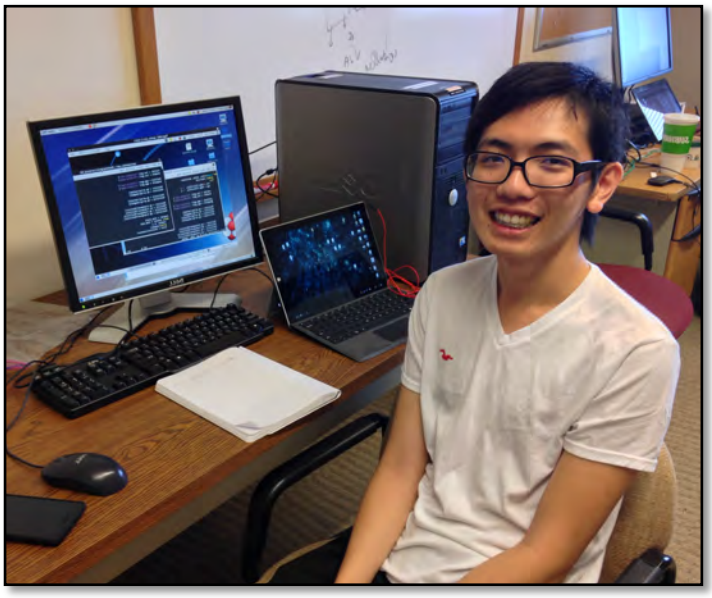


Jason Mar
Current School: Cal Poly San Luis Obispo
Internship Site: Smithsonian Submillimeter Array (SMA)
Mentors: Geoffrey Bower & Ranjani Srinivasan

Project Title: Developing a Real-Time Display for Radio Astronomy

Project Abstract:
The Yuan Tseh Lee array is a radio interferometer that is currently being redeveloped for the purposes of studying the evolution of galaxies and galaxy clusters in the early universe. This experiment will be trying to detect very weak signals coming from the early universe from carbon monoxide spectral lines. Since data is real time, astronomers must have some way to assess data quality and accuracy. The software will receive datasets that contain 21 baselines of data at a maximum rate of every 0.226 seconds. The main real-time display code along with the miscellaneous software tools are written in an Anaconda distribution of Python 3.5 with the display engine running on the PyQTGraph library. The purpose of this project was to extend and optimize existing software by rewriting the code to be more efficient and trying alternative solutions. The previous real-time display program was limited in certain aspects like consuming roughly 80% of the CPU, resulting in delays and eventual failure of the real-time display. In addition to the real time display, software tools were developed for astronomers to analyze specific time intervals of the data collected in a real time setting. Through profiling of the code, the most CPU intensive processes were located and optimized. The most CPU intensive process of the code was the file I/O from the Python library Pandas' ASCII read function. With H5PY's H5 read function as an alternative to Pandas and modification of file retrieval method, the CPU usage dropped from 80% to 20%. With the implementation of multiprocessing, computation time for the software tools has been reduced by over 99%, allowing over 50000 points of data to be processed in less than 10 seconds as opposed to over 10 minutes previously. The software is easily scalable with minimal changes to accommodate the experiment as it expands in scope. It is also currently being adjusted to accommodate for the 1% possible data corruption when reading from a data file that is simultaneously being written into, but further testing is still necessary.

Biography:
Jason was born and raised in Honolulu, Hawai'i. He graduated from McKinley High School in 2014. He is currently a second year Computer Science major at Cal Poly - San Luis Obispo. His hobbies include hiking, going to the beach, photography, and gaming. His goals are to learn more about machine learning and security.



Kyle Mauri
Current School: Colorado State University
Internship Site: Canada-France-Hawaii Telescope (CFHT)
Mentor: Greg Green

Project Title: Declination Pin Redesign and Zenith Alignment

Project Abstract:
As of right now the Canada-France-Hawaii 3.6-meter telescope does not currently park at true zenith, due in part to a misalignment between the declination pin and receiving block. This misalignment causes the pin to occasionally bind in the receiving block. Part of the problem is the air cylinder, which extends and retracts the pin, because it leaks, causing immeasurable losses in transferable power. This was be rectified by replacing the air cylinder with a new unit. By increasing the bore size of the air cylinder, roughly 25% more force will be exerted on the pin using the same air pressure. Additionally, we added updated position sensing switches to detect the location of the pin. State-of-the-art integrated sensing mounts have been designed and implemented for easy maintenance and troubleshooting in the future. All original, more rigid and robust mounting hardware was fabricated to keep the pin from becoming misaligned with the receiver. Long term, these improvements will make mirror exchanges and coating procedures more efficient, leading to less time, money, and stress being spent by Canada-France-Hawaii Telescope during the time sensitive mirror recoating process.

Biography:
Kyle was born on the island of Maui, and after graduating high school went off to Colorado State University to pursue a degree in Mechanical Engineering. Currently topics that interest him most are machine design and optimization of manufacturing processes. He dreams one day to work as a design engineer for a multinational company. Besides engineering, Kyle enjoys the outdoors through activities such as spearfishing and archery hunting.

Kari Noe
Current School: University of Hawai‘i at Mānoa
Internship Site: Daniel K. Inouye Solar Telescope (DKIST)
Mentor: Tom Schad
Co-mentors: David Harrington & Kevin Reardon

Project Title: Designing a Web-based Visualization Tool for Daniel K. Inouye Solar Telescope Imaging Data Sets

Project Abstract:
Remotely visualizing high resolution, image-based, data sets acquired by solar telescopes is challenging due to their multi-dimensionality and immense volume. Once fully operational, the Daniel K. Inouye Solar Telescope (DKIST) is estimated to produce 20 terabytes of imaging data per day. The DKIST Data Center needs a standard tool to visualize and share their imaging data sets with interested researchers and the public. With a goal of being able to visualize and share 100% of all relevant data collected from the telescope with minimal image degradation from compression, we have created a preliminary design of a visualization tool to handle that volume. This prototype is powered by the IIPImage server compiled with the Kakadu SDK to allow for JPEG2000 support. The visualization tool itself is built upon IIPMooviewer, an HTML5-based JavaScript high resolution image streaming and zooming client. Additional features were added to IIPMooviewer to optimize it for DKIST such as allowing for the manipulation of the following parameters: wavelength, polarization, and time. By adopting the JPEG2000 standard, our prototype allows for efficient transfer rates between the server and a remote user, while providing an extensible framework for the DKIST visualization tool interface.

Biography:
Kari was born and raised on Kaua‘i. Currently, she is a Computer Science and Academy of Creative Media double major at the University of Hawai‘i at Mānoa. She loves to work both the creative and technical sides of her brain, and has an interest in data visualization and computer graphics. After she graduates, she hopes to pursue a master’s degree in Computer Science. In her free time, Kari likes to draw, animate, and create video games.

Brialyn Onodera
Current School: University of Hawai'i at Mānoa
Internship Site: Daniel K. Inouye Solar Telescope (DKIST)
Mentor: William McBride

Project Title: Calculating Vibration Transfer for the Daniel K. Inouye Solar Telescope

Project Abstract:
The Daniel K. Inouye Solar Telescope (DKIST) will be the largest solar telescope in the world, housing a primary mirror with a diameter of 4 meters. A mirror of this size will enable DKIST to observe specific regions of the sun in higher resolution and greater detail, but will also be highly sensitive to vibration. To ensure that the image degradation caused by vibration is maintained at an acceptable level, a vibration budget encompassing all vibration sources was calculated. When excluding vibration caused by jitter, there remained 73 milliarcseconds in the vibration budget. Of the remaining vibration sources to be considered, the enclosure is the most prominent source, being subject to vibration output from pumps, wind and motors. To measure how much vibration transfers from the enclosure to the mount pier, tests were conducted using an inertial mass shaker and seismic accelerometers. The shaker was housed in a frame attached to the enclosure and seismic accelerometers were placed on the mount. Then, by imparting force on the enclosure with the shaker and measuring the response with the accelerometers it was possible to collect, filter and analyze the force and response data in MATLAB. To filter out excess noise a combination of band pass filters and window functions were used. By plotting the filtered frequency response function of the data we are able to determine how much energy is transferred and derive the image motion that occurs.

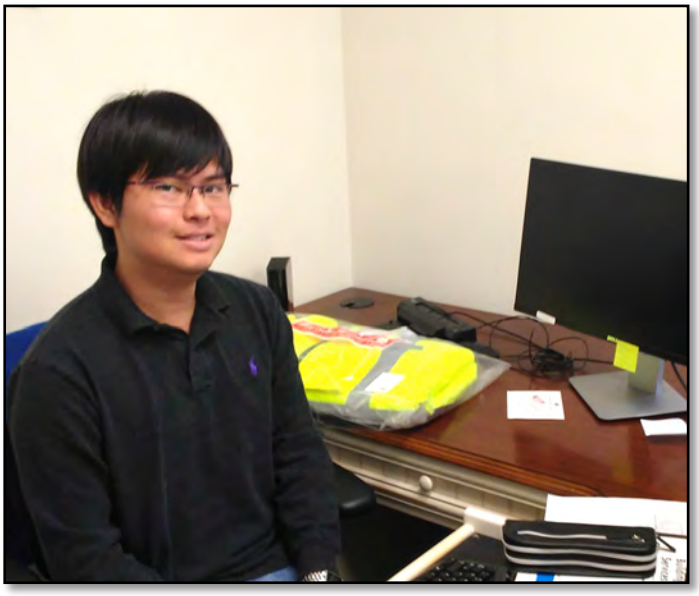
Biography:
Brialyn was born and raised on the Big Island of Hawai'i. A graduate of Kamehameha Schools Hawai'i, she attends the University of Hawai'i at Mānoa entering her senior year of mechanical engineering. She is interested in applying her knowledge of mechanical engineering to a wide range of fields and dreams of eventually getting her master's degree in the subject. Ideally she hopes to use mechanical engineering to develop renewable energies, learn about space or explore the deep ocean.

Keanu Paikai
Current School: University of Alaska, Fairbanks
Internship Site: Daniel K. Inouye Solar Telescope (DKIST)
Mentors: LeEllen Phelps, Guillermo Montijo Jr.

Project Title: Commissioning Plans for the Solar Telescope Thermal Systems

Project Abstract:
The construction of the Daniel K. Inouye Solar Telescope (DKIST) has been going on since January of 2013 and is currently approaching the final stages involving the functional startup of its thermal systems. In order to accomplish functional startup and commissioning of these systems, it is required that all of the subsystem components which make up the telescope's thermal systems be tested and tuned to verify compliance in meeting the design and operational specification required for the telescope to operate properly. The purpose of this project is to generate both pre-functional checklists and general commissioning plans that will initialize the commissioning process of these thermal systems. During the checklist building process, drawings and component Installation, Operation, and Maintenance (IOM) manuals were utilized to determine the proper procedures of installation and operation specified by the component manufacturer. A majority of these installation procedures were then refined and transcribed to form the basis for each respective component checklist. Having completed the checklists, commissioning plans were then generated using templates from previous building projects. These templates were modified and completed using information relevant to the DKIST project such as construction phases and specific management protocols. As a final product, a total of four pre-functional checklists were generated; these cover major components such as centrifugal pumps, heat exchangers, air handling units, and chillers. Commissioning guidelines were also completed and are focused on the pre-functional phase of the commissioning process.

Biography:
Keanu is currently a senior at the University of Alaska, Fairbanks studying Mechanical and Aerospace Engineering. Currently his goals are to obtain a bachelor's degree and to start working for a company in the field of aerospace engineering. However, Keanu has recently found an interest working with modeling and finite element analysis, which might sway him toward further studies and research. Other than academics, some of his hobbies include cycling, archery, and building/flying radio controlled quad-copters.



Pauleen Pante
Current School: University of Hawai'i at Hilo
Internship Site: Akimeka, LLC and JaKris Technologies
Mentor: Rob Bartlett

Project Title: Automated Code Analysis Report Generation

Project Abstract:
The Theatre Blood Mobile (TBLDM) application is a system to track inventory, donations, and transfusions of blood products in war zones. Sensitive information is stored in databases and transmitted over networks, therefore the security of the application is of high importance. Code analysis tools provide insights into security vulnerabilities and other potential issues with the code, however the outputs from code analysis are in XML and JSON. Because JSON and XML are raw formats that do not provide adequate decision-making utility, a report must be composed detailing the findings from the code analysis tools for mandatory delivery to the U.S. government. The purpose of this project is to automatically generate a user-friendly Microsoft Excel and Word report on security problems and other issues with the code, replacing the current manual composition, for effective decision making by the development group, project management of Akimeka, and Akimeka's customers. Visual Studio and SonarQube are software products that provide analysis on code and report findings of potential vulnerabilities. A C# program was written to parse the initial analysis report from both sources. Excel and Word templates were created, which the program populates with the parsed data. The updated documents display charts and graphs to visualize the findings. The components created to implement the program will be published as open source software for potential future use by other developers.

Biography:
Pauleen was born and raised in Southern California and just recently graduated with a degree in computer science from the University of Hawai'i at Hilo. She plans to enter the industry as a software engineer as well as attain her master's degree. Her current interests lay in data analytics and learning new programming languages.

Eric Paopao
Current School: Hawai'i Community College
Internship Site: UH Institute for Astronomy Hilo
Mentor: Marc Cotter

Project Title: Controlling Hazardous Energy on Mauna Kea: Lockout/Tagout for UH88

Project Abstract:
The UH88 Observatory on the summit of Mauna Kea currently does not have a hazardous energy control program--lockout/tagout (LOTO)--in place. Hazardous energy types include electrical, chemical, hydraulic, thermal and pneumatic. Performing equipment service and maintenance without an energy control program can be very dangerous and in some cases, life-threatening. The purpose of LOTO is to protect employees from unexpected machine start-up while they are working on them. During the development of the energy control program, applicable safety regulations were researched and site surveys were conducted. LOTO procedures were then written, approved, and placed into policy. Annual employee training and inspections will be conducted in the future to keep the energy control program up to date. The UH88 Observatory will adopt the LOTO program to provide a safe working environment for its employees.

Biography:
Eric is from Hilo, Hawai'i and is a graduate of Hilo High School. He is an electronics technology student at Hawai'i Community College in Hilo and expects to receive his A.A.S. in May of 2017. After graduation, he plans to further his education by pursuing a degree in mechanical engineering at UH Mānoa. Eric would like to work in the mechanical design field and has always wanted to invent new and innovative products. He enjoys staying active and spending free time with family and friends.

Christine Joy Rioca
Current School: University of Hawai‘i - West Oahu
Internship Site: Daniel K. Inouye Solar Telescope (DKIST)
Mentors: John Hubbard and Steve Wampler

Project Title: Migrating Version Control Systems: Concurrent Version System to Git

Project Abstract:
The High-Level Software (HLS) group of the Daniel K. Inouye Solar Telescope (DKIST) uses version control systems to keep track of file versions of instrument systems, control systems, common services framework, and camera systems software. The current version control system used for these software systems is Concurrent Version System (CVS). CVS has not been keeping pace with modern software version control developments, so the HLS group would like to migrate to a new version control system called Git. The purpose of this project was to verify that Git is a suitable replacement for CVS and develop an upgrade strategy to migrate from CVS to Git. Resources on version control systems and migration strategies led to testing different CVS to Git migration tools and studying Git functions. Simulating migration tools and Git functions was done on a VMware workstation running a virtual Ubuntu operating system. Testing with Git was conducted to understand its functionality, what tools can be used to best organize a large file history, and how to implement the appending file directory structure from CVS. It is suggested that Git is a suitable replacement for CVS based on the success of importing an existing CVS repository and making changes to CVS files in Git. The upgrade strategy should involve using 'cvsconvert' as a migration tool, 'git clone' to replicate the current complex file directory structure of CVS, 'git merge/rebase' for updating between local and remote repositories, and Smartgit as a graphical user interface (GUI).

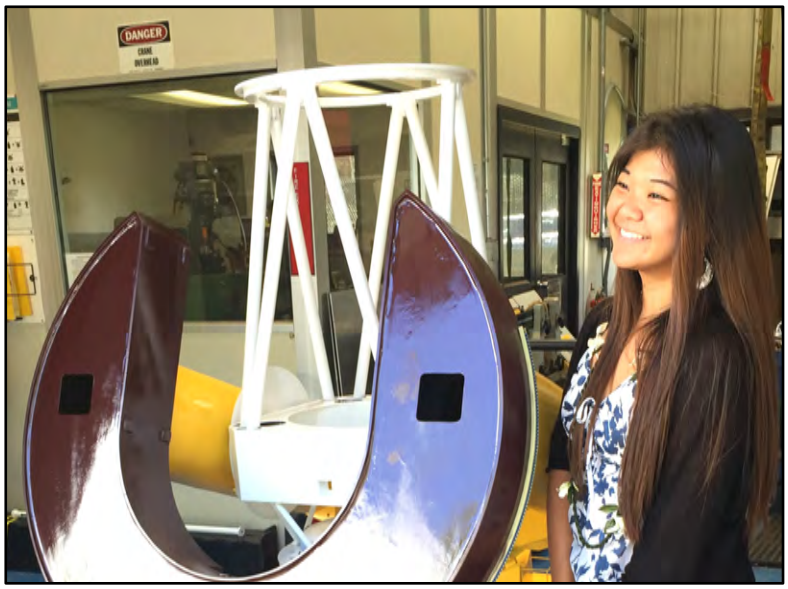
Biography:
Christine was born on the island of O‘ahu and raised in Waipahu. She recently graduated from Honolulu Community College (HCC) with her Associates of Science degree in Computer Electronics and Networking Technology (CENT). Christine will attend the University of Hawai'i - West Oahu in the fall and expects to graduate with a Bachelors of Applied Science in CENT in December 2017. As the Director of IT Affairs at HCC, she promotes the mission to bridge the gap between students, alumni, professors, IT professionals, and Hawai'i youth in the Hawai'i Advanced Technology Society (HATS) student organization. Christine is interested in a career in computer networking and/or cybersecurity. She plans to become a Certified Cisco Network Associate (CCNA) and Certified Information Security Systems Professional (CISSP).

Nicole Tabac
Current School: Northern Arizona University
Internship Site: Canada-France-Hawaii Telescope (CFHT)
Mentors: Steve Bauman and Windell Jones

Project Title: Mechanization of the Scale Canada-France-Hawaii Telescope Model

Project Abstract:
The Canada-France-Hawaii Telescope (CFHT) has a model of its telescope that has not been maintained for years but it would be a stimulating addition to outreach. CFHT's outreach includes work with programs to encourage Hawaii's youth to be involved in astronomy and other STEM fields. The model needs to be able to mimic the movement of the actual telescope in the hour angle (HA) and declination (DEC) axes and pinpoint star positions using a laser. Restoration of the model telescope was executed: cleaning, sanding, painting, replacing, and manufacturing parts. Testing was conducted on the existing motors and encoders to ensure that replacements were not necessary. A Raspberry Pi computer was programmed using Python to communicate with a Roboclaw motor controller, which was used to read the encoders and move the motors. For manual motion, a classic Nintendo USB controller is used, enabling users to move the telescope model manually. The new computer interface was paired with a planetary program that supplies coordinates to simulate the position of the telescope. The addition of a user engagement component to the model enhances the model's impact on outreach activities. Project results will be presented.

Biography:
Nicole was born and raised on the Big Island of Hawai'i. She currently attends Northern Arizona University in Flagstaff, Arizona and will be a junior in the fall, pursuing a Bachelor of Science degree in mechanical engineering. She hopes to work in the renewable energy field to increase self-sufficiency. She is also interested in mentoring high school and middle school robotics teams to help encourage and educate them about the STEM fields.

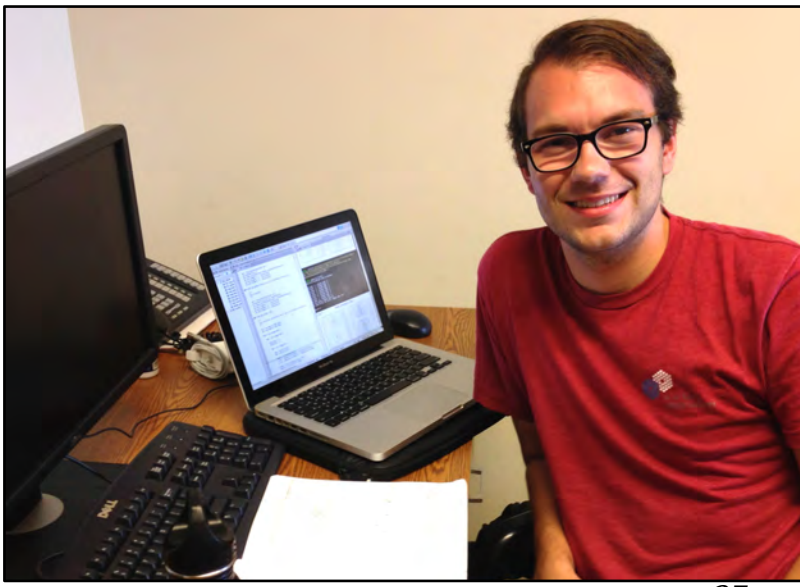


Travis Thieme
Current School: University of Hawai'i at Hilo
Internship Site: Smithsonian Submillimeter Array (SMA)
Mentor: Ramprasad Rao

Project Title: Protostellar Dynamics: Modeling the Effects of Magnetic Fields on Gravitational Collapse

Project Abstract:
Star formation is still one of the many unsolved mysteries in modern astrophysics and is one of the principal areas of research conducted by the Smithsonian Submillimeter Array. In the standard model of low mass star formation, stars form from dense clouds of molecular gas that undergo gravitational collapse. As they become more massive and dense, their internal gas pressure is not strong enough to support hydrostatic equilibrium. The star formation rate based on gravitational free fall timescales is much faster than that determined from current observations, so there must be some mechanism to provide support against collapse. One possibility is the manifestation of magnetic fields in these molecular clouds. The Submillimeter Array has recently collected polarization data of the protostellar system NGC 1333 IRAS 4A in order to try and understand the 'hourglass' morphology seen in the structure of these magnetic fields. By examining different mathematical models, my goal was to produce numerous programs to visualize and fit linearly polarized data in the form of maps of Stokes Parameters to find equation constants to measure the strength of these magnetic fields. Various methods of trying to determine the magnetic field have been explored and progress toward measuring the strength of the magnetic fields will be presented. Ultimately, this will help determine the validity of our mathematical model and the significance of magnetic fields within the early stages of stellar evolution.

Biography:
Travis is from Seattle, Washington and currently attends the University of Hawai'i at Hilo where he will major in Astronomy and Physics. After he completes his bachelor's degree, Travis plans to go to graduate school and complete his Ph.D. in Astronomy. Then, hopefully he can conduct his own research or teach at a university. Travis's areas of research interest include exoplanets, solar system formation and star formation. In his free time, he enjoys playing guitar, traveling, and learning other languages.



Derrick Torricer
Current School: University of Hawai'i Maui College
Internship Site: Maui High Performance Computing Center (MHPCC)
Mentors: Laura Ulibarri, Randy Goebbert, Adam Mallo

Project Title: Highway to High-Performance Computing: Developing Features for the High-Performance Computing Portal

Project Abstract:
Supercomputers possess a great deal of processing power. This is utilized in various scientific and engineering fields for performing research. Research such as large-scale simulation and complex calculations are often performed with supercomputer resources. Users of the Department of Defense Supercomputing Research Center (DSRC) supercomputers gain access via a web portal. The High Performance Computing (HPC) portal users who are running research programs rely on several key pieces of account information to support their workflow. Information on account-system affiliation, queue listings, and time allocations are utilized in optimizing workflow efficiency. In order to allow users to access this information, a feature for the HPC portal is being developed in JavaScript and HTML that will retrieve user information using ReST Services – a programming interface to the supercomputers – and properly display it for the users. The progress on this developing feature will be presented.

Biography:
Derrick was born and raised on the island of Maui, and has been attending UH Maui College since 2011. During this time he has earned an Associate in Science degree from UH Maui College's Electronic and Computer Engineering Technology program, has competed in the American Astronautical Society's CanSat Competition, and NASA's first Swarmathon Competition, and is currently a senior in the Engineering Technology Bachelor's program at UH Maui College. He plans to earn his bachelor's degree in Engineering Technology and seek out a career in which he can further his involvement in the technology field.

Kyle Yoshida
Current School: Harvard College
Internship Site: HNu Photonics LLC
Mentor: Michael Franklin

Project Title: Designing a pH Control Module for a Closed Cell Culture System

Project Abstract:
HNu-Photonics is building the Stem Cell Optical Research Platform in Orbit (SCORPIO-V) to conduct experiments in microgravity with live-cell imaging. This platform enables cell culture at a healthy pH of 7.4 using a BioChip: a custom-designed microfluidic cell culture vessel in which cells are grown and imaged. Due to the fact that a CO_2 incubator cannot be used on the International Space Station (ISS), an alternate method of pH regulation must be implemented. BioChips containing cell media were imaged using a USB microscope to obtain RGB pixel values of a pH indicator dye (phenol red) over a range of typical cell culture pH values. A script in Python was created to take pictures of the BioChip, determine the pH optically, and turn on a pump to change media if necessary. Using the cell densities, cell type, and flow rate, the frequency of cell media replacements can be determined. This automation will keep cells alive and healthy for experimentation on-board the ISS.

Biography:
Kyle grew up in Pearl City, Hawai‘i and graduated from Kamehameha Schools Kapālama in 2014. He is a junior at Harvard studying bioengineering to pursue his goal to create automated and individualized forms of healthcare. In his free time, he volunteers at a student-led homeless shelter and serves as treasurer for the Harvard Robotics Club. He also enjoys classical music, playing clarinet, and learning Swahili.

Akamai Workforce Initiative

AWI advances Akamai (smart, clever) students into the Hawai‘i technical and scientific workforce. AWI partners with industry, observatories, government, educational institutions, and community to meet workforce needs in astronomy, remote sensing, and other science and technology industries in Hawai‘i. The Akamai Internship Program is one of the major programs of the AWI, led by the Institute for Scientist & Engineer Educators (ISEE) at University of California, Santa Cruz.

The 2016 Akamai Internship Program placed 29 college students from Hawai‘i at the following organizations to complete a seven-week project:

- Air Force Research Laboratory (AFRL)
- Akimeka LLC
- Canada-France-Hawaii Telescope (CFHT)
- Cellana, Inc.
- Daniel K. Inouye Solar Telescope (DKIST)
- Gemini Observatory
- HNu Photonics LLC
- Maui High Performance Computing Center (MHPCC)
- Natural Energy Laboratory of Hawai‘i Authority (NELHA)
- National Oceanic and Atmospheric Administration (NOAA)
- Smithsonian Submillimeter Array (SMA)
- Subaru Telescope
- UH Institute for Astronomy, Hilo
- UH Institute for Astronomy, Maui
- University of Hawai‘i at Hilo
- W.M. Keck Observatory

AWI currently receives funding and other support from:

- Thirty Meter Telescope International Observatory (TIO)
- Air Force Office of Scientific Research (FA95501510427)
- Hawai‘i STEM Learning Partnership at the Hawaii Community Foundation, with support from nine funders, including the THINK Fund at HCF (funded by TIO), and the Maunakea Fund.
- Daniel K. Inouye Solar Telescope
- National Science Foundation (AST#1347767)
- National Solar Observatory
- University of Hawai‘i at Hilo
- Canada-France-Hawaii Telescope

For more information please contact:
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http://akamaihawaii.org