

PISCES HAWAII

Message from the Program Manager

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Rodrigo Romo

Aloha Kakou,

Summer is here and everyone at PISCES is preparing for a busy few months ahead. Thanks to collaborative support from the Department of Labor and Industrial Relations and the Hawai'i Technology Development Corporation (HTDC), we are successfully funding our Summer Internship Program and our Summer Women's STARS Program.

Last month we participated in the annual Astroday outreach event in Hilo, joining scientists and astronomers to share what's happening in the local science community. We manned a booth with our friends from HI-SEAS (Hawaii Space Exploration and Analog Simulation) and UH Hilo's Vulcan Robotics Team. The latter's mining robot (appropriately named "Spock") competed at NASA's annual Robotic Mining

Competition last month at Kennedy Space Center in Florida. It was an exciting day with many parents and children stopping by with curiosity and interest in our rovers. I found it encouraging to see so many youth taking an interest in robotics and the science behind them.

In other news, last month our Logistics/EPO Manager and UH Hilo Physics and Astronomy Professor John Hamilton was recognized with the Francis Davis Award for Excellence in Undergraduate Teaching. John is well-deserving of this award. His passion for science, both inside and outside the classroom, is contagious for the students he mentors.

Looking to the summer ahead, I am pleased to welcome five student interns who will be working with PISCES. Three of them will be

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tackling the systems and development of our planetary rover. The others will be testing various methodologies for producing basalt-based feedstocks for manufacturing purposes in our Materials Science Lab.

The recent STTR Grant announcement by NASA for a joint-project between us and Honeybee Robotics is currently in negotiations and we expect to begin work this summer.

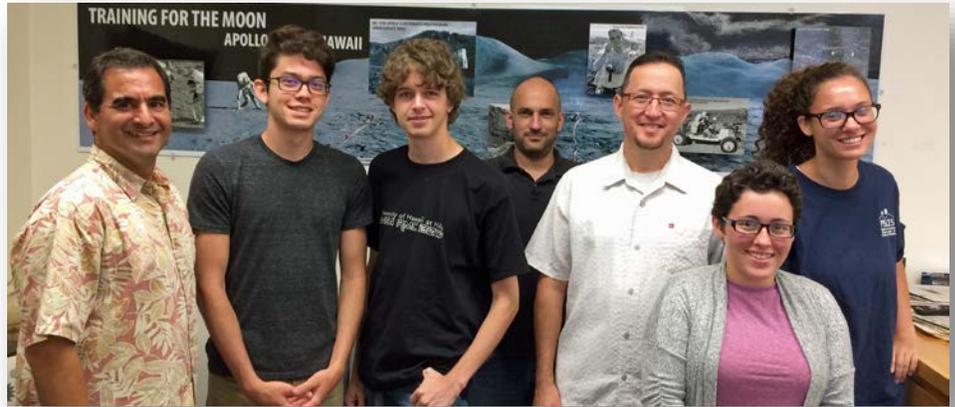
Our upcoming Women's STARS Program promises to be a unique experience. Our local students will be engaged in a range of activities including programming Arduino boards, accessing telescope data from NASA telescopes, and venturing through Hawaii Volcanoes National Park where NASA performed part of their BASALT project field tests. This program would not have been possible without a generous sponsorship by HTDC, as well as support from the Pacific Aviation Museum, Canada-France-Hawaii Telescope, and the entire staff at PISCES.

On a final note of exciting news, Rocket Lab successfully completed their first test flight of an Electron small launch vehicle out of New Zealand. Rocket Lab plans to make space travel more affordable and accessible for small satellite companies, and we applaud their efforts in helping to pioneer the future of aerospace.

With that said, I wish you all a joyful summer. Stay tuned to find out about the exciting work our summer interns will be doing.

Mahalo nui,
Rodrigo Romo
PISCES Program Manager

PISCES Welcomes Five Summer Interns



(L-R) PISCES Prog. Manager Rodrigo Romo, Interns Aaron Roth, Jack Andersen, PISCES Ops. Manager Christian Andersen, Interns Andrew Hasegawa, Lily Leyva, Kyla Defore.

Thanks to a grant award by the Department of Labor and Industrial Relations, PISCES has hired five university students to work full-time in its 2017 Summer Internship Program. The students will work a combined total of 2,000 hours over 10 weeks within two project tracks: Robotics and Materials Science.

Robotics Team Bios

Aaron Roth is a Hawaii native currently attending Arizona State University and majoring in computer science. He interned with PISCES last year, and was an active member of his robotics club during high school. With a natural love for computer science and robotics, he hopes to one day work for NASA or JPL. As a kid, Aaron was inspired by Hawaii events like Ellison Onizuka Day and Journey Through the Universe.

Jack Andersen came to Hawaii Island from the Midwest three years ago. He is pursuing a degree in Electronics Technology at HCC with a personal focus on embedded system programming. Jack's experiences draw from hobby projects and work with UH Hilo's Robotics Club. In fact, he designed the user interface control and server for the club's mining rover "Spock" which competed in NASA's RMC this year.

Originally from Japan, *Andrew Hasegawa* studied theatrical production arts at Ithaca College in New York. He took up electronics technology at HCC last year and intends to complete his associates degree in Spring 2018. Andrew is working with PISCES to learn more about computers and information technologies. He worked at Subaru Telescope for about a decade up until last summer.

Materials Science Team Bios

Lily Leyva is a Hawaii Island native and former PISCES STARS Program participant. She was inspired to work with PISCES after attending the summer program. Lily is interested in aerospace engineering, and wants to join the effort of space research and exploration in Hawaii. The Keauu High School graduate hopes to help build a future akin to Star Trek, where people work together to solve big problems.

Kyla Defore is a returning intern and UH Hilo graduate. Now in her third year with PISCES, the recent geology graduate is well-versed in the world of planetary science. Kyla worked with NASA's BASALT Mars research project in Hawaii last year. She is a Hawaii Space Grant Winner and plans to attend graduate school.

PISCES Manager Receives Award for Teaching Excellence

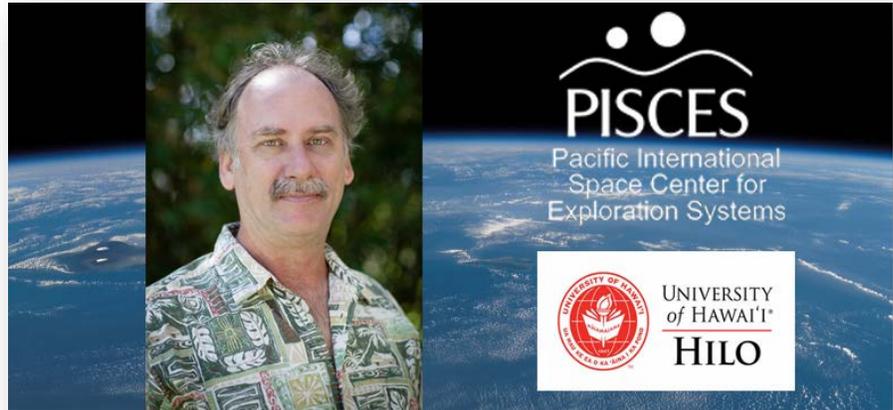
PISCES' Logistics and Education/Public Outreach Manager, John Hamilton, has been recognized for his exceptional efforts as a UH Hilo Physics and Astronomy instructor with the Frances Davis Award for Excellence in Undergraduate Teaching.

John is well-known for his tireless efforts to educate and inspire his students, driven by his own passion for astronomy and science. His

Involvement in various projects, including with PISCES and the University of Hawaii at Hilo's Robotics Team, has helped students get hands-on experience in the worlds of astronomy, planetary geology and robotics prior to graduation. His students say these experiences—such as volunteering with NASA scientists for live experiments—are incredibly valuable for the beginning of their careers. Working with John often provides them with rare opportunities to connect with accomplished scientists and space organizations.

Students also note that John's style of teaching shows them how learning is much more than numbers and memorizing facts—it is a journey that hones their skills and knowledge through experience.

John is among six University of Hawaii instructors to receive the Frances Davis Award this year. The award recognizes dedication and demonstrated teaching excellence with undergraduate students. It was originally established as a memorial to the late Frances Davis, who taught mathematics at Leeward Community College and UH Mānoa for nearly two decades.



AstroDay Showcases Astronomy & Science on Hawaii Island



PISCES and UHH Robotics Team at AstroDay: (L-R) – PISCES' Rodrigo Romo, UH Hilo Robotics Team members Malcolm Chun, Andrew Hasegawa, Jack Anderson and Mark Roberts.

planetary rovers at a shared booth, drawing a lot of attention from curious kids and adults alike. Two of the attending UHH Robotics Team members, Andrew Hasegawa and Jack Andersen, are working with PISCES this summer as paid interns. PISCES also shared samples of basalt-based materials with visitors, including bricks, fabric, rebar and cord. The development of basalt as a viable building material—both on Earth and in space—is a key focus for PISCES and one day, the agency hopes to create a sustainable new product and industry in the Islands.

The annual AstroDay science and astronomy outreach event returned to Hilo for its 16th consecutive year on May 6 to highlight and share the work of the science and astronomy community of Hawaii Island with the public.

Hosted by the Maunakea Astronomy Outreach Committee (MKAOC), the all-ages event drew hundreds of children and their families. More than 35 astronomy, education, and community organizations from around the state attended AstroDay, engaging the public with science activities, astronomy posters and a portable planetarium. The science demonstrations included solar viewing through telescopes, a wearable space suit, robots, rovers, an infrared camera demonstration, as well as liquid nitrogen and frozen carbon dioxide demos. AstroDay organizers called the event “a great success.”

PISCES and the UH Hilo Robotics Team parked their

UH Hilo's Robotics Team Vulcan Competes at NASA RMC



Above: Team Vulcan placed in the top half of the competition at NASA's RMC this year. Team members, (L-R): Malcolm Chun, Brittany Maya Fuemmeler, Jack Andersen and Daryl Albano.

The University of Hawai'i at Hilo's "Team Vulcan" returned to Kennedy Space Center for the second year to compete in NASA's 2017 Robotic Mining Competition (RMC) from May 22 to 26. Team Vulcan placed 21 out of 45 competing teams this year, distinguishing themselves in the top-half of the competition.

RMC challenges national college robotics teams to orient, navigate, mine and collect as much lunar simulant dust as possible. This competition is the "working part" of ISRU (*in-situ* resource utilization), which is a process of mining or collecting raw materials and extracting usable resources from them like oxygen, water and rocket fuel for astronauts and space missions.

Team Vulcan is part of UH Hilo's Space Robotics Club and engages students from both Hawaii Community College and UH Hilo. The Space Robotics Club at UH Hilo is a RISO (Registered Independent Student Organization) extracurricular activity.

The robotics club also fields a NASA Swarmathon Team of two students, Will Barden and Alec Goodson. Led by UH Physics Lab Instructor, Marc Roberts, they placed No. 2 in the nation during the virtual competition this year.

Left: Inside the RMC arena during the action. Below (top): Brittany Fuemmeler examines "Spock" at RMC. Below (bottom): Daryl Albano (L) and Jack Andersen pause at their controls for photo during the competition.



As a result, Barden has been selected to participate in the Swarmathon Hackathon this summer at M.I.T.

John Hamilton, PISCES EPO Manager and UH Hilo Physics and Astronomy Instructor, is the club's Faculty Advisor and has served as a Mining Judge at RMC for the last six years.

UH Hilo Robotics Members who competed at RMC:

Daryl Albano – UH Hilo Computer Science Major, Space Robotics Club President

Brittany Maya Fuemmeler - 2017 UH Hilo Marine Science Major with Physics Minor, Space Robotics Club VP

Jack Andersen - HCC Electronic Technology (ETRO)

Malcom Chun - HCC Electronic Technology (ETRO)

- Marc Roberts - RMC Faculty Team Lead
- Donald Rudny – Mentor & retired Mechanical Engineer



Ready for Liftoff!

Hawaii Senator Glenn Wakai

Nothing ignites the imagination like space exploration, and no place on earth is better situated than Hawaii to be the epicenter of aerospace development. Our proximity to the equator, lunar landscape and collection of telescopes is unrivaled. All we need to create a vibrant aerospace sector is visionary leadership, community support and a few more dollars.

This past legislative session, earthly pursuits like homelessness and education demanded a larger portion of the state's \$14 billion budget. Some lawmakers were looking to defund PISCES. I worked with Rep. Nakashima to safeguard funding in the hopes of putting more fuel into the agency's budget in the coming years.

The possibilities are so promising. With a little more investment, we can support manned missions to deep space, drone research, deep-space laser communications, a potential small satellite launch facility, space tourism, basalt research to aid the effort of colonizing other planets, and provide quality jobs for our keiki.

I believe the state government is in a unique position to re-engineer the future and we can choose to think BIG. I choose to support PISCES and shoot for the stars!

Aerospace in Hawaii Means Business

Hawaii Rep. Mark Nakashima

During my tenure in the legislature, I have strived to provide and support enrichment opportunities for Hawaii's residents to learn and grow, developing their aptitude and leadership skills primarily in the areas of agriculture, health care and STEM/robotics. Today, as the chair of the Economic Development and Business Committee in the House of Representatives, I see it as my responsibility to create employment opportunities that will allow our students to put those skills to work making a positive impact on the state economy. Toward that end, a grant from the Hawaii Department of Labor (DLIR) is providing internship opportunities for university students at PISCES this summer.

The research PISCES is doing for applications



Sen. Glenn Wakai leaps in front of the Pyramid of the Sun in Mexico City. He is an energetic believer in catapulting Hawaii's economy into the stratosphere.



Rep. Nakashima and PISCES Program Manager Rodrigo Romo at the 2017 VEX Robotics Championship held at Keaau High School in January.

in space has real world uses right here in Hawaii. Their research in developing basalt pavers to build launching pads on a distant planet or asteroid can have applications in building your driveway. Appropriations by the legislature this year will allow PISCES to investigate the feasibility to research and develop basalt fiber products such as twine and mesh.

PISCES is also involved in the creation of an \$8.5 million Joint Manufacturing Facility that will serve as an incubator and workforce training facility to provide the equipment and skilled employees necessary to allow a number of related industries to develop and grow in Hawaii. The vision of this joint venture project between the DLIR, UH-Hilo and the High Technology Development Corporation is to support agriculture, health care, astronomy and aerospace opportunities that will benefit from the support provided by this facility when completed.

At the end of the day, the goal here is to create jobs with good salaries and benefits for the people of Hawaii, and PISCES is in a unique position to help usher in that future.