PISCES
Pacific International Space Center for Exploration Systems

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PISCES HAWAII

Message from the Program Manager

PISCES.HAWAII.GOV

Rodrigo Romo
Program Manager

Aloha Kakou,

The legislative session has just come to an end and we're very pleased to announce that PISCES' baseline funding has been approved by State Legislators. We are grateful for the strong show of support we received from Rep. Mark Nakashima, Sen. Glenn Wakai, Robbie Melton of the High Technology Development Corporation, and Luis Salaveria of DBEDT during this session. With their help, PISCES is now poised to continue its programs and projects to benefit the Hawaii community and economy, and space exploration industry.

We've also received good news this month that PISCES will be awarded supplemental funding through several grants and private contracts. The hard work of everyone at PISCES has played a primary role in securing these funds, and I look forward to the exciting possibilities ahead!

Awards Received & In Works:

1) Department of Labor and Industrial Relations' Summer Internship Program Grant: PISCES will receive an award of $25,000 from the DLIR to cover labor costs for five interns this summer over 10 weeks. Our interns will be working in two teams: Robotics and Materials Science.

2) NASA STTR Grant: PISCES and Honeybee Robotics' joint-proposal to develop a regolith-derived feedstock for ISRU manufacturing has been selected for contract negotiations for NASA's Phase 1 STTR grant. NASA received over 1,600 proposals; 338 were selected for SBIR funding and 61 for STTR Phase 1 contract negotiations. The STTR award is expected to provide funding for one year to develop planetary "Lego Blocks" for building infrastructure on the Moon/Mars.

Continued on pg. 3

ISSUE 5 - MAY 2017

UH Hilo Swarmathon Team Claims 2nd Place in NASA Challenge

UH Hilo Swarmathon Team: Alec Goodson (left) & Will Barden (right), both pictured with Team Leader Marc Roberts. Photos by Marc Roberts.

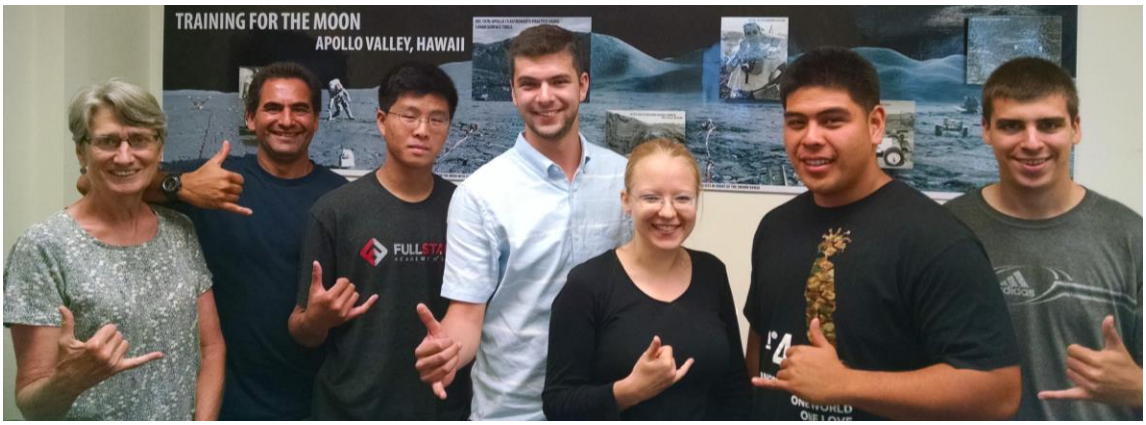
UH Hilo's Swarmathon Team ranked 2nd place in this year's NASA Swarmathon Virtual Challenge, held April 18 to 20! Students Will Barden and Alec Goodson, led by Physics lab coordinator Marc Roberts, competed among 15 national teams for the win.

The Swarmathon Chellenge tasked competing students with developing a search and retrieval algorithm for virtual robots to develop real-world strategies for identifying and collecting resources found on places like the Moon and Mars.

The team claimed victory by rewriting the Swarmathon code with instructions that gave their bots an efficient edge in seeking out virtual resources. Barden set up the hardware system for the program by installing the necessary software to compete; Goodson rewrote the programming code.

The UH Hilo trio took home a $1,000 cash prize for their effort, which Roberts said will go toward new computer hardware and robotics equipment. Congratulations on the win UH Hilo Swarmathon Team! Well done!

PISCES Receives $25K Grant from DLIR for Summer Internship Program



Students from the 2015 Summer Internship Program experienced hands-on learning in the fields of robotics, programming, event outreach and planetary geology.

We're pleased to announce that our 2017 Summer Internship Program for university students has received a $25,000 grant award from the Hawaii State Department of Labor and Industrial Relations' Workforce Development division.

Once in place, the DLIR grant funding will provide five PISCES interns with paid salaries this summer to work on projects in robotics and materials science.

"We greatly appreciate DLIR's support for our hardworking student interns," said Rodrigo Romo, program director at PISCES. "These funds will give them a paid salary and will allow them to fully focus on applying what they've learned in school to real-world problem solving. The program is geared towards helping these kids excel in the competitive field of aerospace careers, and so far, we've seen excellent results."

During the last four years, PISCES has mentored 31 students in aerospace-related fields through both its summer and year-round internship programs. Students are given the opportunity to work with experts in their respective fields including robotics, programming, engineering, planetary geology and materials science.

In addition to hands-on experience, student interns get the benefit of making new connections in the industry through PISCES, as well as publishing work in scientific journals. Former PISCES interns have landed jobs with highly competitive companies like Google and Apple Computers, as well as internships with NASA and Honeybee Robotics.

"I'm excited to work with and mentor this next group of student interns in June," said Romo. "These kids are bright and will go on to do some great work. I'm confident that their time at PISCES will provide a unique opportunity to expand their skills and understanding, and broaden their options after college."

High School Women: Apply Now!

SPACE SCIENCE ADVENTURE!

Women's S.T.A.R.S. Program

STem Aerospace Research Scholars

Visit PISCES.HAWAII.GOV to apply!

Deadline: June 2

Prog. Manager's Message Cont.

3) HTDC Grant: Hawaii Technology Development Corp. has awarded PISCES with a $5,000 grant to support the fourth annual STARS Program aimed at high school girls interested in pursuing a career in aerospace.

4) Basalt Fiber Market Research Funding: Legislators have appropriated $200,000 in funding to conduct a marketing assessment study on the feasibility of developing a basalt fiber and/or basalt rebar manufacturing operation in the State of Hawaii.

5) Hawaii County Dept. of R&D: PISCES will submit a grant application to the County of Hawaii in partnership with the Hawaii Ant Lab and the College of Tropical Agriculture and Human Resources to design and test a delivery method via UAV to control Little Fire Ant (LFA) populations in tree canopies. PISCES will support the project with the staff's experience and knowledge of robotics.

6) In addition, PISCES will be working with Dr. Paul Van Susante of Michigan Technological University and Honeybee Robotics to prepare an STTR Phase 2 proposal for the construction of a robotically-built landing pad.

On behalf of all the staff at PISCES, I want to thank the State Legislature for their confidence in our continuing work to benefit Hawaii's economy through aerospace projects, business and workforce development. We look forward to the continuing journey of growing our impact in Hawaii while forwarding humankind's collective dream of exploring the vast reaches of space.

Rodrigo Romo,
PISCES Program Manager

PISCES & Honeybee Selected for NASA STTR Grant to Develop 'Planetary LEGOS'

An interlocking sintered-basalt paver created by PISCES. Photo: `ENA Media.

NASA announced on April 19 that PISCES and Honeybee Robotics, Ltd. have been selected for the 2017 STTR grant program to develop an ISRU technology that could enable construction on other planets. The award, which is pending contract negotiations, would fund Phase 1 to develop and test "Planetary LEGO Blocks"—sintered pavers made entirely of Hawaiian volcanic basalt.

Due to Hawaiian basalt's similarity to the regolith found on places like the Moon and Mars, an effective process to create construction materials could be applied on other worlds to build critical infrastructure in-situ.

During Phase 1 of the proposed project, PISCES will determine the ideal shape for Planetary LEGOs to allow mechanical jointing and construction of horizontal and vertical structures. These include landing pads, roads, habitats and shelters. PISCES will also fine-tune the sintering process to develop a procedure that yields a uniform, consistent building material. Once completed, the blocks will undergo structural testing.

Honeybee Robotics will design a robotic process during the proposed project for building structures using the sintered blocks. The Brooklyn-based tech company has designed, built and integrated instruments for space exploration, including drills and sampling equipment that NASA rovers use to help scientists learn about Mars.

If all goes well, the project will move into Phase 2 which would involve the design and execution of a robotically-built structure using Planetary LEGOs.

PISCES has already created a variety of sintered pavers using Hawaiian basalt with surprising results. Through testing, NASA found these pavers to be stronger than residential concrete. PISCES intends to develop Planetary LEGOs as a sustainable construction material and potentially launch a new manufacturing industry in Hawaii. Such an industry could benefit both the state's economy and the progress of deep space exploration missions.

PISCES and Honeybee Robotics previously collaborated on the VT/VL Landing Pad Project–a robotically-built landing pad made entirely of sintered basalt pavers and constructed on Hawaii Island.

The joint PISCES-Honeybee Robotics proposal was selected out of 1,621 solicitations submitted for NASA's 2017 STTR Program. The STTR Program funds businesses and research institutions developing technologies that can support NASA missions into deep space. Phase 1 STTR contracts last for 12 months with a maximum award of $125,000.

33rd Space Symposium Convenes in Colorado Springs

PISCES was invited to participate in the 33rd Space Symposium in Colorado Springs from April 3 to 6. The conference—one of the largest in the world—drew aerospace companies like Blue Origin, Boeing, Lockheed Martin, and ULA, as well as well-known organizations like NASA and the ESA.

Rodrigo Romo, PISCES program manager, participated in the "Living and Working on Mars" discussion panel aimed towards young engineers and professionals. His fellow panel-members included Dr. Andrew Aldrin of the Buzz Aldrin Space Institute, Dr. Pascale Lee of NASA-Ames, Dr. Steve Chappell of NASA JSC and Ed Rosenthal of Florikan.

"It was a very impressive conference," said Romo. "We were able to talk with a lot of different companies and get a sense of what the small satellite and small satellite launch vehicle industry is aiming for in the next few years."

PISCES is working to position Hawaii as a launch and manufacturing destination for small satellites. The Hawaiian Islands present an excellent location for space vehicle launches into Low Earth Orbit.

Above: PISCES Program Manager Rodrigo Romo (middle) and Operations Manager Christian Andersen (right) met with Dr. Andrew Aldrin of the Buzz Aldrin Space Institute during the symposium to discuss collaboration opportunities in ISRU, Planetary Robotics and Education & Workforce Development. Below: Romo (left) and Andersen hold out the customary Hawaiian "shaka" in front of a previously-flown Blue Origins rocket outside the conference.

Education & Outreach

PISCES Celebrates Earth Day with Students at PTA

PISCES Program Manager Rodrigo Romo talks with students and teachers about PISCES' work in basalt materials science and its potential uses in the future.

PISCES celebrated Earth Day on April 20 with an educational outreach event at Pohakuloa Training Area, a military base straddling the high plateau between Hawaii Island's massive volcanies, Mauna Loa and Maunakea.

The event drew about 300 elementary and intermediate students from around the Island to see unmanned aerial vehicles, hydrogen powered fuel cells and astronomy demonstrations. PISCES rolled out the ever-popular Helelani planetary rover for show, drawing interest and excitement from local kids and adults alike.

XPLORATION OUTER SPACE ANNOUNCES 2017 #STUDENTASTRONAUT CONTEST

PISCES to Support Winning Student During Martian Astronaut Experience in Hawaii

Photo courtesy of HI-SEAS.

Xploration Station — an educational and informational channel dedicated to STEM programming for teens and families—has announced the return of its #StudentAstronaut video contest. The third-annual contest will award the winning student with a three-part, Martian astronaut training adventure on Hawaii Island. The training activities will include:

1) A planetary rover mission with PISCES and the NASA Robotic Mining Competition Team Vulcan of University of Hawaii at Hilo.

2) An overnight stay at the world-renowned HI-SEAS (Hawaii Space Exploration and Analog Simulation) habitat on Mauna Loa volcano.

3) A summit excursion to Maunakea volcano for a behind-the-scenes tour of the Canada-France-Hawaii Telescope.

The winner student's aerospace adventure will be featured in a Season 4 episode of the Xploration Outer Space TV show with host Emily Calandrelli.

Students can enter online by visiting Xploration Station's Facebook page at www.facebook.com/xplorationstation/, "liking" the page, and uploading a video submission that meet the criteria listed at www.xplorationstation.com/contest.

The contest winner will conduct a simulated space rover mission with the UH Hilo Robotics Team Vulcan's mining rover "Spock" (left) and PISCES' "Helelani" planetary rover (right).