

## ROBOTICS SPECIAL EDITION



### CATERPILLAR AND PISCES TO HOST HAWAII INTERNATIONAL ROBOTICS CHALLENGE IN 2019

Caterpillar Inc. and PISCES are partnering to launch a new international robotics competition on Hawaii Island next year. The first-annual Hawaii International Space Exploration And Robotics Challenge (HI-SEARCH) will bring college teams from around the world to compete with innovative robot designs in the lunar-like lava terrain of the Hawaii Ocean Science and Technology Park run by NELHA in Kailua-Kona. The event is tentatively scheduled for Sept. 2 to 8, 2019.

Caterpillar is the main sponsor for the event, which is based on NASA's Robotic Mining Competition (RMC). The Hawaii Island event will open the arena to international teams and hold the competition outdoors in a volcanic lunar analog landscape. Participating teams will compete using robots designed for lunar and Mars surface exploration to gather the most off-world resources in a given time.

HI-SEARCH will incorporate the principles of In-Situ Resource Utilization, or ISRU. ISRU is crucial to establishing human settlements in space, allowing people to "live off the land" by taking natively sourced, raw materials and transforming them into useful resources like oxygen, shelter, water and rocket fuel.

The multi-day competition will be open to the public and intends to encourage innovation in space technology. Twenty-first century space exploration requires skilled engineers and programmers who can build and operate robots capable of working on the Moon, Mars and other off-world locations. The competition also intends to inspire local youth in STEM and related fields by providing an up-close look at emerging space technologies in action.

*(Continued on pg. 4...)*

### MESSAGE FROM THE PROGRAM DIRECTOR



Aloha Kakou,

This month's newsletter is a special edition dedicated to youth education in robotics. September was a month full of exciting events at PISCES, much of it involving robotics. The most exciting news last month came from Caterpillar Inc. with whom we've been working for just over a year in the planning of an international robotics challenge based on NASA's popular Robotic Mining Competition (RMC). In September, we learned that Caterpillar will be the primary sponsor for the event which is tentatively scheduled for the first week of September 2019 and will be held at NELHA's Host Park in Kailua-Kona. The isolated volcanic terrain at this venue is the perfect setting for this type of event.

*(Cont. on next page...)*

### IN THIS ISSUE:

- Pg. 2 – PISCES-RISE Robotics Team Enters First Competition
- Pg. 3 – NASA JPL Hires Former PISCES Intern and Waiakea High School grad
- Pg. 5 – Guest Spotlight: Mentoring Youth in STEM by Kimberly Stratton

## PROGRAM DIRECTOR'S MESSAGE CONTINUED...

The competition, called "HI-SEARCH" (Hawai'i International Space Exploration And Robotics Challenge) will be open to international universities and the rules and regulations will be made public this month. Universities from around the world are invited and teams from Mexico, Colombia, Canada, New Zealand, Australia, Luxembourg and Hawaii have already expressed interest. This will be an exciting and very challenging event, as well as a great opportunity to promote STEM and related fields for Hawaii youth.

Local students are taking to robotics with enthusiasm and elementary- and high school-level leagues are growing in popularity. Last month I had the privilege of co-delivering a keynote speech at Punahou's First Lego League season together with Dr. Jeff Taylor of the University of Hawaii at Manoa's Hawaii Institute of Geophysics and Planetology. The presentation was recorded and reached teams throughout the U.S. including a group of New Jersey students who I later spoke to via video conference to answer questions and talk about space exploration.

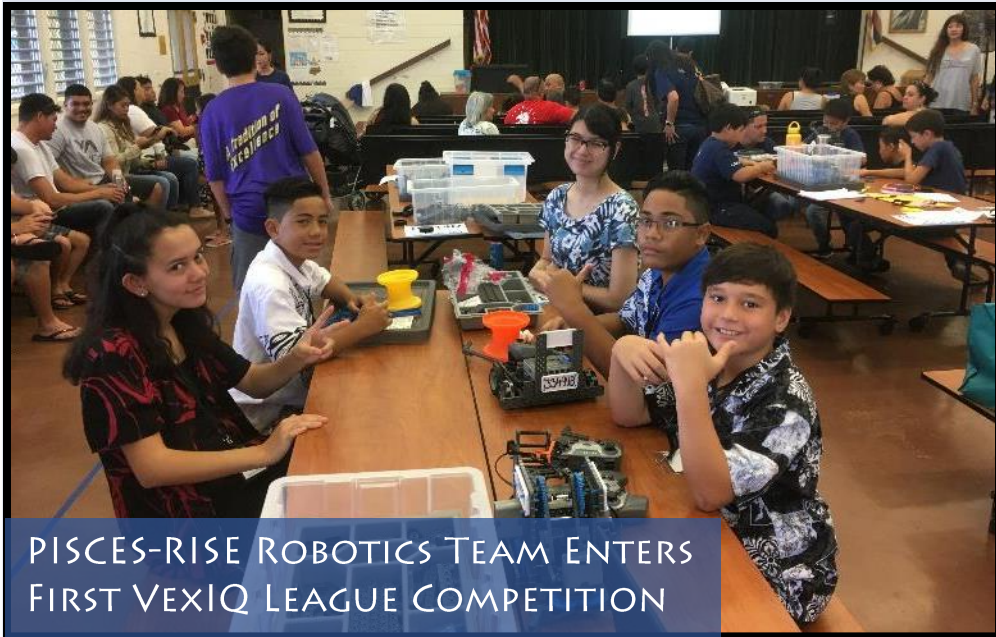
PISCES is also involved in a VexIQ league for youth. East Hawaii now has 29 registered teams making it the largest league in the state.

*(Continued on page 4...)*

## FOLLOW US ONLINE!



@PISCES\_HAWAII



## PISCES-RISE ROBOTICS TEAM ENTERS FIRST VEXIQ LEAGUE COMPETITION

Students and mentors of the PISCES-RISE Robotics Club (shown above) competed in their first Vex IQ competition at Kalaniana'ole Intermediate School in late September. Following a break for the summer, the students jumped back into action. With only two days prep time, they formed teams and got reacquainted with their original robot designs. On game day, they performed exceptionally well. Both the students and parents enjoyed a memorable event.

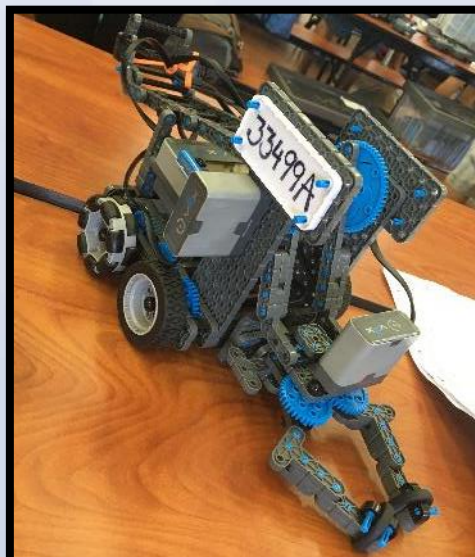
Students in the club have been working hard to prepare their bots for a competition arena and quickly excelled in their programming and piloting skills since the elementary-level team formed.

Working together with PUEO (Perpetuating Unique Education Opportunities) and KOYD (Keaukaha One Youth Development), PISCES coordinated and oversaw the formation of the club in November 2017 to provide more opportunities to local youth. Students began meeting to build and program their robots with support from a TMT Think Fund Grant, as well as student mentors from the University of Hawaii at Hilo—Joel Paye and Teyah

Modjeska.

Hilo now has 29 VexIQ teams, making it the largest regional league in the state. VexIQ offers standardized robotic kits for elementary and middle school students around the world. The bots incorporate easy building blocks for students to create their own designs and prove them in competition arenas. Each year, VexIQ releases a new game to challenge teams to work together to meet a specific goal.

The PISCES-RISE Robotics team is looking forward to competing again as this year's season progresses. Congratulations to teams 33499A and 33499B!





Rodrigo Romo (L) and Dr. Jeff Taylor

## PISCES SHARES KEYNOTE SPEECH FOR ROBOTICS SEASON KICKOFF AT PUNAHOU

PISCES co-delivered the keynote speech at the opening ceremony for the Hawaii First LEGO League (FLL) season held at Punahou in September.

FLL is an international robotics competition for elementary and middle school students challenging teams to solve real-world problems. The students must also design, build and program a robot using LEGO MINDSTORMS® technology and compete on a table-top playing field. This year's FLL challenge is called "Into Orbit Challenge" and students must identify a physical or social problem faced by humans during long duration space exploration and propose a solution.

PISCES' Program Director Rodrigo Romo and Dr. Jeff Taylor, a planetary scientist at UH's Institute of Geophysics and Planetology, shared their experiences working with regolith, living in enclosed systems like Biosphere 2, and envisioning the future of space exploration. A lively Q&A followed where students expressed a strong interest and appreciation for aerospace and engineering.

The level of participation in these robotics competitions indicates strong interest throughout Hawaii and PISCES is excited to participate and support in this enriching STEM and robotics program.

## NASA JPL HIRES FORMER PISCES INTERN



Former PISCES intern and Waiakea High School graduate Aaron Roth has landed a position working for NASA's Jet Propulsion Laboratory in Pasadena, Calif. Roth will begin his employment after he graduates in May 2019, earning a degree in Computer Science from Arizona State University.

Aaron has been interning with NASA JPL to develop systems for the agency's next major robotics mission to Mars, the Mars 2020 rover. He was testing systems software programs that process data received from robots on Mars to ensure they are functioning properly.

"So far, JPL has been such an awesome experience, I am so grateful. PISCES really put an awesome start to my career and I wouldn't be here today if it wasn't for them," Aaron said.

At PISCES, Aaron worked on the Robotics Team during the summers of 2016 and 2017, developing and programming the stereoscopic imaging system aboard Helelani. He said his internship cultivated the skills he needed to work on robotics at a more advanced level. From all the staff at PISCES, congratulations Aaron!

## HELELANI ROVER GETS PILOTING SOFTWARE UPGRADE



Helelani

PISCES' trusty planetary analog rover Helelani recently got a new upgrade that will allow it be operated remotely from any computer with an internet connection. Intern Jack Andersen developed the upgrade, which requires a software program to be downloaded to the user's computer. Helelani is intended both as a student tool and a testing platform for aerospace research. The new upgrade will allow potential collaborators with PISCES to conduct testing from anywhere in the world. For more information about Helelani, visit [www.pacificspacecenter.com](http://www.pacificspacecenter.com).

INTERNATIONAL ROBOTICS COMPETITION CONT...

“We are excited to be working with Caterpillar and NELHA to organize this world-class robotics event,” said Rodrigo Romo, program director at PISCES. “Thanks to Caterpillar’s generous funding, we have an excellent opportunity to promote STEM education for local youth while leveraging Hawaii’s unique volcanic landscape to contribute to the collective human effort of space exploration. This is going to be a great event.”

Caterpillar and PISCES are currently distributing invitations for the competition to universities around the world. Teams from Asia, Australia, Latin America, Europe, Hawaii and the U.S. mainland are expected to attend. PISCES is also seeking potential sponsors on Hawaii Island who can



provide additional support in the form of event services, food and entertainment. For more information, contact [dbedt.pisces@hawaii.gov](mailto:dbedt.pisces@hawaii.gov) or call (808) 935-8270. A website with more information about HI-SEARCH will launch soon.

PROGRAM DIRECTOR’S MESSAGE CONTINUED...

The PISCES-RISE Robotics Club—a STEM education program launched through a partnership with Keaukaha One Youth Development—entered their first competition last month and I was excited to attend and see their progress.

PISCES’ former Robotics Intern Aaron Roth (summers of 2016 & 2017) developed a stereoscopic imaging system for our rover Helelani. Aaron, who is attending Arizona State University, was able to work under Jim Bell at ASU which led him to obtain an internship last summer at NASA JPL working on the Mars 2020 rover. JPL recently offered Aaron a job after he graduates in May 2019. Congratulations Aaron!

Lastly, I want to offer Dr. Kim Binsted our warmest congratulations on her one-year fellowship through the American Association for the Advancement of Science in Washington D.C. She will be working with the office of Senator Whitehouse (D-RI). Congratulations Kim!

A hui hou,

Rodrigo Romo  
PISCES Program Director

PISCES PRESENTS ‘PATHWAYS TO MARS’ AT HAWAII CON



Above: PISCES’ Kyla Defore leads a Q&A on Mars colonization during HawaiiCon. PISCES’ Geology Technician Kyla Defore visited the fifth-annual HawaiiCon Science Fiction Convention in September to talk about the future of human exploration on Mars and her Materials Science research that could one day make science-fiction dreams a reality.

Several dozen adults and teens attended Kyla’s talk, entitled “Living off the Land: Paving the Way to Mars,” which explored what humans will need to

establish a permanent human settlement on the Red Planet. She also discussed Hawaii’s geology and volcanology in the context of Mars research, and how her research to develop sustainable building materials using Hawaii basalt fits into the larger effort of space exploration.

The four-day event was held at a hotel resort in Waikoloa as a fundraising effort to support STEAM (Science, Technology, Engineering, Art, Math) education on Hawaii Island. Educators and scholars gathered to participate in the Pacific-Basin STEAM Teaching Conference and the Science Fiction Popular Cultures Academic Conference—both held in conjunction with the event. HawaiiCon also highlighted the unique contributions of traditional Hawaiian culture to science fiction and fantasy genres.

Below: A First LEGO League team in New Jersey poses with PISCES Program Director Rodrigo Romo following an hour-long Q&A session via Skype in late September.





## GUEST SPOTLIGHT

### MENTORING YOUTH IN STEM

Kimberly Stratton, Aerospace Engineer

*Kimberly Stratton is an Aerospace Engineer (and former guest author!) at Caterpillar Inc.'s Automated Division who is passionate about STEM outreach. She has attended and supported the annual Women's STARS Program hosted by PISCES for two consecutive years providing chaperone support, mentoring and thoughtful presentations for Hawaii high school girls who attend the week-long event.*

Growing up, I wasn't guided toward entering a STEM field; I was left to navigate those waters on my own. I didn't have a STEM mentor, and everything I knew about engineering I learned from my dad who is an electrical engineer. I also didn't have the opportunity to learn about STEM by entering various STEM focused programs (such as the PISCES STARS Program) or by attending inspiring robotics competitions (such as the Hawaii International Space Exploration and Robotics Challenge [HI-SEARCH]) or the NASA 3D Printing Habitat Centennial Challenge). I wish I had had similar opportunities that students have nowadays. I would've been better prepared for the future.

For these reasons and others, I am very passionate about participating in STEM outreach with a focus on inspiring the younger female generation to show them various STEM fields, speak about engineering, and provide them the opportunity to connect with a female STEM mentor who can prove to them that yes, there is a place for girls in STEM.



*Kim presents to a group of students about being a female engineer during the 2018 STARS Program.*



This summer I participated in another bright, successful STARS program on Hawaii's Big Island. STARS connects girls with excellent female role models and really sheds light on a wide variety of STEM fields. It's been a pleasure and a source of pride for me to be involved in such an inspiring program as a guest speaker. As a female aerospace engineer, I know what it's like being, on occasion, the token female in a male-dominated field. Luckily, my years in the field have been a positive experience.

On a related note, the first annual HI-SEARCH competition is scheduled to happen in September 2019 in Kona, HI and raise the bar for lunar robotics challenges. College students worldwide must build a robot to conduct a NASA-like lunar "mission." As a publicly open competition, the event will not only teach participating students vital engineering skills that are hard to learn in a classroom but will also inspire younger generations (come out and see us!)

Finally, the NASA 3D Printing Habitat Centennial Challenge is a worldwide competition hosted by Caterpillar and broadcasted by NASA 360 and is taking steps to use moon dirt-simulant (regolith-simulant), recycled materials, and water to 3D print an astronaut habitat.

Events and programs like these teach students vital work-related skills such as: effective team communication, meeting deadlines and budgets, problem solving, creative thinking and best practices for systems engineering.

Overall, it's a very exciting time for our youth to explore the wonderful world of STEM fields. I hope you will tune in, compete, or attend any of these exciting programs.

*For more information about these programs, visit:*

[PISCES Women's STARS Program](#)

[NASA 3D Printing Habitat Centennial Challenge](#)

*HI-SEARCH: Website URL to be announced. Stay tuned!*