



DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM

PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS

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PISCES and Honeybee Robotics Receive \$119K NASA STTR Grant

Award to Fund Phase I of Planetary Building Block Project Using Volcanic Basalt

HILO—The Pacific International Space Center for Exploration Systems (PISCES) and Honeybee Robotics, Ltd. have received a \$118,690 NASA Small Business Technology Transfer (STTR) grant to jointly develop an In-Situ Resource Utilization (ISRU) technology that could launch the future of space settlement.

ISRU takes raw, natively sourced materials and converts them into usable resources. On places like the Moon and Mars, ISRU can transform regolith (or surface soil) into critical necessities like oxygen, water, rocket fuel and construction materials. PISCES and Honeybee Robotics have partnered on the 12-month ISRU project to design and develop an automated construction process that creates building blocks made entirely of sintered Hawaiian basalt. Since Hawaii's basalt closely resembles Martian and lunar regolith in chemical composition and appearance, the blocks will have applications both on Earth and in space. ISRU basalt materials could enable the construction of habitats, tools, shelters, roads, landing pads and other critical infrastructure required for space settlement. Basalt building blocks could also provide a sustainable new construction material for the State of Hawaii in place of imported cement.

Through the STTR grant, PISCES is currently investigating the ideal sintering temperature to create these building blocks with an optimal balance of strength and volume. Honeybee Robotics is designing a robotic process for creating and/or deploying the blocks to automate the ISRU construction process. The Brooklyn-based company designs, builds and integrates technologies for a range of challenging environments

including space exploration. It has contributed sample acquisition and processing tools for NASA rovers currently exploring Mars.

“We are excited to be working with Honeybee Robotics again on this NASA STTR project,” said PISCES Program Manager, Rodrigo Romo. “Honeybee was a key partner in our robotically built launch and landing pad that we constructed using only local basalt materials. This grant award will take the process a step further, allowing us to optimize the building block design and construction materials to allow for both vertical and horizontal construction applications that can be used both on Earth and on other celestial bodies for space settlement.”

“Hawaiian basalt is a great analog to the challenging environments we are likely to find on Mars or the Moon, where autonomous ISRU systems will need to work reliably and autonomously in tough conditions,” said Kris Zacny, vice president of the Exploration Technology Group at Honeybee Robotics. “Using local resources will be critical to enable new mission architectures by harvesting materials from the planet as needed. Also, approaches we develop for ISRU can also have applications in space mining, opening doors for both exploration and commercial missions. That’s why we’re so excited to be working with PISCES to advance our experience and robotic technologies.”

The STTR-funded project is Phase I in the development for planetary building blocks. If successful, PISCES and Honeybee Robotics will solicit a proposal for a Phase II STTR award which provides funding awards up to \$1 million over two years.

The joint PISCES-Honeybee Robotics project was selected among 1,621 proposals submitted to NASA’s 2017 Small Business Innovation Research (SBIR) and STTR programs. Of those, NASA selected 61 STTR Phase I proposals to negotiate contracts for funding. NASA’s STTR Program funds businesses and research institutions developing technologies that can support the space agency’s missions into deep space.

About PISCES

PISCES is a state-funded Hawaii aerospace center under the Department of Business, Economic Development, and Tourism (DBEDT). The Hilo-based agency is working to position the state as a leader in space exploration while developing sustainable products and technologies that benefit the Islands. Through Applied Research, Workforce Development and Long-Term Business and Economic Development, PISCES provides hands-on experience to Hawaii’s future scientists and engineers, preparing them to meet the demands of a highly competitive industry while improving the local economy through job diversification, innovative products and new industries.

About Honeybee Robotics, Ltd.

Honeybee Robotics, a wholly-owned subsidiary of Ensign-Bickford Industries, develops advanced robotic and electromechanical systems that operate in challenging environments in space and on Earth. The company serves as a research and development partner to help solve its customers’ unmet needs with robotic systems that extend and enhance capabilities in extreme and unstructured environments. Since 1983, Honeybee Robotics has completed more than 350 advanced projects for NASA, the US Department of Defense, academia, and industry. Based in New York, the

company maintains satellite offices in Longmont, CO, and Pasadena, CA. For more, go to www.honeybeerobotics.com.

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ABOUT DBEDT (Department of Business, Economic Development and Tourism)

DBEDT is Hawaii's resource center for economic and statistical data, business development opportunities, energy and conservation information, and foreign trade advantages. DBEDT's mission is to achieve a Hawaii economy that embraces innovation and is globally competitive, dynamic and productive, providing opportunities for all Hawaii's citizens. Through its attached agencies, the department fosters planned community development, creates affordable workforce housing units in high-quality living environments, and promotes innovation sector job growth.

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