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KSC NEWS

tech transfer

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THE IT ADVANCED CONCEPTS LAB

Tracey Kickbusch and Mike Conroy of the ITACL. See pages 6-7 to learn more about the lab and its many projects.

Photo credit: Tony Gray and Tom Farrar, Vencore

Mizell Named KSC Manager of R&T Management Office and KSC Deputy Chief Technologist

Carolyn Mizell

Carolyn Mizell recently accepted the position as manager of the Research and Technology (R&T) Management Office and deputy Center Chief Technologist (CCT) for KSC. Previously Carolyn worked as a strategic integration manager for the R&T Management Office. In her new roles, Carolyn will oversee the R&T Management Office, which includes program and project management, technology integration, technology transfer and partnerships, CCT staff functions, management of the Research and Technology Management Board, program analysis, technology strategy, university outreach, Small Business Innovative Research Program management, and technology evaluation for the Environmental Risk Mitigation Center. Carolyn is very excited about her roles in the new organization and all of the possibilities for collaboration on research and technology development at KSC.

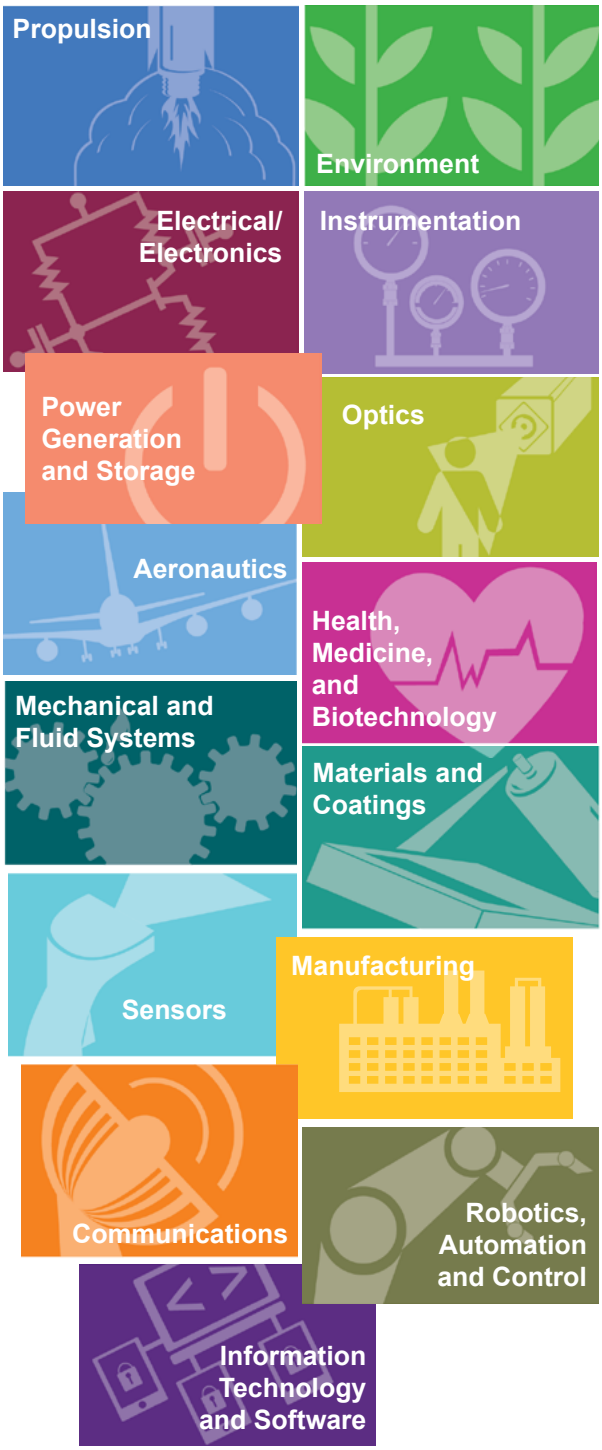
New Exploration Research and Technology Directorate Established at KSC

Carolyn's new leadership role is not the only change for the Research and Technology Management Office. A recent reorganization consolidated R&T with International Space Station (ISS) within the new Exploration Research and Technology Directorate (UB). This new organization will pull together many of KSC's researchers and scientists supporting the various labs at the Center and promote focused advocacy for R&T projects at the Center and Agency level. The goal is to increase discoveries and innovation in R&T and sustain the ISS–both considered building blocks for exploration to deep space and beyond–as well as to spin off innovation that will benefit life on Earth.

The new organization will allow KSC to better align proposals and work content with the interdependencies among various funding sources, to make our strategic investments more effective. By consolidating all R&T projects and key enabling support functions at KSC under a single organization, we increase our ability to nurture and sustain our R&T capability and to develop innovative technologies that help us accomplish our mission of exploration.

The reorganization benefits the Technology Transfer Program by creating one organization with many innovators and researchers and allowing for a greater emphasis on Tech Transfer at KSC. ■

Agency Comes Together to Market NASA Technology Portfolios



This past year, the Technology Transfer Offices of all 10 NASA Centers have worked on new ways to market NASA technologies online, at conferences, and through publications.

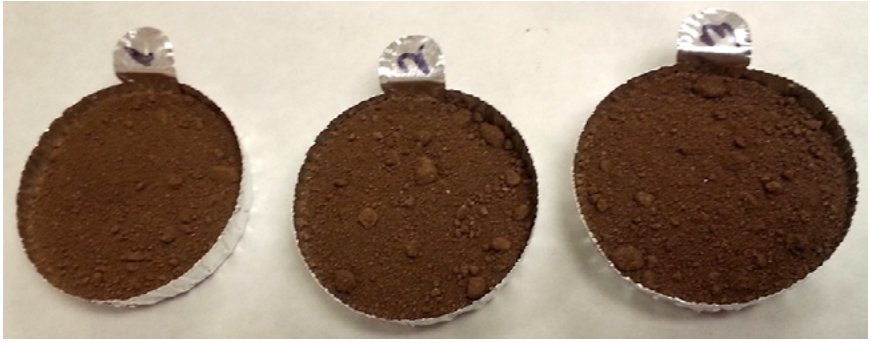
One of the major accomplishments was categorizing all of the Agency's patented technologies into appropriate industry sectors or "bins" so that the newly formed marketing team could market a particular portfolio of technologies at appropriate events and through appropriate channels. For instance, the marketing team is coordinating participation by all Centers and marketing materials-related patents at the Society for Advanced Materials and Process Engineering Conference. The Technology Opportunity literature for distribution at conferences and other marketing outlets has also been updated to reflect the different bins of technologies. All Centers are using the same format–a color-coded system featuring appropriate symbols reflecting the industry bin relating to the technology.

NASA also collaborated with NASA *Tech Briefs* magazine by increasing emphasis on restoring NASA *Tech Briefs* magazine's inventory of NASA technologies for marketing purposes. Published monthly since 1976, *Tech Briefs* has a print circulation of more than 190,000. Approximately 400 NASA technologies are featured per year through this publication and its website. The magazine published NASA's top 100 patented technologies in a special issue at the end of last year.

Working together, NASA's Technology Transfer Offices have streamlined and automated their efforts to make it easier for potential customers to do business with NASA. ■

Brazilian Company Evaluating a KSC Environmental Technology

SGW Services LLC, based in Sao Paulo, Brazil, with a subsidiary office in Freeport, Illinois, has received an evaluation license for a KSC-developed technology designed to treat polychlorinated biphenyls (PCBs) in paint, caulk, wood, concrete, and soil. Researchers in the KSC Applied Chemistry Laboratory developed the "Activated Metal Treatment System" technology, also known simply as "AMTS," to provide a means to treat PCBs *in situ* rather than having to resort to costly demolition and landfilling of structures as hazardous waste or to incineration and destruction of the debris.



Samples of homogenized soil

According to company president Sidney Aluani, numerous sites in Brazil have soil contaminated with PCBs. Currently, the only way to treat this soil is to excavate and haul it to an incinerator for destruction. And because there are only a handful of incinerators in the country, hauling can be long and hard, and it can take years before the waste is incinerated. Consequently, the company is evaluating the use of AMTS to extract PCBs from excavated soil, then treat and eliminate the extracted PCBs. The treated soil can then be put back in place, thus eliminating any need for long-distance hauling and incineration.

SGW has provided a sample of PCB-contaminated soil from one of their sites to the KSC researchers for analysis and treatment. Concurrently, the company is also working with AMTS on their own site samples. To date, results of AMTS treatment and analysis at both locations have been very promising. If the technology proves to be effective for treatment of PCB-contaminated soil, the company plans to commercially license the technology for production, use, and sale. ■

Stage-one laboratory setup for processing soil samples

The Importance of Filing a New Technology Report (NTR)

Each year, a number of NASA innovations are patented and commercialized. Many of these inventions have been incorporated into common items we use every day. These innovations bring value to the country, prestige to the Center and monetary reward to the inventors. Reporting new technologies is not just essential to the achievement of NASA's mission, but it also helps advances in aeronautics and space technologies permeate the many sectors of the national economy.

At the Center level, NTR reporting ensures

- identification of NASA's valuable technology,
- commercialization assessment and marketing analysis/assistance,
- recognition and perhaps monetary compensation for the innovator,
- enables consideration for protection of intellectual property,
- compliance with U.S. export control regulations, and
- fulfillment of Agency performance reporting requirements.

Innovators play an important role in NASA's technology transfer and commercialization mission. There are several incentives available to inventors, including royalties for license patents, recognition luncheons, and award plaques.

KSC Tech Transfer's Regional Partnerships

The KSC Technology Transfer Office established several new partnerships with regional organizations. One such organization is the Brazil-Florida Chamber of Commerce. The Brazil-Florida Chamber was established at the suggestion of entrepreneurs from American and Brazilian companies to provide a strong link between United States businesses and Brazil. The organization strives to develop international policies that help Brazilian and American companies and entrepreneurs succeed. Brazil offers unprecedented market opportunities for Florida to expand trade and create jobs for Floridians. The partnership between NASA and U.S.-based Brazilian subsidiaries will benefit Brazilian business by providing access to NASA patented technology, which can in turn support the establishment of new businesses in the United States.

In addition, KSC is working with the University of Central Florida's Office of Research and Commercialization on seeking industrial partners in Florida for KSC's patented technology portfolio. As a result of UCF's outreach, several companies and startups have shown interest in NASA's technologies.

NASA has also engaged with the Florida Institute for the Commercialization of Public Research, a nonprofit organization that supports new-company creation based on publicly-funded research. Leveraging a $2B research base, the Institute collaborates with technology licensing officers across Florida to create new companies and jobs in industries that are driving the global economy.

The continuation of KSC's partnership with Rollins College's Entrepreneurial Scholar of Distinction program has resulted in another successful commercialization and marketing plan for NASA's technologies. The team of students, under the advisement of Rollins professor Pete McAlindon, worked with NASA/KSC's licensee of the Personal Cabin Pressurization Monitor, Aviation Technologies, Inc. Aviation Technologies is beginning to market this portable unit to pilots and passengers of pressurized aircraft. Team members Christian Fielitz and Alain Blanchard presented their market research, marketing contacts they made at an Aviation Conference in Orlando, and suggestions on new product and packaging designs to the Technology Transfer team and Aviation Technologies. Aviation Technologies was very appreciative of the information. The inventor, NASA/KSC's Jan Zysko, also attended the presentation. ■

Jim Nichols, Jeff Kohler, Jonathan Leahy, Alain Blanchard, Christian Fielitz, Ashley Clarke, and Professor Peter McAlindon

The IT Advanced Concepts Lab, Changing the Way IT Is Done

By Frank Ochoa-Gonzales

Kennedy Space Center's Information Technology Advanced Concepts Lab is leading the evolution of information technology and turning yesterday's science fiction into today's science fact. The team, part of KSC's IT Directorate, is a diverse set of developers, leaders, designers, and modelers that combine revolutionary technologies with NASA needs to create futuristic tools for space exploration.

Spaceport KSC App

The Spaceport KSC application is a great example of game technology meeting NASA needs. Spaceport KSC brings detailed information on Kennedy Space Center and Cape Canaveral's launch sites and systems to a touch-enabled computer by providing a 3-D map of Kennedy and Cape Canaveral Air Force Station, with facilities, launch systems, and vehicles. It works on the iPad and touch surface computers, such as a touch tablet and touch screen.

The user can select the facility for a close-up view and, in some cases, can see a high-level interior view. In the information panel of each facility, the user can learn more about the facility, see photos, watch videos, and soak up interesting facts and trivia. If the selected facility (such as the Vehicle Assembly Building or a launch pad) processes a vehicle, the user can get a close-up look of the rocket and learn about its different components.

The goal is for Spaceport KSC to travel and show people what we do and where we do it. This app includes information from the new KSC Master Plan and is being developed for the Ground Systems Development and Operations Program, the Launch Services Program, and Center Planning and Development.

The Distributed Observer Network

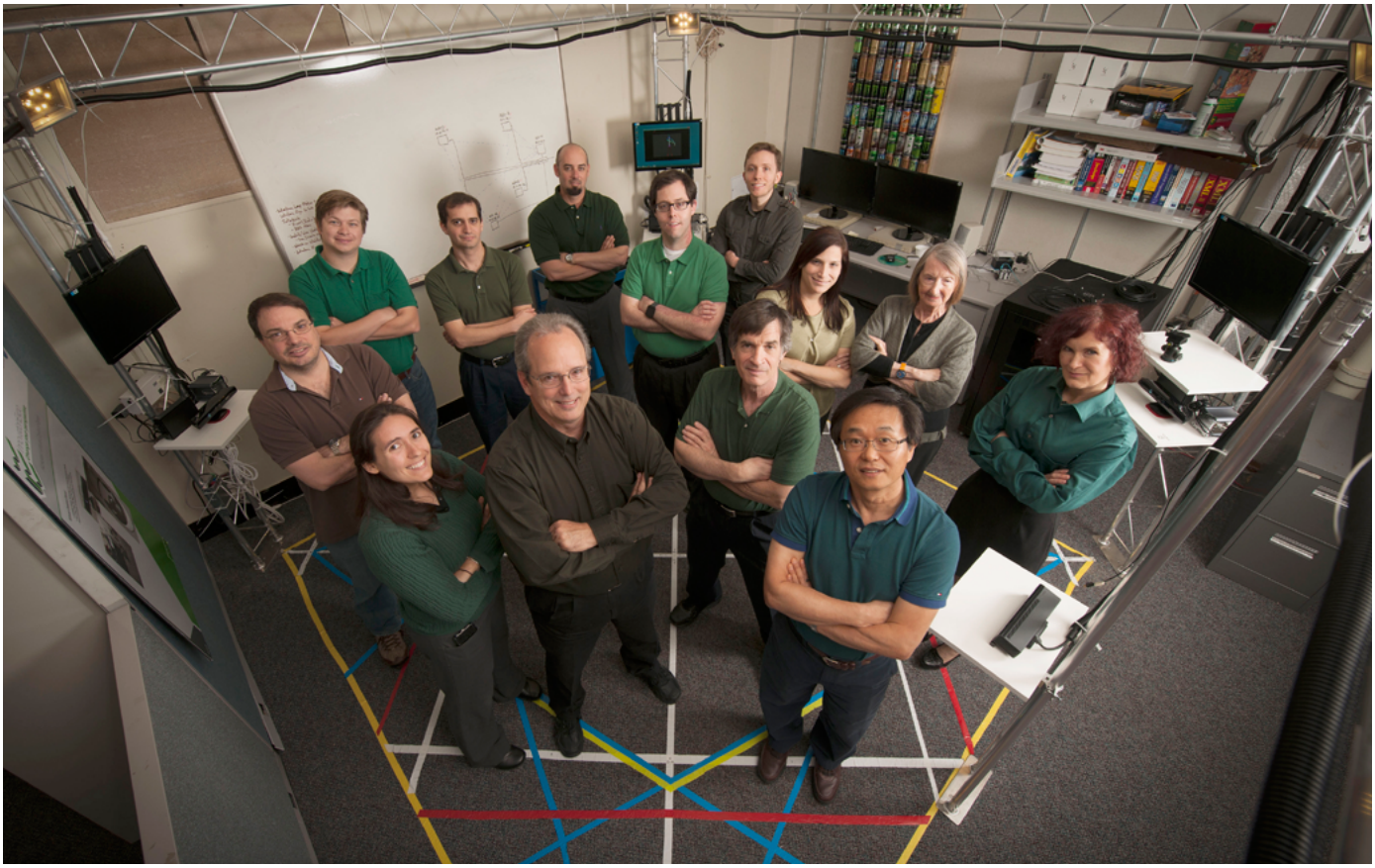
Using tools that vary from massively parallel computers to Microsoft Excel, NASA develops immersive representations of spaceflight, computational physics, process studies, system visualizations, and work processes. These simulations run on supercomputers, networks of computers, or workstations everywhere at NASA.

During the Constellation Program, NASA developed a way to share and distribute this rich simulation data, as well as the interface language necessary to connect this new capability to the simulators themselves. The Distributed Observer Network (DON) was the distribution tool, and the Model Process Control (MPC) format was the transitional language that enabled the simulators to communicate with DON.

Today, version 3 of DON addresses these same needs, but with a modern game core, a new user interface, and an enhanced version of MPC. DON 3 combines the best of the Unity 3-D multiplatform game development environment with touch controls, gesture controls, and version 3 of NASA's MPC data standard. The result is a modern, immersive simulation distribution, archive, and analysis capability that supports NASA's exploration efforts, as well as student projects, outreach, and education. Storing, moving, and appropriately sharing the DON3 data (models and MPC files) is a significant technical challenge, one accepted by IT's Data Center and Applications branches. The result allows NASA's Exploration teams ready and secure access to extremely large data sets, from multiple devices, without the delays typically associated with multi-gigabyte transfers. This capability is on track to become the foundation for future data sharing across Kennedy, with the likelihood of becoming a general service across all NASA programs and projects.

3-D Printing/3-D Scanning

A 3-D printer designed to operate in microgravity was sent to the International Space Station as part of SpaceX CRS-4, and the 3-D Printing in Zero-G Technology Demonstration experiment demonstrated that a 3-D printer works normally in space. Testing a 3-D printer, using relatively low-temperature plastic feedstock on the International Space Station, is the first step toward establishing an on-demand machine shop in space. This hardware will increase on-station capabilities, which will be important for future ISS expeditions and eventually long-duration spaceflight missions. Here on Earth, IT has been investigating desktop 3-D printing and scanning for a number of years with the goal of providing



KSC's IT Advanced Concepts Lab team combines a diverse group of developers, leaders, designers and modelers. Back row (left to right) Matt Verdier, Jason Miller, Phil Michael, Stephen Paglialonga, David Miranda, Sam Neblett, Mariane Colon Zambrana, Priscilla Elfrey, and Tracey Kickbusch. Front row (left to right) Bec Mazzone, Mike Conroy, Bill Little, and Jonathan Byon. Photo credit: Tony Gray and Tom Farrar, Vencore

it as a service to the multiple organizations at Kennedy. This new technology has the potential to revolutionize how we do work at the Center and is a way for IT to bring the intangible nature of our modeling work into the tangible nature of a physical 3-D object.

Virtual Control Panel

Virtual Control Panel started as a KickStart-funded project, following a successful pitch at the 2012 KSC Innovation Expo, and has grown significantly since. VCP uses Microsoft Kinect's motion-sensing technology to track a user's movements. Virtual-reality, head-mounted displays allow the user to interact with a software-generated control panel designed to convert hand gestures into commands that operate a remote robotic device. This capability can be useful in a number of areas, especially for operations in hazardous operations in hostile environments.

In addition, it can be useful in areas ranging from controlling presentations in a conference room to remote "tele-control," which is the ability to control something from a distance with just gestures.

"It's always a challenge trying to see how one can control the physical without using physical. It's not real there, we're just trying to make it real," Kickbusch said.

And More

These are just a few of the ITACL's projects. Another technology under investigation is integration of simulation data with the Oculus Rift, a commercial technology currently is in prototype form. It is a virtual-reality headset that allows users to step inside their favorite games and virtual worlds. The Desert RaTS (Research and Technology Studies) Virtual Test Site (released on Android and iOS) brought the user to the Black Point Lava Flow in Arizona to participate in the Desert RaTS outing and explore a NASA test site, collecting achievement badges along the way and gaining access to detailed information on the test elements. Also, the Simulation Exploration Experienced (SEE) is an international education outreach effort to promote an understanding to the importance of modeling and simulation among university students. ■

Stratospheric Exposure Technology (Strat-X)

What is it?

Strat-X is a stratospheric exposure technology that can carry experiments to the edge of space in a completely controlled manner when mounted on large scientific balloons. It is a fully self-contained system (autonomous avionics, power, and environmental controls and sensors) that attaches to the exterior of balloon gondolas. Strat-X has removable panels for hardware integration and four independently rotating skewers that hold experimental samples. The technology was conceived and constructed at NASA Kennedy Space Center, and it was tested on a flight provided by the NASA Balloon Program Office in summer 2014.

Why was it needed?

Experiments in space are expensive and infrequent, but Earth's upper atmosphere is accessible via large scientific balloons and can be used to investigate many of the same fundamental questions. The stratosphere is a readily-accessible yet highly neglected Mars analog environment.

Strat-X in flight

What makes it better?

Demonstrating operability and autonomy of spaceflight hardware with cheap and frequent stratospheric balloon flights can increase Technology Readiness Level (TRL) because test systems/components will experience Mars-like pressures, temperatures, desiccation, and irradiation. Today, the only other near-space verification tests are through costly suborbital/orbital missions. Strat-X autonomously operates with its own customizable avionics, power, and environmental controls and sensors. It has a flexible design with removable panels for hardware integration, a control board for autonomous operations, and four doors for timed exposures aloft.

How might it be used?

Strat-X may be used for microbial studies that will lead to the development of survival models for microbes traveling through Earth's harsh upper atmosphere. Moreover, measuring the endurance of spacecraft-associated microbes at extreme altitudes may help predict their response on the surface of Mars.

For more information, please contact the Technology Transfer Office: *ksc-dl-technologytransfer@mail.nasa.gov.*

Inflating the Scientific Balloon

From left, Prital Thakrar, Anthony Bharrat, and David Smith with the Strat-X

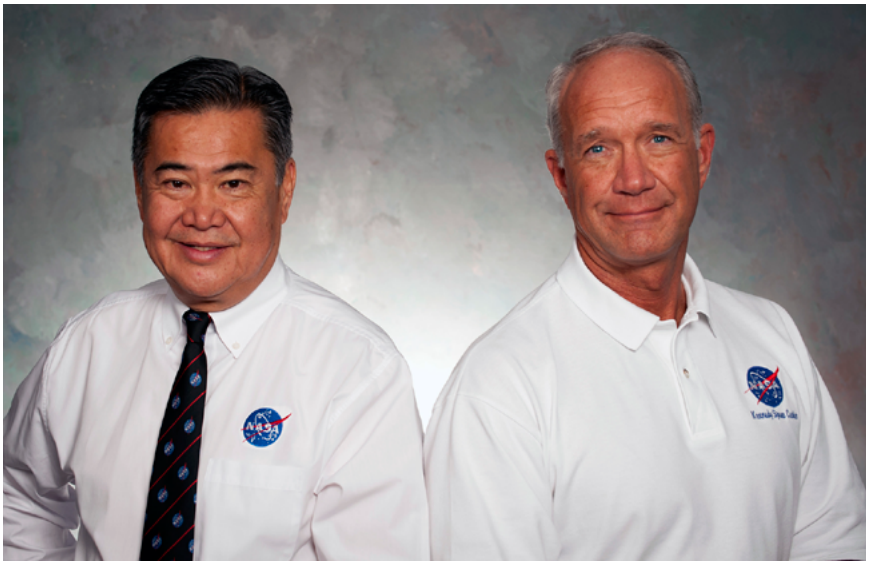
New Catalog Makes NASA Software More Accessible

Have you ever wondered if it's possible to get access to NASA software? With its release of a new online software catalog, NASA is now making available to the public, at no cost, more than 1,000 unique codes. The catalog is organized into 15 broad categories and provides a wide variety of applications for use by industry, academia, other government agencies, and the general public.

Not all codes in the catalog are available to the general public. Before being placed in the catalog, each code is carefully evaluated to determine its access restrictions. The types of release that can be assigned to a code can range from those that are open all U.S. citizens to those that are restricted for government use only. The type of release assigned to each code is identified in the catalog, along with a "request software" button to click in order to request the code.

Developers whose code has been identified for inclusion in the catalog must complete and submit a NASA software release request authorization form and compliance matrix to provide basic information about the code to the Center software release authority (SRA). The release request will then be reviewed by the Center Technology Transfer Office, patent counsel, IT Security, Export Control, Section 508 coordinator, and technical authority for proper classification and release clearance. The Center SRA determines the final release classification for the code and provides the final approval or disapproval for release to the catalog.

Requests for software are reviewed by center SRAs to determine the requestor's eligibility to receive the code. If found eligible, requestors must sign and return a software usage agreement to the center SRA before the software is provided. The NASA Software Catalog can be viewed at *https://software.nasa.gov/.*



NASA Software Release Authority Roger Liang (left) and Senior Technology Transfer Specialist Lewis Parrish. Photo credit: Tony Gray, Vencore

Kennedy Innovation Team Honored with Silver Achievement Medals

By Bob Granath, NASA's KSC

At NASA's Kennedy Space Center in Florida, innovation is fueling projects to explore new horizons and establish a multiuser spaceport for both government and industry. A group of space center employees recently were honored for outstanding achievements in developing innovative technologies for the Agency's future.

The results of efforts to develop new technologies were compiled in an annual report and delivered to the Center Information Fund (CIF) Program in December 2013, documenting the technical merit and innovation, relevance and value to NASA and the nation, collaborations and partnerships, and technology advancement for 14 CIF projects executed during fiscal year 2013.

During a ceremony on Oct. 21, 2014, Dr. Jay Falker, Space Technology Mission Directorate (STMD) program executive for the CIF and NASA Innovative Advanced Concepts (NIAC) programs, awarded NASA Agency Silver Achievement Medals to 66 scientists and engineers and KSC Group Achievement Awards to 16 project support staff for their contributions to the CIF Program. KSC ranked best of all 10 NASA Field Centers in NASA Headquarters' assessment of the CIF annual report.

"The Center Innovation Fund provided through STMD is important for NASA because it encourages employees to take the initiative in developing innovative technological concepts to help meet the needs of future NASA missions. We strongly encourage employees to work with collaborative partners from other NASA centers, other government agencies, industry and academia for proposals submitted for CIF," said Kennedy's Chief Technologist Karen Thompson.

Karen Thompson and Nancy Zeitlin, STMD technology integration manager, accepted on behalf of the Center a framed replica of the NASA Silver Achievement Medal Certificate.

NASA Silver Achievement Medal recipients included David Bush, Robert Cummings, Barry Slack, and David Tipton from NASA Center Operations.

Carlos Calle, Otis Deal, James Fesmire, Paul Hintze, Michael Hogue, Philip Howard, Curtis Ihlefeld, Michael Johansen, Thomas Lippitt, Victoria Long, Lawrence Ludwig, Paul Mackey, James Mantovani, Peter Marciniak, Philip Metzger, Robert Mueller, Mark Nurge, Jacqueline Quinn, Stanley Starr, Adam Swanger, Jamie Szafran, Emilio Valencia, Raymond Wheeler, Martha Williams, and Robert Youngquist from NASA Engineering and Technology.

Janelle Coutts, Robert Cox, LaShelle Spencer, and Ivan Townsend from Craig Technologies.

John Lane, Brian Larson, Oscar Monje, Steven Parks, Jason Schuler, Laurent Sibille, and Kyle Weis from Enterprise Advisory Services Inc.

Kennedy Space Center Chief Technologist Karen Thompson (center) and Space Technology Mission Directorate Technology Integration Manager Nancy Zeitlin (right) accepted on behalf of KSC a NASA Silver Achievement Medal and certificate. Dr. Jay Falker, Space Technology Mission Directorate program executive for the Center Innovation Fund and NASA Innovative Advanced Concepts programs (left) awarded NASA Agency Silver Achievement Medals to 66 scientists and engineers and Kennedy Group Achievement Awards to 16 project support staff for their contributions to the CIF Program.
Photo Credit: NASA/Kim Shiflett

KSC Partners with FWC to Develop Green Laser Scaling Device

For bird conservation, the Florida Fish and Wildlife Conservation Commission (FWC) is trying to scale images of Florida mottled ducks in order to measure a certain plumage pattern. The Florida mottled duck is one of a few nonmigratory ducks in North America and occur only in peninsular Florida. The long-term well-being of Florida mottled ducks is threatened by crossbreeding with feral, domesticated mallards and the FWC is working hard to combat this problem. The complete hybridization could result in the extinction of the Florida mottled duck. FWC needs to distinguish between the breeds and separate them to avoid this.

Laser Scaling Device projecting dots on duck decoy

FWC found KSC's Laser Scaling devices while researching solutions for their duck problem. The device was invented by KSC's Dr. Robert Youngquist. FWC contacted the KSC Tech Transfer Office and partnered with Dr. Youngquist and his team, who were able to develop a prototype green Laser Scaling Device for FWC's specific application of measuring plumage characteristics. While the male mottled duck is easily distinguishable from the mallard, distinguishing a female mottled duck can be more difficult. The female mallard has a broad, white wing bar above and below the colored portion of her wing. The female mottled duck lacks the upper wing bar but may have a faint lower bar. This is what FWC needed to measure.

Dr. Youngquist and Robert Cox constructed a prototype for the FWC based on their requirements for use in the field. The device was delivered to FWC and tested in the field. It worked perfectly, and the FWC is considering ordering more devices for a statewide effort to preserve the mottled ducks. ■

NASA Achievement Awards

Continued from page 10

Berta Cohen, Kenneth Cohen, Catherine DiBiase, Robert Friedman, and Daniel Woodard from InoMedic Health Applications Inc.

Jason Menzies from Nelson Engineering Co.

Lilliana Fitzpatrick, Wayne Heckle, Johnny Kerce, Christina Khodadad, Andrew Nick, Matthew Nugent, Jan Surma, and Steven Trigwell from Sierra Lobo Inc.

Janicce Caro, Scott Jolley, Lanfang Levine (posthumously), and Jeffrey Richards from Stinger Ghaffarian Technologies (SGT).

James Captain, Robert DeVor, Jesus Dominguez, Joshua Duncan, Tracy Gibson, and Mary Hummerick from Vencore.

Group Achievement Award recipients included Meredith Chandler, Wanda Henderson, David Makufka, and Michael Lester from NASA Center Planning and Development.

Michelle Ford from NASA Chief Counsel.

Irma Granell and Debbie Lapinski from NASA Chief Financial Office.

Melanie Clegg, Dionne Jackson, Teresa Lawhorn, Anna Maria Ruby, Luke Setzer, and Avis Upton from NASA Engineering and Technology.

Michele Birmele from Sierra Lobo Inc.

Yvette Oliva-Buisson from Vencore.

Sherri King from Wichita Tribal Enterprises, LLC. ■

NASA KSC Honored at Space Foundation Hall of Fame

NASA KSC was honored at the Space Foundation Hall of Fame induction ceremony in April for their contribution in the development of the space technology, Swing-arm Dampers, commercially known as Taylor Devices' Seismic Damper.

During the Apollo missions, Taylor Devices worked with NASA to outfit the swing arms on the vehicle launch platform with huge dampers to control their backswing when they detached from the spacecraft at launch. It was later used again in the swing arms for the Space Shuttle Program and is still used to protect sensitive electronic equipment during launches to the International Space Station.

Seismic fluid viscous damper, 50,000 pounds output

The Space Technology Hall of Fame increases public awareness of the benefits of space exploration and encourages further innovation by recognizing individuals, organizations, and companies that effectively adapt and market technologies originally developed for space to improve the quality of life for all humanity. They work with U.S. and international space agency technology transfer offices to identify the most significant space innovations and, with panels of space and technology experts, to select the most meaningful examples for induction. The ever-growing list of honorees showcases the significant contributions space makes to life on Earth.

To date, they have inducted dozens of technologies, eight of which came from innovators at Kennedy Space Center, and honored hundreds of organizations and individuals who transformed space technology into commercial products that improve the quality of life for all humanity.

NASA KSC will also be honored as an organizational inductee. ■

2014 Best of KSC Software

The 2014 Best of KSC Software Award is designed to recognize outstanding software developed by KSC teams for the purpose of serving the KSC mission. Software developed by civil servants or contractors is considered, providing there is a NASA intellectual property interest. Awards are grouped under two general categories: KSC Institutional Category and KSC Mission. Institutional software is designed to support and improve KSC business processes, and Mission software is designed to support and enhance the KSC scientific and engineering mission. The 2015 Best of KSC Software will be held later this year. For more information on this award program, e-mail: *megan.e.victor@nasa.gov*. The 2014 Winner was **Ground Hardware Management Tool**. Runners-up were Institutional Category, **Kennedy Action Tracking System (KATS);** Mission Category, **KSC Weather Data Archive Administrative Website;** and Outreach Category, **LSP Activity Book.** ■

Kennedy Tech Transfer News
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This magazine seeks to inform and educate civil servant and contractor personnel at Kennedy Space Center about actively participating in achieving NASA's technology transfer and partnership goals.

Please send suggestions or feedback to the editor.

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