

FIRST Robotics Teams Compete

April 30, 2014



Aerospace employees helped mentor FIRST Robotics teams.

Aerospace employees were mentors to three schools that participated in the FIRST Robotics regional competition in Long Beach last month. View the video below.

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Aerospace Features Young Scientists at D.C. Science Festival

by Amanda McCarty

April 29, 2014

Aerospace joined hundreds of thousands in celebrating science at the 3rd USA Science and Engineering Festival in Washington, D.C. April 25-27, which featured a variety of dynamic, hands-on exhibits and stage shows for people of all ages.

Local students demonstrated their science and engineering projects at Aerospace's exhibitor booth at the festival — the largest science, technology, engineering, and mathematics (STEM) education event of its type in the country.

Aerospace selected 10 middle- and high-school-aged students from D.C., Maryland, and Virginia science fairs to showcase their projects at the event. Students demonstrated a range of projects including a wind tunnel, robot, and trebuchet, a type of catapult that is powered by a falling counterweight.

One student, Justen Holl, showcased his project titled, "Crudely Managed." He tested the efficiency of different types of materials in absorbing oil in water. Encouraging booth visitors to touch the materials, he demonstrated his test of the absorbency of dog fur, rice, cotton, and polypropylene. Cotton did the best job of absorbing spilled oil on hard surfaces. "By far, polypropylene does the best job [of absorbing oil in



Justen Holl explains his science project to interested visitors at the Aerospace booth. (Photo: Amanda McCarty)

water] because it doesn't absorb the water like cotton," explained Holl.

Along with his physical project, Justen also displayed images of animals covered in oil from spills as he explained his interest in learning more about the cleanup efforts after the damaging effects of oil spills like the BP spill in 2010.

In addition to featuring students, the Aerospace booth also hosted representatives who explained the corporation's mission and some of its activities, including its role in STEM engagement. Aerospace encourages and promotes the advancement of science and math education with youth to inspire students to consider careers in STEM disciplines.

More than 750 STEM organizations presented activities at the expo. More than 350,000 people attended over three days.

For more information about the festival, visit <http://www.usasciencefestival.org>.

STARS Hosts ROTC Students During SMC's 60th Anniversary Celebration

by Heather Golden
April 25, 2014

Members of the University of Southern California's Reserve Officers' Training Corps toured the El Segundo Spacelift Telemetry and Reporting System (STARS) lab Friday as part of the Space and Missile Systems Center's 60th anniversary celebrations.

Two groups of about 30 cadets each met with Dr. Edward Ruth, principal director, Launch System Engineering, and Jon Binkley, systems director, STARS, to discuss Aerospace's role with the Air Force and within the national space program. They also watched a launch video from inside the control room and were particularly excited to touch a piece of actual space debris.

The tour gave the students a taste of what they could be doing in the future, either with the Air Force or as private citizens. Several of the students expressed an interest in pursuing careers in the space industry.

"We wanted them to gain experience with an active duty Air Force base and exposure to the space environment," said Air Force Lt. Col. Sean Marler, commander of USC's ROTC program. "In ROTC, we continue to emphasize the technical fields, which includes engineering and science. There is a lot of interest in the space and tech fields. Two of our cadets are considering pursuing careers as astronauts."

Along with the ROTC outreach, other anniversary celebration plans include heritage roundtable talks, adding names of noteworthy space pioneers to an SMC Wall of Honor, a payload competition with SMC personnel partnering with local high school students, and a black tie banquet.



Dr. Edward Ruth, principal director, Launch System Engineering, speaks with students in the University of Southern California's Reserve Officers' Training Corps. (Photo: Heather Golden)

Colleen Stover: Elevator Talk Led to Aerospace Job

April 21, 2014

The week of April 20 is Administrative Professionals Week and was first proclaimed in 1952 by U.S. Secretary of Commerce Charles Sawyer as National Secretaries Week. The name was changed to Professional Secretaries Week in 1981 and became Administrative Professionals Week in 2000 to encompass the expanding responsibilities and wide-ranging job titles of administrative support staff. The week is observed annually during the last full week in April.

At Aerospace, the week is called Office Professionals Week. During the week, the Orbiter is profiling four office professionals to illustrate the support office professionals provide to engineers and scientists and their role in helping the corporation achieve 100 percent mission success. On Wednesday, the Orbiter will break from this four-part series to publish an interview with this year's Office Professional Recognition Award recipient.

Colleen Stover is a project administration specialist for the Missile Defense and Space Sensors Division (MDSSD), Systems Planning, Engineering and Quality, located in Crystal City, Va. She is also chair of the Office Professionals Advisory Team's Communications Subcommittee. Stover came to Aerospace six years ago.

Stover holds a bachelor of arts in interdisciplinary social science from San Francisco State University, California. She also earned a master of science in comparative politics of Latin America from the London School of Economics and Political Science, United Kingdom. Stover is currently working on her certificate in project management from Georgetown University, Washington, D.C.

How did you decide to become an office professional?

The opportunity really just fell into my lap during a time that I was looking for a change. It's been a great chance to try my hand at new skills and build my knowledge in a professional environment.

How did you come to work at Aerospace?

In my previous career I was a certified teacher of English as a Second Language (ESL) and spent six years overseas. I worked for the international development arm of the British government for most of the time, living and working in South Korea (in a rural village), Sri Lanka (during the civil war), Egypt (before the civil war), Bangladesh (during 9/11), and the United Kingdom (my grandmother's native country).

As a result I can say I've been to more than 25 countries. I then took time away from my career to get a master's degree and start a family. Coming back to the work world and now living in my hometown outside Washington, D.C., I got a temporary job as office support with Northrop Grumman in Rosslyn, Va., the same building that Aerospace occupied at the time. After almost a year, an impromptu conversation with Debbie Kellner-Mamiaro [Special Security director] in the elevator to the 26th floor turned into an eventual permanent position with Aerospace as a senior office assistant. My career as an office professional and at Aerospace was launched. I miss living overseas but it feels good to have the stability of home again.

What do you do in your job?

I am co-located with the Missile Defense Agency customer, starting out at the Pentagon Annex and now housed with several other DOD agencies inside the beltway. [Incidentally, the Pentagon Annex is also where my paternal grandfather worked for many years from the 1940s while a U.S. Navy officer; he was buried in Arlington National Cemetery just across the street from the Annex.]

My job is split between supporting the Missile Defense Agency (MDA) Knowledge Centers, which is a core group of federally funded research and development centers (FFRDCs) and University-Affiliated Research Centers (UARCs) that provide technical oversight to the entire MDA, and supporting the Aerospace MDSSD on an organizational level. I track budgets, design websites, capture knowledge, train others on new tools, as well as perform the standard administrative duties. My position is unique in that I sit away from most of the Aerospace employees I communicate with. I work closely with our Level 5 and across his level, but also vertically in our division. My job is varied and there's always something new to learn.

What's your favorite part of your job?

I like that I interact with people from all over the country and from various corners of government and the national labs. I've had the chance to tour other FFRDC/UARC labs and see massive lasers, the research behind nuclear fission, heavy-lift rockets and launch sites, and in general learn a lot about space and space systems. It's a very different environment than when I was working in developing countries, often under difficult circumstances. I like the contrast.



Colleen Stover worked in five countries as an English as a Second Language teacher before starting a career at Aerospace. (Photo: Amanda McCarty)

Why is your job important?

My job is important in that I've really helped our division be more cohesive organizationally. Our division is the most geographically dispersed in the company with staff located in 11 different locations across five states. I've been told I ask the right questions and can see the big picture when it comes to bringing us all together. This lends to the customer's positive viewpoint of Aerospace as organized and cohesive. I promote communication and knowledge sharing; the staff sees me as a source of information; managers know that I will get the job done. I also take my role as an Aerospace representative in the program office seriously; government customers often ask for my assistance to make contact on issues ranging from a technical inquiry to a security question.

What are your hobbies/interests when you're not at work?

I have an active life at home and with family. I am the coach for my son's Little League soccer team. I am the creator and editor of my neighborhood's quarterly newsletter and represent our association at various city meetings, especially for parks and recreation.

I also volunteer as an English teacher at a local church on a weekly basis. The students are all adult immigrants from every corner of the world. It's very rewarding to help newcomers acclimate to their lives here and to teach them about U.S. culture in such an internationally diverse setting.

I also continue to travel overseas as a tourist and I have passed on this passion to my young son. By the time he was seven years old we had been to five other countries. And while I've been to 48 states, he's building his list from a current 18. We are planning a cross-country trip this summer.

Cheryl Sakaizawa: Taking Care of People

April 22, 2014

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Cheryl Sakaizawa has found that working with the Mission Assurance Improvement Workshop has added interest to her job. (Photo: Eric Hamburg)

Cheryl Sakaizawa is an executive secretary for the Mission Assurance Subdivision, Systems Engineering Division, Engineering and Technology Group, at the El Segundo offices. She has been with Aerospace nearly 25 years.

Sakaizawa has taken some college courses and has earned her cosmetology license.

How did you decide to become an office professional?

I like helping people and the challenges that supporting or taking care of people brings. I think to do my job you have to have a heart for people.

How did you come to work at Aerospace?

I was first hired as the senior vanpool coordinator. After the vanpool program was no longer company sponsored, my job went away. Because I loved working at Aerospace, I decided to switch over to secretarial work.

What do you do in your job?

I am an office professional who supports my principal director, Jacqueline Wyrwitzke, her direct reports, and one additional manager and his department as well as other subdivision personnel when needed.

I also support the Mission Assurance Improvement Workshop (MAIW) as a contributing member of the Program and Arrangements Committees. My general manager, Russ Averill, and principal director are the co-chairs of the Steering and Program Committees, so I was asked to support the event with them.

The MAIW is unique in that its governing members (MAIW Steering Committee) are made up of contractors, government, and Aerospace personnel. The group's purpose is to tackle issues that are causing problems industrywide. To accomplish this, teams are formed from all of the steering committee members. The workshop teams produce up to five products a year that offer solutions, guidelines, and handbooks.

This year the topics cover Standards and Guidelines for Radio Frequency Breakdown in Spacecraft Components; Design Integration of Rideshare Payloads — Do No Harm Analysis; a Counterfeit Parts Prevention Guide; Risk Identification at Program Inception; and a Root Cause Analysis Best Practices Guide. It is very interesting working with the teams and committees.

What's your favorite part of your job?

I like interacting with people, solving problems, and organizing events. And, supporting the MAIW definitely makes my job more interesting.

Why is your job important?

I think that those I support appreciate my assistance. Helping them with issues and taking care of everyday things that would take them away from doing their jobs is where I come in.

Supporting the MAIW is important because of the work that it accomplishes. Joining with all of the major contractors and government representatives generates different perspectives on things. Decisions represent a team approach and that fosters a more congenial atmosphere when we work together in the future. Gaining a better work relationship with our contractors is very important and makes Aerospace unique and a more effective federally funded research and development center.

What are your hobbies/interests when you're not at work?

I love to cook all types of food. Some of my children's favorite dishes are my apple walnut salad, macaroni and cheese, lasagna, grape leaves, hummus, taco salad, green beans and bacon, five-cup salad, and creamed chicken. For me, cooking is one of the ways I show people I care for them.

Another interest of mine is going on mission trips with my church. I have travelled to India, Mexico, and Mississippi. The trip to India was most memorable because of the culture shock. What I have learned through all of my experiences is that people all over the world are basically very loving and enjoy fellowship with others.

Tell Us About Yourself, Michelle Lash

April 23, 2014

Interviewed by Heather Golden

Michelle Lash, executive assistant, Special Projects Directorate, is this year's Office Professional Recognition Award recipient. The following is all about Michelle, in her words.

Name: Michelle Lash

Age: 49

Hometown: Centreville, Va.

Spouse: Jim

Children: son Tim, age 25; daughter Ally, age 23

Years at Aerospace: 3.5 years

> Way back in 1983, I started at Errol's Video as a receptionist.

> I've been married 16 years. Jim and I met online, like way back in the day on AOL Personals.

> We met in August 1997 and married in April 1998. It was a quick courtship. We were engaged after four months, married at

- eight months. We were both older. We knew what we wanted. We figured it's either going to work or it's not.
- > We are huge Washington Capitals fans. We watch every game on TV and go to one-to-three games a year. We make a whole day of it, go to DC, get a hotel.
 - > Hockey's it. That's it. If they don't win tonight, tomorrow it's going to be a bad day.
 - > I'm more of the superstitious type. If that's the shirt I wore when they won, then that's the shirt I wear the next game.
 - > My family knows not to call during a game. We won't answer unless it's a commercial.
 - > My son is my pride and joy. All I ever wanted to do was become a mom. That's it. The minute I laid eyes on him, I was in love. I knew I wouldn't have any more kids because I didn't think I could love them like I love him.
 - > I still have every note my son's ever given me.
 - > My son would never pull his tooth when they were loose. When he was asleep, I'd go in and pull them. He'd come in the next morning and say, "Mom, look my tooth fell out!" He later said he couldn't understand how I could slip his teeth out from under his pillow to leave money, and I said, "Son, I pulled teeth out of your head and you didn't wake up. I think I can get under your pillow without waking you."
 - > It's always been my son and me against the world. We had nine years before I met my husband. We've always been very close. I'm glad we had that time together. He's always been my world.
 - > Then there's my daughter. I didn't know what I was missing until she came into my life at six years old.
 - > She's my stepdaughter. But she is my daughter. No step. I can't imagine my life without her.
 - > There were rough teen years. We didn't speak for months sometimes. Now, we share a heart. We believe we've gone through hell to get to where we are today, and we wouldn't change a thing. I wouldn't skip any of that heartache if it would mean changing what we have today.
 - > We have built a relationship outside of me being her stepmom. In the beginning, I tried too hard to be her mom. After teen years, I was more like a friend. Now, we're more like mother and daughter.
 - > My kids are going to hate me for this. This is one of my favorite stories. They were nine and seven. They were out in the park and each came in crying that the other had thrown dog poop on them. I made them go into their rooms and write letters about why it's not OK to throw poop. I still have those letters.
 - > The Virginia Safari is the perfect family vacation with grown adult kids. I don't think any of us have laughed so hard. We went through twice.
 - > My mother always had fruits and vegetables. My son, when he was younger, came home one day and told me he had had this yellow thing. Turns out it was a banana. He'd never had one. I said, "Yeah, we don't have those here."
 - > I don't like to cook. We should probably eat out every night, actually.
 - > I'd be happy with a candy bar for dinner. I don't like food; I like sweets. Thankfully, both the kids eat really well, despite that.
 - > I would like to be more athletic without the possibility of getting hurt.
 - > That's my motto: "Exercise is bad."
 - > I had a friend in college. We were always together. People called us the double-mint twins. We could not speak for years and pick up on the same conversation like it was yesterday. Those are the best friendships to have. They'll last you a lifetime.
 - > Dad was in the military 30 years. Go Navy!
 - > The hardest part of being a military brat was moving every two-to-three years. Middle school was the worst. I was always arriving halfway through the years.
 - > Teachers always thought my name was pronounced "Michael." I would say it's "Michelle," and they insisted it was "Michael."
 - > Aerospace is the first place I've known another Michelle.
 - > One of my favorite times at Aerospace was meeting one of the other admins, Crystal. I would call her my best friend. She would tell you I'm her partner in crime.
 - > I'm moving to the campus, and Crystal's not. Moving to the campus is going to be like a divorce. We're both going to cry our eyes out.
 - > Centreville is about two miles from Aerospace. I came here because I wanted to be closer to home. I knew Aerospace was right in my neighborhood.
 - > I absolutely love every single aspect about my job.
 - > I have the world's best boss. We're staying together until I retire. I told him he can't get promoted unless I go with him. Thankfully, he agrees.
 - > He includes me in everything. Nothing goes on that he doesn't tell me about. He doesn't have to micromanage. He's easy to



Michelle Lash, executive assistant, Special Projects Directorate, is this year's Office Professional Recognition Award recipient. (Photo: Amanda McCarty)

talk to and he's very supportive. He's just a wonderful human being. His name is Todd Nuteson. Tell the world.
> I truly was in shock when I heard about this award. I'm very humbled by it. He told me he put me in for it this year and last. He did everything for it. I had no knowledge about it.
> I had never worked with engineers before Aerospace. They are just like the Big Bang Theory. They are goofy and geeky, but they are by far the most caring and loyal people you can meet.
> I'm a very boring person. I really am. I talk a lot though.

Sonia Aitken: Making the Team Look Good

April 24, 2014

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Sonia Aitken is executive assistant to Catherine Steele, Strategic Space Operations (SSO), Systems Planning, Engineering and Quality and works at the Colorado Springs, Colo., offices. She has been with Aerospace nearly 32 years.

Aitken's education includes an associate of science degree as a legal secretary from Miami-Dade Community College in Miami, Fla.

How did you decide to become an office professional?

I have always enjoyed assisting others and found that becoming an office professional would satisfy those needs. I knew I did not want to work in the retail business or service industry. I wanted to work in a professional office environment so I went to college to become a legal secretary. Being at the front line of an office, I enjoy meeting and helping a variety of customers in person, over the phone, or via email.

How did you come to work at Aerospace?

My younger sister was hired by Lockheed Martin in Sunnyvale, Calif., after graduating from college. I was living in Maryland working as a legal secretary and my sister convinced me to move with her to California. Two single ladies in California – the possibilities were endless! Upon arriving in Sunnyvale, Aerospace was one of the local companies that I applied to for a secretarial job and was hired in March 1980. I left the Aerospace Sunnyvale offices in 1987 with my future husband Don, a U.S. Air Force captain, whom I met while playing volleyball at the Aerospace facility. I moved to work at the Aerospace El Segundo offices while Don transferred to an assignment at Los Angeles Air Force Base AFB). I left Aerospace in March 1991 after having my son, Kyle.

After leaving the Air Force, my husband was hired by a defense contractor in Colorado Springs, Colo., and I was re-hired in 1993 for a position at Aerospace's offices located on Peterson Air Force Base in Colorado Springs, Colo., initially as a part-timer but later it became a full-time position.

What do you do in your job?

As the executive assistant to Cathy Steele, I have a wide range of executive-level administrative and secretarial responsibilities. My responsibilities enable Cathy to optimize her attention as a vice president toward supporting Aerospace, our customers, and



Sonia Aitken supports Vice President Cathy Steele and Strategic Space Operations.
(Photo: Jonathan Davis and Jeffrey Wong)

employees. I coordinate/prioritize her schedule and organize her activities including individual appointments, meetings, and travel arrangements. Our SSO organization is primarily based here in Colorado Springs, Colo., with other offices located in Albuquerque, N.M.; Kirtland AFB, N.M.; Hill AFB, Utah; and Houston, Texas. Working at a regional office, I frequently interact with other Colorado groups — Security, Facilities, EIS, and other technical organizations as well as personnel in our El Segundo, Crystal City, and Chantilly offices. I have become very proficient in scheduling meetings across three to four time zones concurrently.

What's your favorite part of your job?

I love my job so I have a lot of favorite responsibilities. Working directly for Cathy Steele is my biggest challenge, but also the favorite part of my job. My primary focus remains making my manager look good. She keeps me on my toes and constantly challenges me with her heavy travel schedule and diverse work load. Remember the TV show M*A*S*H? Do you remember Col. Potter's office clerk, Radar O'Reilly? A coworker compared me to him. He hit the nail on the head as I strive to stay one step ahead of Cathy. A second favorite part of my job is the diversity of customers and requests for information. My work days are never boring. Finally, I enjoy the challenge of building and updating PowerPoint slides. The more complicated they are, the better I like it.

Why is your job important?

I strive to keep Cathy and SSO organized. I am Cathy's "alarm clock" so our organization is on schedule in meeting company and customer deadlines and goals. My objective is to always make Cathy and SSO shine.

What are your hobbies/interests when you're not at work?

My family is the most important hobby and interest. As my family is spread across the country with my son, parent, siblings, and nieces and nephews residing in Indiana, California, Texas, Florida, Maryland, Virginia, Massachusetts, and Connecticut, getting together for annual family reunions is very important. I love eating out, and I love to cook. Cooking de-stresses me at the end of a work day. I recently picked up knitting again, which I haven't done since I was a teenager.

Living in Colorado Springs also affords us opportunities to attend various U.S. Air Force Academy (USAFA) sporting events. During the past 15 years, we've become the sponsor family to various academy cadets. During the fall, you can usually find us at the USAFA football games and pre- and post-game tailgating gatherings regardless of the weather conditions. With one exception — last year, we attended a game that had a temperature of minus 20 degrees wind chill. I barely stayed through the first quarter.

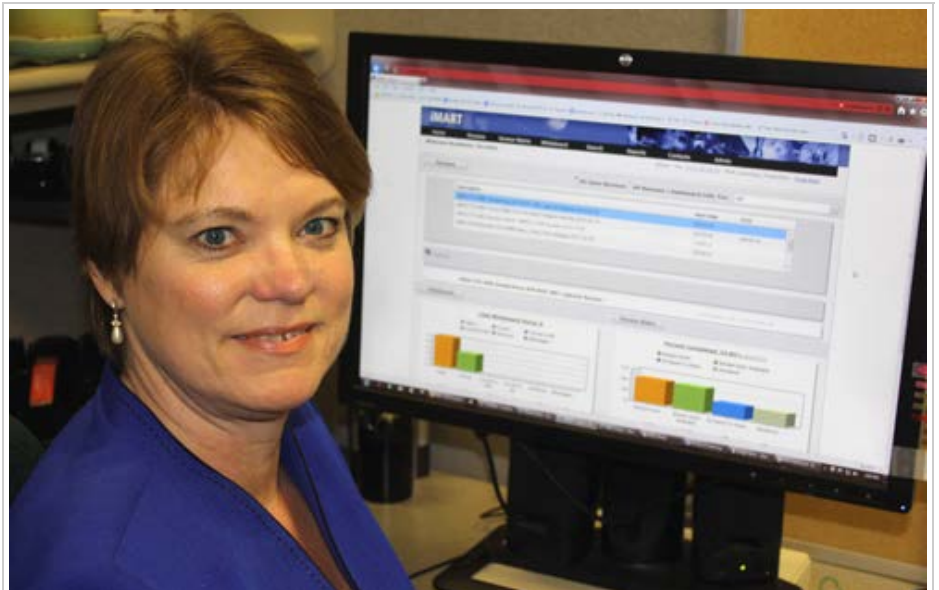
Dorretta Bradshaw: Home on the Western Range

April 25, 2014

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Dorretta Bradshaw is an office assistant for the Aerospace Western Test Range Systems Engineering Department, Western Range, Launch and Satellite Control Division, Space Launch Operations, Space Systems Group. She works at the Western Range Directorate on Vandenberg Air Force Base.



Dorretta Bradshaw works with technical staff and office professionals from across the corporation, in addition to customers and contractors. (Photo: Dennis Laws)

Bradshaw joined the corporation 14 years ago. She holds a bachelor of arts in business administration from the University of LaVerne.

How did you decide to become an office professional?

I worked in a variety of support roles before coming to Aerospace so stepping into an office professional's role came naturally.

How did you come to work at Aerospace?

I had just gone back to school to pursue a business degree and someone I met on campus told me about an office support position opening at Aerospace. They thought I might be a good fit with my skills so I applied and never looked back.

What do you do in your job?

I've had tremendous opportunities for growth at Aerospace. I'm a member of a dynamic team supporting launch operations and critical supplier audits. As an office professional in a fast-paced environment, I support a range of activities from basic administrative support to development of databases and tools to help automate critical tasks and streamline work flows. I work with technical staff and office professionals from across the corporation in addition to customers and contractors. The diversity of personalities and activities keep me on my toes. I enjoy learning new things and it's been absolutely crucial that my skills evolve with changing technologies and requirements.

The Aerospace Education Tuition Reimbursement Program helped me get my bachelor's degree and the training provided by The Aerospace Institute has been invaluable in my keeping up with changing technology.

What is your favorite part of your job?

There are a number of things I truly love about working here. Every day presents new challenges and growth opportunities. My work here allows me to directly support our charter—space mission success. It's very exciting watching a rocket launch up close.

Why is your job important?

My role as an office professional is important because if I do it well, the technical staff is free to focus their time and energy on the technical tasks of mission assurance. It's about the synergy of collaborating and supporting one another to produce the best outcomes. I believe that is the hallmark of mission assurance success.

What are your hobbies and interests when you're not at work?

My interests outside of work include spending time with my family, digital scrapbooking, staying active with my dogs, and helping out in the community by volunteering at the local dog park. I also serve on the board of a foundation whose purpose is to improve and develop family-friendly activities within the community.

Comet ISON Provides Look at Origins of Solar System

by Matthew Kivel
April 14, 2014

Ray Russell is an astronomer.

As a seven year old in 1957, Russell was awestruck by the launch of Sputnik. The pioneering Soviet satellite captured the young boy's imagination and led him to dream — like many other children of the era — that he would one day become an astronaut. Within that same year, the seven-year-old Russell discovered that his eyesight was 20/400, as opposed to the 20/20 required of pilots and astronauts. With a pragmatism belying his age, Russell immediately decided that he would devote himself to astronomy, figuring that if he couldn't travel into space, the next best thing would be to study it.

With renewed purpose and dedication to his education, the precocious Russell diligently carried a briefcase to his elementary school classes and took on extracurricular, astronomy-focused science projects in his rural hometowns of Heuvelton and Westville — located close to the Canadian border, deep in the wilds of upstate New York. Though he lived far from New York's cultural centers, Russell made the most of his towns' limited resources and continued to progress as a student and as an amateur astronomer. His passion for space and scientific exploration only grew from there, eventually leading him to the State University of New York at Stony Brook, where he earned an undergraduate degree in astronomy. Upon completion of his degree, Russell was accepted into a graduate program at the University of California, San Diego. Then, things got a little bit more difficult.

"I should have taken physics," says Russell. "I had taken all of the astronomy classes that I could, thinking that it was a good way to prepare for astronomy ... bad idea. If you take physics, you can pick up the astronomy, but if you take astronomy it's

tough to pick up the physics.”

At the time, U.C. San Diego didn't offer a Ph.D. program in astronomy or astrophysics, so Russell was forced to pursue a Ph.D. in physics — a subject he had unintentionally neglected during his years of undergraduate studies. “When I took the first departmental physics exam my first year at UCSD, I failed miserably,” says Russell. “I didn't have anywhere near the background that I needed. So I booked it. Seven days a week for that whole year, learning everything I possibly could about physics.” Russell devoted himself to physics and performed well in his courses, allowing him to secure valuable time working in observatories and gathering astronomical data.

Arrival at Aerospace and the Comet ISON

After six years in the program, Russell received his Ph.D. and went to work as a postdoctoral fellow at Cornell University where he put five instruments on two NASA airborne observatories in three years. This hardware experience led to his being hired to work at Aerospace in 1981. “My first question to Aerospace was: ‘will I get to do any astronomy when I come here?’” recalls Russell. “And they said: ‘you'll get to do some and how much you do will depend on how clever you are at finding things that are applicable to both the astronomy and the applied world.’”



Daryl Kim, left, and Ray Russell used NASA's Infrared Telescope Facility in Hawaii to observe the Comet ISON as it approached the sun last year. (Photo Illustration: Elisa Haber and Eric Hamburg)



The NASA Infrared Telescope Facility above the clouds in Hawaii. (Photo: Aerospace)

Ray Russell has now worked at Aerospace for more than 32 years, and in that time he has consistently explored the intersections of scientific discovery and customer-serving pragmatism. His work is always geared toward the needs of Aerospace customers, but the techniques and technology that he uses are often equally relevant to the scientific community. One of Russell's most recent projects is a NASA-sponsored effort that involves the compositional analysis of Comet ISON — an unprocessed comet (a comet that has not been heated and cooled by passing close to a star) that emerged from deep space and disintegrated as it passed the sun late last year. ISON is an acronym for International Scientific Optical Network, the facility from which researchers discovered the comet.

For years, Russell and his Aerospace colleagues have been accumulating sets of data on the composition and properties of stars and their dust shells, which are

primarily used for the calibration of infrared sensors. By consistently obtaining high-accuracy measurements of the brightness of stars, Aerospace is able to offer its customers a consistently high-quality set of data that can be used to calibrate and characterize the accuracy of their space-based sensors. Russell started working specifically on star measurements for calibration in the early 1990s. In the intervening decades, Russell's Aerospace team has made significant improvements in the accuracy and reliability of its data sets. The calibration set that Aerospace currently maintains provides data for close to ninety stars and it represents the most comprehensive effort of its kind.

Russell and his Aerospace colleague George Rossano started working with NASA on a very longwave infrared project on the NASA Learjet in the early '80s. Their work with NASA expanded to the first use of 2D infrared arrays on aircraft for the Army as part of the Kuiper Infrared Technology Experiment (KITE) from 1985 through 1987. Russell and the rest of the Aerospace team later moved on to working with NASA on a project that involved the characterization of Leonid meteors. In 1998, the group flew to Okinawa, Japan, bringing along a midwave infrared imager and a broadband array spectrograph system for measuring the thermal spectrum of the meteors.

“NASA sponsored the trips for the meteor study, which got us into the business of saying that we could make measurements in the field that could help characterize threats to the satellites and thus help protect the satellite constellation,” says Russell. The ability of the Aerospace team to characterize the composition of meteors, stars, and a litany of other objects in space — both manmade and naturally occurring — is incredibly useful for both research scientists and organizations with valuable spacecraft

on orbit.

How it Works

Russell and his Aerospace colleagues use a number of techniques to measure and characterize the composition of stars and other objects in space. In the case of Comet ISON, the Broadband Array Spectrograph System (BASS – created by John Hackwell and David Warren in the late '80s) was used to gather the infrared data. The BASS is a metal cylinder with two cans inside— one holding liquid nitrogen and one holding liquid helium. The helium is incredibly cold— around 4.7 degrees Kelvin— and the nitrogen serves to protect and increase the lifespan of the helium. There are two prisms contained within the BASS, one made of table salt and one made of calcium fluoride. While pointing at the object of interest, the BASS uses its two prisms to spread the infrared spectrum onto two lines of detectors. The detectors are connected to a set of small cooled amplifiers that produce a signal proportional to the amount of light to which a given detector element is exposed. The detectors are each connected to an individual amplifier and the voltages put out by these signal chains are sampled 200 times per second and converted into digital signals in the analog electronics rack. Thus, the raw data are produced.



The NASA Infrared Telescope Facility, located on top of Mauna Kea on the island of Hawaii at 13,700 ft. in winter. (Photo: Aerospace)

In early November of 2013, Russell and Daryl Kim traveled to NASA's Infrared Telescope Facility located atop the dormant Mauna Kea volcano on the island of Hawaii. The Comet ISON had been tracked since its discovery in September of 2012, and the Aerospace team had timed its observational trip to coincide with ISON's near approach of the sun. ISON provided a unique opportunity for the Aerospace team to observe and study an object from deep space that may be about 4 billion years old and had been traveling on its lonely course since the earliest days of the solar system.

The composition of a distant comet like ISON has the potential to reveal a great deal about the makeup of the materials that contributed to the formation of the solar system and the process by which comets are formed. Using the BASS, the Aerospace team was able to collect a large amount of data on ISON. Plans had been made to track the comet after it had passed by the sun, but unfortunately, the sun's heat overwhelmed the comet and ISON had fully disintegrated by Dec. 2.

Though ISON is gone, Aerospace's November observational trip to Mauna Kea produced unique

spectroscopic data, and at first glance, it appears there will be some interesting and unexpected results in the months to come.

"We were actually able to get the shape of the comet's spectrum and we were able to see a silicate emission feature, but it wasn't a very strong emission feature," says Russell. "The weird thing is, although we need to do more analysis on the data, at first blush, quick-look reductions say there was actually some crystalline material there." The finding of crystalline material in a first-time comet would lend credibility to the notion that there was an unknown process of particle flow and mixing in the early solar system that brought amorphous grains from the outer reaches of the solar system closer to the sun, which resulted in some of the grains being converted to a crystalline form — which requires a fairly high temperature and thus usually only occurs near stars. This mix of grains then travelled back into cold, deep space where comets like ISON were formed.

ISON's data will live on, well past the life of the actual comet, and the record it left behind might very well increase our understanding about the nature and mechanics of our solar system. Russell will continue to hone his processes and utilize the infrared to glean more information about the composition of planets, stars, comets, and other celestial bodies. His work lies not just in the acquisition of new information, but in the understanding of age-old properties that govern the vast expanses of space.

ISON may have traveled for an eternity, only to appear to us as an ephemeral streak of light in the night's sky, but its disintegration merely represents the end of its physical journey. After a multi-billion year voyage through deep space, ISON's next phase of life is just beginning — among the scientists and astronomers here on planet Earth.

Atlas Lofts National Security Payload

April 11, 2014

A powerful Atlas V rocket has launched a national security satellite to orbit.

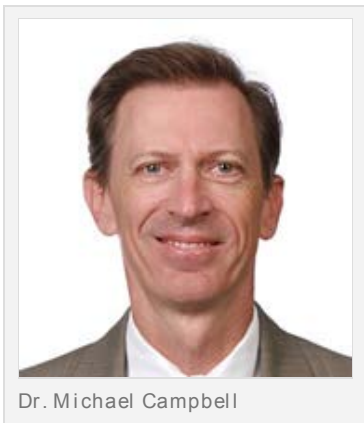
Ray Johnson, Aerospace vice president for Space Launch Operations, issued the following statement: "This is Ray Johnson on Thursday, April 10, and I'm very pleased to announce the successful launch of Atlas V and its NROL-67 payload. The vehicle lifted off of Space Launch Complex 41 here at the Cape right at the opening of the window this afternoon at 1:45 ET (10:45 a.m. PT). The countdown was one of the smoothest countdowns that I have ever participated in. The flight was also without any issues or anomaly. The Atlas team has done an outstanding job of supporting two launches in one week. The successful launch last week of DMSP from Vandenberg on Thursday, and also this launch today one week later — a truly exceptional accomplishment by the Atlas team. Thank you."



An Atlas V rocket lifts off from Cape Canaveral on Thursday, April 10. It was the 45th Atlas V launch since the inaugural flight in 2002. (Photo: United Launch Alliance, LLC)

Campbell Named Principal Engineer for National Systems Group

April 08, 2014



Dr. Michael Campbell

Dr. Michael Campbell has been named a principal engineer in the Ground Engineering Directorate, Ground and Communications Division, National Systems Group. In his new position, Campbell is supporting the emerging capabilities of the directorate.

Additionally, Campbell is providing technical leadership to the future evolution of the National Reconnaissance Office's ground architecture in the areas of systems engineering and software engineering. He is also responsible for coordinating Engineering and Technology Group (ETG) support in this area with emphasis on West Coast ETG activities.

Campbell was most recently a principal engineer in the Navigation Division, Space Program Operations, Space Systems Group (SSG), where he served as the chief software engineer for all Global Positioning System programs.

Aerospace Engineer Proves Staggered Engine Start Theory

by Heather Golden
April 07, 2014

Those watching a Delta IV Heavy vehicle launch from Vandenberg Air Force Base in January 2011 noticed something was not quite right when a fireball engulfed the rocket during liftoff, setting insulation on fire as the launch vehicle cleared the tower.

This was the first Delta IV Heavy launch out of Vandenberg, and the fireball took everyone by surprise.

"When we launch these rockets, failure is very costly," said Dr. Ejike Ndefo, director, Fluid Mechanics Department. "The burning insulation stayed on fire for a very long time. That was the first time we had seen this behavior."

Although the launch went off without any further complications, it was a problem that needed to be solved to prevent a repeat

during the next Vandenberg Delta IV Heavy launch.

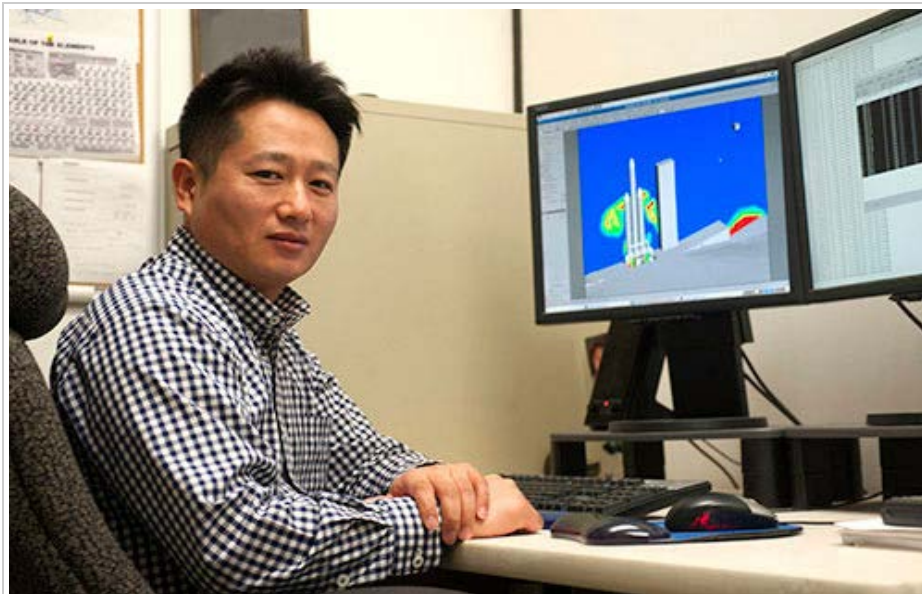
“The concern was for the thermal issues,” said Dr. Jin Wook Lee, engineering specialist, Aerothermal Analysis, Fluid Mechanics Department. “The avionics, structure, and mechanical components on a rocket are vulnerable to heat. Insulation material, once burned, releases particulates that could contaminate these multibillion-dollar satellites we are launching.”

Lee requested and was awarded an Independent Research and Development project to develop a capability that can investigate a very large-scale combustion problem. The ultimate goal of the project was to verify a previously suggested theory – a staggered engine start as an ignition plume mitigation option.

He realized the fireball reached the heat and height it did, not because of a flaw in the rocket, but as a result of the design of the Vandenberg launch pad, Space Launch Complex-6.

The SLC-6 was originally built to launch the Titan III, and later modified to launch Air Force space shuttles and the Titan IV. This is why the design of the pad is different from its counterpart pad at Cape Canaveral Air Force Base, SLC-37B. These two launch pads are designed with trenches that collect hydrogen expelled during the preparation for engine start. This gaseous hydrogen ignites in the trenches and is vented out through duct openings.

Lee said there could be several reasons the plumes from the first Delta IV Heavy launch out of SLC-6 were more intense than the ones that occurred out of SLC-37B. The most likely is that the larger pad window and deeper ducts of SLC-6 can vent out a larger volume of ignition plume, which then spread to encompass the vehicle surface. Deeper ducts allow more hydrogen gas to collect under the launch table, enabling more combusted gas to rise, creating the fireball effect.



Dr. Jin Wook Lee proved that a staggered engine start could reduce the fireball that engulfed the first Delta IV Heavy launch at Vandenberg AFB. (Photo: Eric Hamburg)



A Delta IV Heavy lifts off from Vandenberg AFB in January, 2011, the insulation on the outside of the rocket blackened and still burning as the launch vehicle clears the pad. (Photo: United Launch Alliance, LLC)

Some plumes were expected and planned for. This plume, however, exceeded the expected heating levels when the flaming hydrogen was forced up through the pad window instead of out through the vents, pushing the flames up far higher.

To stagger an engine start, one engine fires alone, then the other two fire later simultaneously. The suction created by the first engine start would hopefully pull the hydrogen from the next two engines down and out instead of up.

“Changing the engine start sequence is a big deal,” Lee said. “It affects a lot of people – propulsion, acoustic environment, structure, and even guidance. It’s a big decision to make. My job was to ensure this was the right decision.”

He suggested using computational fluid dynamics software to make accurate calculations and simulation of a staggered engine start launch.

Lee had one problem though. There was no way for him to accurately simulate such large-scale combustion with the computational tools at hand. He reached out for help from Professor Ed Luke, University of Mississippi, and Dr. Rex Chamberlain, Tetra Research Corporation.

“One role of the FFRDC is to leverage the expertise of academia and national laboratories,” Lee said. “We developed the capability based on their tools.”

The team set themselves a definite two-year deadline in which to perform a successful CFD simulation, before an August 2013 national security launch.

“They had to model everything; the vehicle, the pad, how hydrogen would be affected, et cetera,” Ndefo said. “That process takes a large computer a lot of time.”

The team requested and was granted high priority use of the Department of Defense high performance computing resources. They ran three separate simulations, two using the DoD computing center and one using Aerospace technical computing, to be sure of the eventual real-life results.

It took 512 central processing units four months to complete each simulation.

“With one computer, it would have taken decades to do these calculations,” Ndefo said.

Lee was able to see his work in action when a staggered engine start was used for a 2013 national security launch, with complete success.

“That flight proved how accurate the work was,” Lee said. “The simulations predicted very accurate heating levels, and the numbers matched with the flight data. All the hard work paid off.”

“The customer really pressed us, asking ‘Is it going to be OK?’,” Ndefo added. “He (Lee) worked very hard and got us comfortable for the launch.”

While the project is complete for the West Coast, Lee’s work is not finished yet. He is currently running similar calculations for staggered engine starts on SLC-37B launch pad. He said it is widely beneficial to have a consistent launch procedure across the board. He is currently on schedule to successfully complete his simulation prior to the first East Coast staggered engine launch in January 2015.

The first video below shows animation of a simultaneous engine start of a Delta IV Heavy. The second video is a staggered start. The darker orange areas are the hottest flames.

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Penultimate DMSP Satellite Soars to Orbit

April 03, 2014

An Atlas V rocket launching from Vandenberg Air Force Base Thursday morning, April 3, carried the penultimate Defense Meteorological Satellite Program (DMSP) spacecraft to orbit.

Ray Johnson, vice president of Space Launch Operations, issued the following statement: “This is Ray Johnson on Thursday, April 3, and I’m very pleased to announce the successful launch of the Atlas V and its DMSP-19 satellite. The vehicle lifted off of Space Launch Complex-3 at Vandenberg Air Force Base at the opening of the window at 7:46 a.m. Pacific Daylight Time. It was a very successful mission with no major problems. The Atlas team is aggressively completing their postflight review in preparation for supporting next week’s launch of the Atlas V NROL-67 launch from the Cape. I want to thank the Atlas team for all the hard work, and congratulations to the Atlas and DMSP team on this very successful launch.”



Guests in the El Segundo STARS lab watch the launch of the DMSP-19 satellite on Thursday, April 3. (Photo: Eric Hamburg)

The DMSP carries a sophisticated suite of weather instruments that includes sensors in the visible and infrared spectrums for observing cloud cover, surface temperatures, precipitation, soil moisture, and space weather.

The DMSP-20 satellite has already been built and is expected to be launched in 2016.

Awards and Recognitions, April 2014

by Matthew Kivel
April 01, 2014

Aerospace employees frequently earn recognition for their professional accomplishments. This Orbiter feature will acknowledge those honors and awards, including the publication of books. To nominate someone for consideration in this section, send details of the award in a timely fashion to orbiter@aero.org, or contact Matt Kivel at matthew.k.kivel@aero.org. Include a photo related to the award, if available.



Members of the Modified Battery Charging Control Team

Five Aerospace employees were members of a group that won the Space and Missile Systems' Mission System Team of the Year award.



From left, Lt. Gen. Ellen Pawlikowski, Capt. Jacob Hempen, and Heidi Graziano. (U.S. Air Force photo by Sarah Corrice)

Donnie George, Heidi Graziano, Warren Hwang, Mike O'Brine, and Mark Strub received the award, presented Feb. 21 at SMC's annual awards banquet, as members of the Modified Battery Charging Control Team.

Capt. Jacob Hempen and Graziano accepted the award on behalf of the entire team.

The team won the award for devising a method to prolong the life of about 60 percent of the current on-orbit GPS satellites. That involved first identifying batteries as the No. 1 life limiter for the GPS IIR and IIR-M satellites, then coming up with a plan to extend the life of the satellite batteries. The plan involved charging the batteries from the satellites' solar arrays at a slower pace than previously done, thus preventing heating and wear on the batteries. It is estimated that the new battery charging protocol will add some 27 cumulative years to the GPS constellation, equivalent to about three satellites, for a savings of \$800 million to \$1.4 billion.

Henry Helvajian



Dr. Henry Helvajian, senior scientist, Micro/Nano Technology Department, has been elected as a SPIE Fellow for “achievements in photophysical and chemical processes and laser interactions in materials.” SPIE is the international society for optics and photonics, a not-for-profit organization founded in 1955 to advance light-based technologies.

Helvajian has published more than 100 technical articles, 12 book chapters, and edited four books, in two disparate fields: laser material interaction physics/chemistry and microengineering aerospace systems and nanosats. He has been granted 13 patents and has been an active member of the SPIE community for many years, taking on numerous leadership roles including service as national co-chair of SPIE’s Photonics West LASE Conference Series — the largest laser/photonics conference in North America, drawing over 17,000 participants annually.

He joined Aerospace in 1984.

Members of the Space Launch System Emergency Egress System Team

The Space Launch System Emergency Egress System Team recently received the prestigious NASA Group Achievement Award. Twelve Aerospace employees were honored as members of the team: Russell Brucker, John Brekke, Denise Castro-Bran, Abelardo Cantu, Steven Escalante, Ronald Williamson, Art McClellan, Steven Moss, David Anderson, Eric Lundgren, Chandrakant Patel, and Jim Rosenbauer.

The EES team was honored for “outstanding teamwork resulting in the risk mitigation and concept selection of the Emergency Egress System.” The independent assessment that the Aerospace team conducted was used to validate the NASA EES team’s down selection of its final seven design options. Aerospace’s analysis was critical to the success of the overall selection process.

April 2014 Anniversaries

by Carolyn Weyant
April 01, 2014

35 YEARS

Engineering and Technology Group: Ira Weiss

Space Systems Group: Paul Thompson

Systems Planning, Engineering, and Quality: Keith Zondervan

30 YEARS

Engineering and Technology Group: Sheri Benator, John Cox, Ann Mazuk, John Morgan, Donna Speckman, David Taylor

Space Systems Group: Jay Penn

Systems Planning, Engineering, and Quality: Laura Inase

25 YEARS

Engineering and Technology Group: Brian Brady, Eugene Krc, Saul Miller, Chandrakant Patel, Gary Schipper, Dana Whitfield, Allyson Yarbrough

National Systems Group: Jeffrey Crawford

Office of the General Counsel and Secretary: Carole Mulchinski

Space Systems Group: Stephen Anstey, Rita Lollock, Kenneth Sieck

20 YEARS

Engineering and Technology Group: Robert Davis

National Systems Group: Frank Eppler

Operations and Support Group: Kelly Grijalva

15 YEARS

Engineering and Technology Group: James Chudoba, Robert Wares, Michelle Zentz

Operations and Support Group: Anita Davis

10 YEARS

Engineering and Technology Group: Joe Cheng, Jacob Everist

April Obituaries

by Carolyn Weyant
April 01, 2014

Sincere sympathy is extended to the families of:

William Aston, member of the administrative staff, hired Oct. 1, 1968, retired Oct. 1, 1993, died March 4.
Edwin Berry, engineering specialist, hired Feb. 6, 1961, retired June 1, 2012, died Feb. 9.
Ronald Cagnon, senior project engineer, hired Nov. 3, 1988, retired Oct. 1, 1995, died Dec. 21, 2013.
Norman Carter, member of the technical staff, hired April 7, 1980, retired Sept. 1, 1992, died Oct. 9, 2013.
Mildred Engle, office support, hired Jan. 12, 1981, retired Dec. 1, 1995, died Oct. 28, 2013.
Ralph Finney, project engineer, hired Oct. 26, 1982, retired July 1, 1994, died March 21.
William Green, project engineer, hired May 5, 1980, retired June 1, 1993, died Dec. 26, 2013.
Hugh Heritage, manager, hired June 3, 1966, retired Oct. 1, 1993, died March 15.
Raymond Kardas, member of the technical staff, hired Sept. 19, 1961, retired Feb. 1, 1986, died March 16.
Everett McGovern, member of the technical staff, hired Feb. 4, 1980, retired Nov. 1, 1993, died Feb. 4.
Mack Martin, member of the technical staff, hired Feb. 9, 1981, retired Dec. 1, 1994, died March 7.
Helen Proctor, administrative secretary, hired March 26, 1962, retired April 1, 1982, died Feb. 27.
David Rogers, member of the technical staff, hired March 11, 1963, retired March 1, 1986, died Feb. 7.
Grant Southworth, electrician, hired Sept. 5, 1989, retired Aug. 1, 2009, died March 9.
Robert Thomas, senior AIS specialist, hired July 31, 1962, retired Nov. 1, 1990, died March 23.

To notify Aerospace of a death and have it included in the Orbiter, please contact Cynthia Evans in Human Resources at 310-336-5806.

April Notes

by Carolyn Weyant
April 01, 2014

Notes of appreciation to fellow employees and Aerospace for thoughtfulness and sympathy have been received from:

Stephen Cota, for the recent passing of his mother, Blanche Cota.
Jill Greenlaw and Mark Greenlaw, for the recent passing of their mother and mother-in-law, Edna Kempner.
Kathleen Hoke, for the recent passing of her mother-in-law, Doris Hoke.

To submit a note of appreciation to Aerospace, please contact Valerie Jackson in Human Resources at 310-336-0891.

Patents – Q4 FY13

by Carolyn Weyant
April 01, 2014

The United States Patent and Trademark Office has awarded patents to the following Aerospace employees:

David Ksienski; "Phased Array Antenna with Intermodulation Beam Nulling;" U.S. Patent No. 8,643,543; issued Jan. 4, 2014.
Margaret Abraham and David Taylor; "Systems and Methods for Preparing Films Using Sequential Ion Implantation, and Films Formed Using Same;" U.S. Patent No. 8,625,054; issued Jan. 7, 2014.
Joshua Train; "Multicast Emulation;" U.S. Patent No. 8,630,837; issued Jan. 14, 2014.
Richard Welle; "Microfluidic Device for Inducing Separations by Freezing and Associated Methods;" U.S. Patent No. 8,642,353; issued Feb. 4, 2014.

Patents – Q1 FY14

by Carolyn Weyant
April 01, 2014

The United States Patent and Trademark Office has awarded patents to the following Aerospace employees:

Rafael Zaldivar and James Nokes; "Hybrid Adhesive;" U.S. Patent No. 8,551,287; issued Oct. 8, 2013.
Thomas Grycewicz; "Systems and Methods for Super-Resolution Digital Time Delay and Integrate (TDI) Image Processing;" U.S. Patent No. 8,558,899; issued Oct. 15, 2013.
Matthew Ferringer, Timothy Thompson, Ronald Clifton, and Marc DiPrinzio; "Systems and Methods for Supporting Restricted Search in High-Dimensional Spaces;" U.S. Patent No. 8,560,472; issued Oct. 15, 2013.
Russell Patera; "Energy-Angular Momentum Closed-Loop Guidance for Launch Vehicles;" U.S. Patent No. 8,571,727; issued Oct. 29, 2013.
Christopher Tarsitano, Renny Fields, and David Hinkley; "Systems, Methods and Apparatus for Improving the Visibility and Identification of Satellites Using Light Emitting Diodes;" U.S. Patent No. 8,593,065; issued Nov. 26, 2013.
Kenneth Lau and Ronald Williams; "Peripheral Filtering Optical Eyeglasses;" U.S. Patent No. 8,602,554; issued Dec. 10, 2013.
Jerome Fuller; "Buried Radial Flow Rapid Prototyping Rocket Motors;" U.S. Patent No. 8,601,790; issued Dec. 10, 2013.
Russell Patera; "Apparatus and Method for Propagating the Attitude of a Vehicle;" U.S. Patent No. 8,612,068; issued Dec. 17, 2013.
Patrick Smith and Steven Beck; "Systems and Apparatus for Monitoring Concentration of Greenhouse Gas;" U.S. Patent No. 8,614,794; issued Dec. 24, 2013.
Robert Dybdal, Chris Clark, Samuel Curry, and Lan Xu; "Systems and Methods for Reducing Narrow Bandwidth Interference Contained in Broad Bandwidth Signals;" U.S. Patent No. 8,614,940; issued Dec. 24, 2013.
Robert Dybdal, Keith Soo Hoo, and Samuel Curry; "Systems and Methods for Protecting a Receiving Antenna from Interference by a Transmitting Antenna;" U.S. Patent No. 8,614,644; issued Dec. 24, 2013.
Brian Hardy and Jerome Fuller; "Systems and Method for a Self-Deploying Vehicle Drag Device;" U.S. Patent No. 8,616,496; issued Dec. 31, 2013.