The AIAA Los Angeles-Las Vegas members were in for a treat on September 19, 2017, when Test Pilot William Koyama, Captain USN (Ret.) spoke at the Manhattan Beach Library, telling about his career path and experiences as a test pilot flying the F/A-18 Super Hornet, as well as describing its development. His most recent adventure was coming up with a title for his talk that covered everything that he has done. After showing a slide covered from top to bottom in text, he gave up and told the audience, “This is complicated, why don’t we just meet in a bar?”

Koyama has had a long and distinguished career. He was a Spacecraft System Engineer for the Jet Propulsion Laboratory, Pasadena, CA, working on the Galileo mission. He followed this with a long and extensive military career, consisting of 28 years of active duty in the US Navy including numerous operational combat tours and instructor tours. He was a FA-18 carrier pilot and test pilot by training, has accomplished 1,113 arrested shipboard landings as carrier pilot, and spent 4,024 hours in the FA-18 out of 5,400+ hours total flight time.

Koyama outlined the evolution of the Boeing FA-18 E/F Super Hornet from the McDonnell Douglas FA-18 A/B/C/D Hornet after the McDonnell Douglas-Boeing merger, as well as the Super Hornet’s variant, the EA-18G Growler. Notably, he flew all of those planes. The audience, which included veterans, civilian pilots, engineers, and others (continued on page 7)
2017 AIAA Aerospace Cybersecurity Panel Event—Prospects & Challenges

By Lisa Kaspin-Powell
Newsletter Editor, AIAA Los Angeles-Las Vegas Section

The AIAA-Los Angeles Las Vegas Section enjoyed an informative evening on October 19, 2017, at a Section Dinner Event featuring a panel discussion about the latest issues and biggest challenges in aerospace cybersecurity. Tammy Choy, an expert in information technology, IT operations, and governance, moderated the panel. The panelists included Jeffrey Thomas, an expert on information security; Frederick Beck, an expert in cybersecurity systems and incident management, forensics and investigations, system hardening and preventative measures; Anthony Choi, who has 20 years of experience in the IT and cybersecurity field; John Nilles, an expert on space systems cybersecurity including vulnerability analysis and penetration testing, network protocols, cloud security, cyber resilience, and cyber defense; and Marke Beasley, with more than 40 years' experience with management and operations of space systems, command and control, training, standardization and evaluation, and cybersecurity.

What are the biggest challenges facing us today in aerospace cybersecurity?

The need to think ahead is paramount. Choi noted that we need to plan technology to protect a satellite 5-10 years in advance, given that a satellite in orbit can’t be restarted. Moderator Choy added that while space-based systems are old, the threats are happening now. Therefore, you need to think ahead to anticipate those threats when designing the space-based systems.

There are various sources of new talent.

Many agencies gather new talent at DefCon, one of the largest conventions for hackers. Beck cited the need for public outreach, to approach universities and even high schools. Choi noted that people are hired straight out of high school competitions, giving as an example the Air Force Association’s CyberPatriot program, which hosts the National Youth Cyber Defense Competition. At the same time, Thomas commented that “some of the more underground people are the ones you are looking for”. A student in the audience asked about the best path to take through college to get into aerospace cybersecurity. Panel members responded that electrical engineering or computer science majors are good degree programs: the former will prepare a student to go into hardware while the latter is for software cybersecurity. Students should look for scholarship programs such as the Science, Math and Research for Transformation program, established by the Department of Defense to support college students pursuing STEM subjects, and the CyberCorps Scholarship for Service, which pays for 2 years of tuition. Students should also look for internships, and try different organizations within their company to see what they like to do.

Choi closed with “The common thread is to be inquisitive. We all did different things—software, hardware, networking. Keep asking questions. Keep learning. You will find your path.”

What are your favorite cyber resources and where do you go to get information?

Panelists cited Krebs on Security, Wired, Slashdot, SANS Internet Storm Center, and Hackin9. Nilles added that Slashdot is quick and easy: once a day, you get 10 links, of which 1 or 2 will be related to security. North American (continued on page 6)
Las Vegas Chapter Update

Marty Waldman having his initial meeting with AFwerX leadership in Las Vegas to discuss AIAA-Las Vegas Spaceport and NDIA interfaces. You can read more about AFwerX here: http://www.nellis.af.mil/News/Article/1287604/afwerx-vegas-opens-new-doors-to-innovation/

Future Events

Tuesday, December 5, 2017, 5:30 - 9:00 pm (presentation starts at 7 pm). And The World Turned: Spin Testing The DG-1000S. Speaker: Timothy McDonald (USAF Test Pilot School). PLEASE SEE AD ON PAGE 9

Sunday, December 17, 1:00 - 3:00 pm. International Space Development Conference 2018 Planning Meeting. LAX Sheraton, Salon 205, ½ mile east of LAX on Century Blvd. Public parking is available behind the hotel at parking meters (free on Sundays) on 98th Street.

Sunday, December 17, 3:00 - 5:00 pm. OASIS (Los Angeles Chapter, National Space Society) Board Meeting. LAX Sheraton, Salon 205, ½ mile east of LAX on Century Blvd. Public parking is available behind the hotel at parking meters (free on Sundays) on 98th Street.


POSTPONED: 2018 New Year Launch Event Virgin Galactic's Quest into Space: LauncherOne & SpaceShipTwo. Speaker: Todd Ericson - Vice President, Virgin Galactic. The event has been postponed to the spring. Watch the AIAA Los Angeles-Las Vegas Section website for more details: https://info.aiaa.org/Regions/Western/LA/default.aspx
Sixth Annual Mars Rover & Los Angeles/Orange County Society EXPO
By Lisa Kaspin-Powell
Newsletter Editor, AIAA Los Angeles-Las Vegas Section

On September 16, the Los Angeles-Las Vegas Section of AIAA was a proud participant in the Sixth Annual Mars Rover & Los Angeles/Orange County Society EXPO. The Expo gave the Section the opportunity to mix and mingle with around 20 different organizations devoted to the space sciences, different branches of engineering, the military, and STEM. The AIAA Los Angeles-Las Vegas table was flanked by the tables of two of its collaborating organizations: the Orange County Section of the AIAA and the Los Angeles Chapter of the National Space Society (OASIS).

The Expo welcomed elementary through high school students to encourage them to think about STEM careers, and introduced the local STEM and professional societies to spread the word and get volunteers. Host Fred Lawler noted that the societies have job banks and networking opportunities. Attendees were given an incentive to join: there was a raffle at the end of the Expo, and attendees got two raffle tickets if they signed up to join an organization, and three if they signed up to volunteer. Some attendees stopped by the AIAA Los Angeles-Las Vegas table to gather copies of the latest newsletter and to find out more about the Section’s activities and opportunities to participate.

Other organizations present included the American Society of Mechanical Engineers, INCOSE, IEEE-Cal State Long Beach, Irvine Valley College Career and Technical Education, Space and Missile Systems Center, EnCorps STEM Teachers Program, Society of Women Engineers, Southern California Investors Forum, Air Force Academy, Orange County Engineering Council, Open Tech, American Society of Mechanical Engineers, Institute of Engineering and Technology, Los Angeles and Orange (Story continued on page 8)

From left to right: Matthew Mundy (STEM K-12 Chair, AIAA Los Angeles-Las Vegas Section), Ken Lui (Programs/Events Chair, AIAA Los Angeles-Las Vegas Section)  

Photo: Bob Welge (AIAA Orange County Section)

Advertising space is available in the AIAA Los Angeles-Las Vegas Newsletter: Business card, quarter page, half page, and full page. The newsletter has over 5,000 subscribers, which is growing. To inquire about purchasing advertising, email Lisa Kaspin-Powell at LASectionnewsletter@yahoo.com.
Top left: Gary Moir (Technical Chair and Aero Alumni Chair, AIAA Los Angeles-Las Vegas Section). Top right and bottom: the lucky winners of the raffle prizes donated by the Section.

Photos: Ken Lui
Network Operators Group has a mailing list for the people who work 24/7 to keep the Internet working, and anything that happens will be publicized hours or days ahead of other sources. Thomas commented that he was especially impressed with the amount of security information posted on Twitter, and he follows approximately 1500 people on Twitter about security issues. In one notable example, Twitter announced the KRACK security breach one day before it was released.

Sharing sites offer information as well. Choy noted that “before, if you had a breach, it was kept secret. Today, it’s open. Companies exchange information about it.” There has been sharing between the Department of Defense and contractors: Thomas cited the Defense Industrial Base, a sharing site that started in the Pentagon, and the Defense Security Information Exchange.

Alan Shinkman, Public Policy Chair of the AIAA Los Angeles-Las Vegas Section, added that the AIAA has a monthly newsletter, Protocol: Aerospace Cybersecurity News, which offers commentary and expert analysis on the most important and current cybersecurity issues. For corporate members of AIAA, there is a sharing group, TruSTAR Threat Intelligence Exchange, which enables anonymous sharing of cyberincidents and gives real-time insights into what other companies are experiencing. The AIAA-specific resources can be found here: http://www.aiaa.org/cybersecurity/. On that site, people can also find out about the first AIAA Aerospace Cybersecurity webinar, Protocol Live, hosted by the AIAA Executive Director, Dr. Sandra Magnus, with a top Aerospace Cybersecurity and Homeland Security expert, Richard Clarke. The website also mentions the Aerospace Cybersecurity Workshop in the AIAA Aviation Forum/Conference, and the November announcement from AIAA President Jim Maser.

Shinkman also told the audience about the first city-based CyberLab, launched by Los Angeles Mayor Eric Garcetti. According to the website, “The lab is a public-private partnership that will disseminate information and intelligence based on analysis of more than one billion security-related events and over four million attempted intrusions into City networks per day.”

What about the dark web as a source of information? Nilles answered that finding information there was difficult, and there is no secret site with all the information. Beck commented on a Secret Service member who performed fraud investigations: he found that 50%-55% of the people on the Dark Web are in fact law enforcement officers trying to see what everybody else was doing. Choi added that the dark web can be a bad thing for your home system, but there are legitimate places where you can get information.

What would be the role in the future of artificial intelligence in aerospace cybersecurity?

Artificial intelligence was described as always being on the job and flagging deviations for humans to examine later. However, Choi observed that “we don’t have all the time to look at all the threats out there, and humans are at the other end. If there are terabytes of information coming at you, it scares me.” However, Nilles added a more optimistic note: “It’s worth watching.”

What about cybersecurity for UAS and UAV drones?

The greatest risk to those systems is degradation of the GPS signal. The capture of the drone by Iran was given as an example, in which GPS data were fed to the drone such that it landed in Iran. Beck explained that to protect drones from these attacks, there are a number of redundant systems. However, for an autonomous drone, you can only build so many checks into it. Even a slight degradation of the GPS signal is a huge problem, as there are more capabilities to degrade GPS than attempts to solve the problems. Choi warned that if we can’t think of a way to get into our system, the enemy can. They have forever to try, versus our 1 day of testing.

Overall, however, the main concern is the end user. There is an important need to keep educating the user about threats. Beasley noted the difficulty of persuading aerospace customers that they need a cybersecurity system in the first place. A company needs to understand the magnitude of the risk, know the threats and prepare to protect themselves against those threats—regardless of the cost.
similarly interested in aircraft development, thoroughly enjoyed Koyama’s explanation of the development of the Super Hornet and got to share their questions and experiences as well.

Koyama shared how it felt to fly the FA-18 Super Hornet, starting with a breathtaking video “this video is going to be corny” from the cockpit of a high performance jet. Other videos showed varying terrains, weather conditions, and even a heartstopping landing in pitch darkness in the middle of the ocean: the audience only saw the green instrument markings in the video until seconds before the landing on an aircraft carrier. Koyama took many photos and videos from the cockpit, with no special effects added: one stunning photo showed the FA-18 Super Hornet with the background of Mt. Fuji, Japan.

Koyama also described how the big test pilot schools were created to meet the need to test the sheer number of new plane designs being pumped out. After explaining all the different flying skills learned in these schools, Koyama added “what do they really teach?” The test pilot schools train your brain to think critically. A test pilot’s training and career includes many different kinds of jobs, tactics, and procedures, and they change all the time. Koyama learned to be far more analytical, to evaluate situations much more critically, with the experience or “mission relation” gained. Jets were developed with lessons learned from pilot experience. Over their various missions, pilots learned what needed to be improved, and their feedback was incorporated into the F/A-18 designs. Overall, however, Koyama asked for the following:

“In all conflicts and in peacetime, I would like GOOD handling qualities, because I need to get home to my stereo.”

Aerospace Cybersecurity: Useful Websites

Air Force Association’s CyberPatriot program (National Youth Cyber Defense Competition)  
https://www.uscyberpatriot.org/

Science, Math and Research for Transformation program https://smart.asee.org/

CyberCorps Scholarship for Service https://www.sfs.opm.gov/

DoD’s DIB (Defense Industrial Base) Cyber Incident Reporting and Cyber Threat Information Sharing Portal  
https://dibnet.dod.mil/portal/intranet/

NANOG.ORG mailing list https://www.nanog.org/

Krebs on Security: https://krebsonsecurity.com

Wired: https://Wired.com

Slashdot https://slashdot.org/

SANS Internet Storm Center: A global cooperative cyber threat/internet security monitor and alert system  
https://isc.sans.edu/

Hackin9: https://hakin9.org/

Los Angeles CyberLab https://www.lacyberlab.org/

The F/A-18 Super Hornet  
(continued from page 1)
Sixth Annual Mars Rover & LA/OC Society EXPO


The highlights of the Expo included the latest news about some of the most famous JPL missions: the spectacular ending of the Cassini mission, along with its highlights and last images; the newest discoveries of Opportunity and Curiosity in their search for water; and the plans for Mars 2020, which will search for signs of life on Mars. Attendees were in for a real treat: they got a high-bay view of the James Webb Space Telescope, under construction in a 10,000 class cleanroom! Jon Arenberg, the chief engineer for the JWST led the tour. The JWST sunshield and spacecraft bus are being assembled at Northrop Grumman. The optical assembly has undergone testing at NASA Johnson in the largest high-vacuum, cryogenic-optical test chamber in the world. Once it is ready, it will be shipped to Northrop Grumman for the full telescope spacecraft assembly. Visitors got to hear Arenberg describing some of the mechanics of the telescope while clean-suited workers climbed in and out of the sunshield.

Before the tour, Arenberg gave a talk about the JWST mission. We will find out about the first stars and galaxies, the evolution of those galaxies, the birthplaces of stars and planets, and the building blocks of life elsewhere in the galaxy. The key is its infrared telescope, which will detect the red shift from the farthest, and therefore oldest, stars and galaxies at the edges of the expanding universe. But the telescope must remain cold so that heat from the telescope operations won’t drown out the often-faint infrared signals. Unlike the previous infrared telescope, chilled by a dewar filled with liquid nitrogen that would eventually boil off, the JWST will be kept cold in a manner that will prolong its life: it will be folded into an Ariane V launch vehicle, carried out to a million miles from Earth at Sun-Earth L2 where the Earth and Moon will shield it from the Sun, and only then unfolded. Its sunshield will provide further protection. There, the JWST will be able to see 40% of the sky at any one instant, and will scan the entire sky over one year. The JWST is considerably larger than its predecessor, the Hubble, and is 15x more efficient.

Next up, Charles Baker, JPL Flight Project Systems Engineer and Flight Operations Engineer for the Mars Exploration Program Office and Earth Science Mission Office, treated the audience to “Cassini Grand Finale.” Why did we terminate the mission after 13 years at Saturn and 20 years in space? Cassini was nearly out of fuel and, rather than disturb possible life on Saturn’s moons, Cassini was sent to crash on Saturn. Baker showed the last flyby of Titan on September 11, which nudged Cassini into Saturn. On September 14, Cassini transmitted all data; on September 15, Cassini reconfigured for the crash and the signal was lost. Baker showed the final Cassini image of Titan, in real color: yellowish, surrounded by the atmosphere’s bluish haze. Another image showed wispy high-altitude methane clouds over dark hydrocarbon seas and lakes around the north pole.

He then showed the final image of Saturn, taken 2 hours before Cassini entered its atmosphere. The final Cassini ringscape image showed different colors in the rings, indicating density and types of minerals. Light bands are ice, while dark bands are made up of sand or other minerals that don’t reflect light. An earlier image showed Saturn’s shadow on the rings growing shorter as the northern hemisphere entered summer. Still another image showed Saturn’s moon Daphnis in the closest view ever of a shepherd moon between the rings.

Next, Baker presented the latest from Curiosity, on its journey to search out water and a potential habitat for life. He noted that Mars 2020 has 7 instruments but they’re better instruments. Still, Baker added that “Curiosity’s sampling system looks like a spaghetti factory but they actually do the job.”

(continued on page 9)
Various images showed the accumulating evidence of water on Mars. Curiosity’s 5-month trip at Pahrump Hills yielded an unprecedented data set of physical and chemical stratigraphy. A diagram of southward-tilted sandstone beds shows evidence of water-driven transport of sediment. Mineral veins through lake-formed mudstone are a classic example of liquid water, and explorations of Marias Pass showed a good amount of ancient sandstone and mudstone. Significant enrichments of silica in the mudstone gave indications of volcanic activity as well as flowing water. Mudstone mineralogy from CheMin showed more proof of the dynamics of the surface of Mars. Mud cracks indicated dry spells that interrupt rainier periods, similar to Death Valley.

Even though Curiosity has driven through mostly silty as opposed to rocky areas, the titanium wheels still had a gouge and some dents; Mars 2020 wheels are upgraded so they last longer. Still, Baker noted that over 5 years Curiosity had “gone 18 miles, a pretty good trip considering we had wheel trouble at one point.” In the meantime, Curiosity has a steep climb ahead. The mission has been extended 2 years, which is the second 2-year extension of the mission. Curiosity will explore the lower reaches of the 5-km high Mount Sharp to explore the role of water in its formation.

With that, Baker was off to describe the Mars 2020 mission and its goals. Mars 2020 would begin a search for life on Mars and prepare a sample return for a possible future mission. Mars 2020 will gather data to understand ancient environments that may have been habitable. Mars 2020 will look for a match on Mars for the earliest evidence of life on Earth, as we know Mars and Earth had a similar early history. Evidence does suggest that early Mars had a warm thick atmosphere, and perhaps even a global ocean. However, long-lasting water bodies no longer exist because of the low atmospheric pressure. While briny water could temporarily exist on the surface, the evidence is controversial.

Mars 2020 will look for biosignatures, fine scale mineralogy, chemistry, and texture in outcrop. The rover science sample caching system will seal, assess, manipulate samples, drop them, and store them until a future mission takes them back to Earth for analysis. An Entry Descent Landing camera suite will take pictures of critical EDL events to improve our way to get to the surface. By means of Terrain Relative Navigation, the rover will avoid hazards in the landing ellipse.

Baker described the final three candidates for the landing, found by MRO imaging. Jezero Crater may have hosted microbial life during the wet period of Mars, when the crater was part of a lake. NE Syrtis may have had volcanic-heated hot springs, a rich source of minerals for microbes to flourish. At Columbia Hills, Spirit made the discovery that hot springs once flowed there. Studies of Spirit’s older data records showed evidence that past floods may have formed a shallow lake in Gusev Crater.

A major objective of Mars 2020 is to prepare for humans to explore and eventually settle Mars. MOXIE, The Mars Oxygen In-Situ Resource Utilization Experiment, will help to accomplish that goal. MOXIE will make oxygen from Mars’ carbon dioxide atmosphere.

The Expo concluded with the raffle. The AIAA Los Angeles-Las Vegas Section donated a model of the F-22 Raptor and a Solar Plane Mobile as raffle prizes.

Overall, the Expo was a rousing success. The talks were enthusiastically received, and the attendees showed much interest in what the exhibitor societies had to offer. The attendees are looking forward to the 7th Annual Expo next year and its exciting updates.

Many thanks are owed to Programs/Events Chair Ken Lui, who arranged for the Section to have a table at the Expo and who volunteered at the table, and to STEM K-12 Chair Matthew Mundy and Technical Chair/Aero Alumni Chair Gary Moir, who also volunteered at the table.
The USAF Test Pilot School recently completed an extensive spin test of the DG-1000S to evaluate its suitability for stall, departure, spin and spin-recovery test training. Please join us and:

- Learn more about the DG-1000S and its features
- Learn about emergency bailout planning factors and considerations
- Learn about coping with the emergence of unexpected spin modes, competing considerations between structural loads and recoverability when designing a build-up approach and the potential dangers of dismissiveness when testing certified and/or unpowered aircraft.
- Learn more about an alternative approach to classifying spin modes which are highly/vio-
  lently oscillatory, highlights unique emergency bailout considerations, underscores the impor-
  tance test configuration control and offers techniques to maximize the flight test envelope across the dimensions of CG and pitch moment of inertia.
- Learn more about the important human factors & critical decision making in aviation.
- Learn more about the career path of an Experimental Test Pilot
- Learn more about the USAF Test Pilot School
- Network with the speaker and other aerospace and aviation professionals

Manhattan Beach Library
1320 Highland Avenue
Manhattan Beach, CA 90266
(South of 105 Hwy and West of 405 Hwy/Pacific Coast Hwy (1))
Tuesday, December 5, 2017, 5:30 pm - 9:00 pm (Presentation starts at 7:00 pm)
(Ticket sale will end at 11:30pm on Sunday, December 3, 2017)
Click here to register: http://bit.ly/2yS4EKj
Contact events.aiaalalv@gmail.com if any questions
AIAA LA-LV 2018 January Dinner Meeting
F-22 Raptor & F-117 Nighthawk (with MiG 21/23 Flight Test)
Speaker: Jim Brown
Chief Operations Officer & Test Pilot Instructor, National Test Pilot School
Thursday, January 25, 2018

The Lockheed Martin / USAF F-22 Raptor and F-117 Nighthawk are the most advanced stealth fighters / attack aircraft on Earth. With the advanced functions and features, they are the top leaders in defense / combat aircraft. They are fascinating and have captured great attention from people around the world.

Please join us to learn more about these high-tech aircraft from the person who had the first-hand experiences and amazing records with those powerful stealth jets. And also:
- Learn more about the exciting experiences with these advanced aircraft.
- Learn about the operational, combat, and personal stories from the world's highest time Stealth Fighter pilot.
- Learn more about the development and deployment of them.
- Also learn about the interesting flight testing of MiG 21/23.
- Learn more about the National Test Pilot School.
- Network with the speaker, aviators, aerospace professionals, business leaders, educators, students, and enthusiasts.

Event Location
S-Café (Building S - Cafeteria)
Northrop Grumman Aerospace Systems
One Space Park
Redondo Beach, CA 90278
*Next to the Space Park
*West of 405 Hwy, East of Pacific Coast Hwy (1), and South of 105 Hwy
*Please follow the directions & maps here:
http://events.r20.constantcontact.com/register/event?oeidk=a07eeqzu3r9e202e129&llr=p9tbt6cabbage

Thursday, January 25, 2018, 5:30 pm - 9:30 pm (starts at 7:00 pm)
Click here to register:
https://events.r20.constantcontact.com/register/eventReg?oeidk=a07eeqzu3r9e202e129&oseq=&c=
Contact events.aiaalv@gmail.com if any questions