



To commemorate 60 years of space exploration, the Lowell Center for Space Science and Technology of the University of Massachusetts Lowell and the Massachusetts Space Grant Consortium present a symposium on:

Space Exploration in the Upcoming Decade: THE DOMESTICATION OF SPACE

April 21, 2017: 3-8 p.m.

April 22, 2017: 8 a.m.-6:30 p.m.

UMass Lowell Inn & Conference Center
50 Warren St, Lowell MA 01854

CHANCELLOR LEVEL SPONSORS



Technologies

UMass Lowell Francis College of Engineering

PARTNER LEVEL SPONSORS



McKinsey & Company

SUPPORTERS

HARRIS
NDIA New England
UMass Lowell Online &
Continuing Education
UMass Lowell Office of
Student Activities & Leadership
UMass Lowell Kennedy College
of Sciences



WELCOME!

It is my honor to welcome each of you to the University of Massachusetts Lowell to commemorate the 60th anniversary celebration of space exploration. Ten years ago, we reflected on the first 50 years of space exploration and we considered how the next 50 years could contribute to the betterment of Earthly problems. The participants discussed and debated various issues including space governance, improvement of the quality of life through the material resources and energy harvested from space, and public participation.

The intervening 10 years have seen dramatic progress to the point that the theme of this symposium is how to make space accessible to all. Space exploration used to be the domain of countries and large corporations – today, university students and, in some cases, school children are involved in the exploration of space. As tools such as 3-D printers are becoming as “essential” to college dorm rooms as microwave ovens, space is getting closer to reach than ever before. The convergence of passion for exploration and technology revolution has brought us closer to bringing space to the public and engaging the public in our future work and play in space. It is our hope that this gathering of distinguished thinkers, disrupters and, most importantly, future explorers will chart a path toward that goal and ensure that our journey is a smooth one.

This is also an exciting time for space science and technology at UMass Lowell. We have been awarded a Cubesat mission that is being developed by our undergraduate students, with minimal faculty and staff supervision. A space-based ultraviolet spectrograph developed by our researchers is collecting data that might someday help predict Space Weather. We are developing wide-ranging technologies from robots, to self-healing materials, to instruments that could take an image of a planet around a star.

I’d like to thank you for attending our symposium and bringing your experience, knowledge and entrepreneurship to our gathering. Your leadership, critical thinking and vision will help motivate us to work harder and, together, to achieve our space goals and create new ones. Through these efforts we will gain a better scientific understanding of our place in the universe and develop new tools that will be used to improve the world around us. We could not accomplish any of these without your commitment, participation, support and leadership. I am personally grateful to all of you and to our sponsors and supporters, and am excited to see where we can take the future.

Sincerely,

Supriya Chakrabarti
Director, Lowell Center for Space Science and Technology
University of Massachusetts Lowell

As director of the Massachusetts Space Grant, I would like to welcome you to this symposium at UMass Lowell to commemorate the 60th anniversary of the Space Age. This symposium will concentrate on the significant developments in space that have occurred during the past decade, among which are the development of commercial space flight, the tremendous advances in small satellite capabilities and the retirement of the Space Shuttle, to name just a few.

Space research is thriving in Massachusetts, with research programs in many colleges and universities in the state. Holding this symposium at the University of Massachusetts Lowell recognizes the exciting growth of space research on this campus, described in Dr. Chakrabarti’s welcome remarks.

We are fortunate to have the participation in this symposium of many distinguished people from government, industry and academia. I hope that their presentations will stimulate many interesting discussions and that all of you attending the symposium will leave with increased appreciation for what has been accomplished during the past decade and with excitement and enthusiasm for what lies ahead during the coming decade.

Thanks to all of you for attending, and thanks to our sponsors for their support.

Sincerely,

Jeffrey Hoffman
Professor, MIT Department of Aeronautics and Astronautics
Director, Massachusetts Space Grant

AGENDA

FRIDAY, APRIL 21, 2017

3-4 p.m.
Pre-Symposium Event

A visit with Valkyrie, NASA’s newest humanoid robot in residence at UMass Lowell.

Location: New England Robotics Validation and Experimentation (NERVE) Center, 1001 Pawtucket Boulevard, Lowell, MA 01854. A bus will leave from the ICC at 2:45 p.m.

4:30-5:30 p.m.
Registration/Networking
Inn & Conference Center (ICC)

6-8 p.m.
Conference Banquet

Welcome Address
UMass Lowell Chancellor
Jacqueline Moloney

Keynote Address
“Open-Innovation and Inclusion and their Effect on Technology Development”

Catherine (Cady) Coleman, Colonel, USAF, Ret., NASA Astronaut

SATURDAY, APRIL 22, 2017

Location: All events at the UMass Lowell Inn & Conference Center

8-9 a.m.

Breakfast
Keynote Address
“Science and Exploration with the James Webb Space Telescope”

Kenneth Sembach, Director, Space Telescope Science Institute

9-10 a.m.
Panel 1: Space for the Benefit of the Earth

Susanna Finn, Moderator, UMass Lowell LoCSST

Panelists: **Lars Dyrud**, CEO OmniEarth, Washington, D.C.; **Kjell Stakkestad**, President and CEO, Kinetx Aerospace, Tempe, Ariz.; **Vesselin Vassilev**, CEO, Cluster for Aero-Space Technologies research and Applications, Sofia, Bulgaria.

10:05-10:25 a.m.
Coffee Break

10:30-11:30 a.m.

Panel 2: University-Industry partnership in Space Research and Applications

Ron Polidan, Moderator, PSST Consulting

Panelists: **Kevin Maschhoff**, Global Engineering Fellow, BAE Systems, Nashua, N.H. **Joseph Robichaud**, Chief Technology Officer, L-3 Communications-SSG, Wilmington, Mass.; **Gerry Rafanelli**, Senior Engineering Fellow at Raytheon Space and Airborne Systems, El Segundo, Calif.

11:45-1 p.m.
Lunch

Keynote Address
“The Future of Mankind’s Space Enterprise and the Unstoppable Force of Space Commerce”

James A. Abrahamson, Inaugural Director, Strategic Defense Initiative, Assoc. Admin NASA (Ret.)

1:20-2:20 p.m.
Panel 3: New Players and New Approaches

Steven Battel, Moderator, Battel Engineering

Panelists: **Rahul Narayan**, Team Lead, Axiom Research Labs, Bangaluru, India; **Adnan M. Alrais**, Act. Director - Remote Sensing Department, Mohammed bin Rashid Space Centre, Dubai, UAE; **Talbot Jaeger**, Founder and Chief Technologist, NovaWurks, Inc., Los Alamitos, Calif.

2:25-2:40 p.m.
Coffee Break

2:45-3:15 p.m.
Keynote Address

“Multi-User Spaceport: From Vision to Reality”

Robert D. Cabana, Director, John F. Kennedy Space Center (Colonel, USMC, Ret., former NASA astronaut)

3:20-4:20 p.m.
Student Session

John Noto, Moderator, Computational Physics Inc.

Students/student teams have submitted short reports on research they have conducted or participated in within the past year, that are consistent with the symposium theme. The audience will vote after their presentations and rank the presentations and proposals. Prizes will be awarded.

4:30-5 p.m.
Keynote Address

“How Close Are We To Mars?: The Complexities of a Human Mars Mission”

John Connolly, Mars Study Capability Team Lead, NASA Johnson Space Center

5:15-5:45 p.m.
Symposium Summary/Future Plans

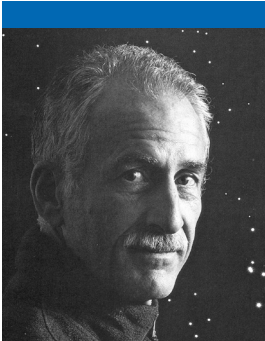
Jeffrey A. Hoffman, Professor, MIT Department of Aeronautics and Astronautics, Former NASA Astronaut

6-7 p.m.
Reception/Networking



Supriya Chakrabarti

Supriya Chakrabarti is the Associate Dean for Research and Graduate Studies at the Kennedy College of Sciences at the University of Massachusetts Lowell, where he also heads the Lowell Center for Space Science & Technology (LoCSST). Prior to joining UMass Lowell, Chakrabarti was Director of Center for Space Physics, Boston University and Professor at the Astronomy Department, Boston University; and Senior Fellow, Space Sciences Laboratory, U.C. Berkeley. Chakrabarti is an experimentalist, with diverse research interests involving space experimentation. He is author or co-author of over 200 published papers. He is the recipient of the 2016 SPIE George W. Goddard Award. Dr. Chakrabarti holds a PhD from the University of California Berkeley.



Jeffrey Hoffman

Jeffrey Hoffman is a professor in MIT's Aeronautics and Astronautics Department. He received a B.A. in Astronomy (summa cum laude) from Amherst College (1966); a Ph.D. in Astrophysics from Harvard University (1971); and an M.Sc. in Materials Science from Rice University (1988). As a NASA astronaut (1978-1997), Hoffman made five space flights, becoming the first astronaut to log 1,000 hours of flight time aboard the Space Shuttle. He has performed four spacewalks, including the first unplanned, contingency spacewalk in NASA's history (STS 51D; April 1985) and the initial rescue mission that repaired the optics of the Hubble Space Telescope (STS 61; December 1993). His primary research interests are in improving the technology of space suits and designing innovative space systems for human and robotic space exploration. He is Deputy Principal Investigator of the MOXIE experiment on NASA's Mars 2020 mission, which will for the first time produce oxygen from extraterrestrial material, a critical step in the future of human space exploration. Hoffman is director of the Massachusetts Space Grant Consortium. In 2007, he was elected to the U.S. Astronaut Hall of Fame.



Catherine (Cady) Coleman

Cady Coleman is a former NASA Astronaut and a retired U.S. Air Force Colonel who started her career as a polymer chemist. She earned a B.S. in chemistry from MIT and a Ph.D. in polymer science and engineering from the University of Massachusetts. Over the course of her 24-year career at NASA and the USAF, Coleman flew twice on the Space Shuttle Columbia and completed a six-month mission aboard the International Space Station (ISS). Coleman's space shuttle missions spanned leadership of microgravity science as a precursor mission to the ISS (STS-73) and responsibility for deploying the Chandra X-Ray Observatory (STS-93). In 2010, she served as the Lead Science Officer for ISS Expedition 26/27, providing onboard supervision of more than 100 science and technology experiments. As the Lead Robotics Officer for the mission, she became the second-ever astronaut to capture a free-flying supply ship from the ISS. Along with her crew, she hosted a record number of supply ships at the ISS.

On the ground, Coleman was known for her ability to facilitate problem solving among groups with diverse interests. She served in a variety of roles within the Astronaut Office, including Chief of Robotics, Lead for Tile Repair Efforts after the Columbia accident and Lead Astronaut for integration of supply ships from NASA's commercial partners, Space X and Orbital ATK. Before retiring from NASA in late 2016, Coleman led open-innovation and public-private partnership efforts for the Office of the Chief Technologist at NASA Headquarters in Washington, D.C. Currently a public speaker and consultant, Coleman is passionate about sharing her experiences in leadership and inclusive collaboration, and about advancing our human footprint in this exciting new era of space exploration. She resides in Shelburne, Mass.



Kenneth Sembach

Kenneth Sembach became Director of the Space Telescope Science Institute (STScI) in October 2015. He is responsible for the over the 600-person institute responsible for the science operations of Hubble Space Telescope as well as the future mission and science operations of its successor, the James Webb Space Telescope. In 2009, the Hubble Space Telescope was finally serviced for the last time, and the Institute played a key role in the science priorities of that mission. The science productivity of HST subsequently increased beyond its already unprecedented level: the science community exploiting both Hubble's new science capabilities and the Hubble Legacy Archive run by STScI. The Institute today is also deeply engaged in preparing for the science operations of the James Webb Space Telescope, due to launch in 2018. The objective is to ensure the astronomical community can fully exploit the enormous new science potential of JWST from day one. Sembach has been deeply involved in the scientific, operational, and managerial aspects of the Hubble Space Telescope for the past 15 years. He has served as interim deputy director, Hubble mission head and Hubble project scientist. Previously, Sembach was the Far Ultraviolet Spectroscopic Explorer deputy project scientist for Large Science Programs from 1996 to 2001 at the Johns Hopkins University. He also was a NASA Hubble Fellow from 1992 to 1995 at MIT. Sembach received a B.A. in physics with honors in 1988 from the University of Chicago and a Ph.D. in astronomy in 1992 from the University of Wisconsin-Madison.



Susanna Finn

Susanna Finn is a Research Scientist at the Lowell Center for Space Science and Technology (LoCSST) at the University of Massachusetts Lowell. She received a bachelor of science degree in physics from Brown University, and a master's and Ph.D. in astronomy from Boston University. Finn is the instrument scientist for the Limb-imaging Ionospheric and Thermospheric Extreme-ultraviolet Spectrograph (LITES), currently aboard the International Space Station. She also serves as the Deputy PI of Science Program Around Communications Engineering with High Achieving Undergraduate Cadres (SPACE HAUC), an undergraduate CubeSat mission. She has a broad background with experience in space hardware development, adaptive optics for vision science applications, and radio astronomy.



Lars Dyrud

Serving as President and CEO of OmniEarth, Lars Dyrud has a history of building diverse teams and delivering complex projects and is a public champion for the benefits of small-sats and hosted payloads. Dyrud has led space-related missions and projects as head of the Earth and Space Science Group at Draper Laboratory and previously as a senior scientist and section lead at JHU/APL in the areas of space physics, GPS tomography, Novel Earth observation missions and mobile applications. He was a Fulbright Scholar at the University of Oslo and received a Ph.D. from Boston University in super-computing plasma physics.



Kjell K. Stakkestad

Kjell Stakkestad is the President and Chief Executive Officer of KinetX Aerospace, an innovative engineering, technology and software development firm based in Tempe, Ariz. He was one of the original founders of KinetX in 1993, serving as its first President and Chief Financial Officer. Prior to forming KinetX, he spent several years as a staff orbit analyst at Lockheed Missiles and Space Company working on an array of operational satellite programs run by the Air Force, NASA and SDI. Stakkestad has an extensive background in project management, space systems and satellite operations. He was the orbit dynamics lead for the development of the IRIDIUM satellite ground control system, and has led a variety of KinetX software, hardware, and system engineering projects. An expert in satellite orbit dynamics and operations, he has written several papers on effective satellite operations and autonomy for large satellite constellations. Stakkestad holds both bachelor and master degrees in mathematics from the University of California at Davis.



Vesselin Vassilev

Vesselin Vassilev received a M.Sc. degree in applied physics from the University of Plovdiv, Bulgaria in 1994 and a Ph.D. degree in electrical engineering from K.U. Leuven, Belgium in 2004. In 1995-97 he worked as a research scientist with the Solar Terrestrial Influences Laboratory, Sofia, Bulgaria, developing remote sensing systems for space applications. From 1998 till 2005 he was with the world leader in the field of semiconductor technology development, IMEC, Belgium, executing R&D work in the field of semiconductor systems reliability and design for the state of the art semiconductor technologies and applications (analog, RF, high-power). From 2005-09, Vassilev was with Texas Instruments in Dallas, where he worked on technology reliability development, design and support for the corporate wireless and mixed signal IC product business lines. In 2009 Vassilev founded the startup company Novorell Technologies, focusing on providing novel EDA-CAD tools and IC reliability design and verification services to the semiconductor industry.

Since 2011, Vassilev has served as CEO of CASTRA, an industry driven consortia of SMEs and academic organizations developing small satellite technologies in Europe. His research interests include semiconductor device physics, circuit and systems reliability, IC design and CAD tool development, space safety, space debris mitigation. He is the author and co-author of more than 40 research publications and several patents. In 2016, Vassilev was the Chairman of the Organizing Committee for the 7th Nanosatellite Symposium and the 4th UNISEC Global meeting held together for the first time outside Japan, in Europe, which brought together space experts and scientists from 31 countries worldwide.



Ronald S. Polidan

Ronald Polidan has over 40 years of space mission experience and is currently the Chief Scientist for Polidan Science Systems & Technologies, LLC, an Oregon-based small consulting company providing space science and engineering consulting. Polidan previously held roles as Director, Manager and Chief Architect in the Space Systems Division, Civil Systems of Northrop Grumman Aerospace Systems. He spent 14 years with NASA as the Goddard Space Flight Center Chief Technologist, Assistant Director of Space Sciences for Technology, GSFC Liaison to the Air Force Research Laboratory, Explorers Senior Project Scientist, Hubble Space Telescope Project Scientist for Operations, and a variety of other space mission positions as well as doing astronomical research. Prior to joining NASA, he worked as an astronomical researcher and spacecraft operations team member for Princeton University (OAO-3) and the Lunar and Planetary Laboratory (Voyager 1 and 2). Polidan has a Ph.D. in astrophysics from the University of California, Los Angeles. He has been the recipient of numerous NASA awards including the NASA Medal for Exceptional Service.



Kevin Maschhoff

Kevin Maschhoff is an Electro-Optical Systems Engineer, and an Engineering Fellow with BAE Systems in Merrimack, N.H. He received a bachelor of science degree in electrical engineering from the University of New Mexico in 1980, and a Ph.D. in physics from the University of Illinois in 1986, where he studied the quantum tunneling behavior of interstitial hydrogen in various transition metals at low temperature, in both the superconducting and normal states. Over the last 25 years, he has been involved in the design and development of space and air-based passive and active remote sensing instruments based on infrared technology. He is currently the Principal Investigator for a NASA Instrument Incubator Program focused on atmospheric observations of the temperature, moisture, and vector wind fields using a constellation of nano-satellites. He recently served as Chief Engineer for a multimodal sensor suite for a classified airborne remote sensing application. He was the instrument architect/design lead for the Hyperspectral Environmental Suite for the GOES-R, in its Formulation Phase for the BAE team, which demonstrated to NASA's satisfaction that advanced hyperspectral infrared sounding was technically achievable from geostationary orbit. Prior to joining systems engineering, he was involved in all aspects of photovoltaic HgCdTe FPA/Dewar development, from device design through semiconductor detector array fabrication, test and analysis, for a variety of sensors for tactical military applications as well as for the NASA AIRS sounding spectrometer.



Joseph L. Robichaud

Joseph Robichaud is Chief Technology Officer of SSG, a Division of L3 Technologies based out of Boston. L3T SSG is focused on the development of space-based electro-optical imaging and infrared sensing instruments. The company produces hardware in support of a broad range of NASA, DoD and commercial satellite applications. These include providing high-resolution imaging payloads for the next generation of Google Earth maps, supporting NASA's search for Earth-like planets, providing the next generation of weather observing sounding instruments and finding near-earth asteroids and comets which are a risk to collide with the Earth. Robichaud has a strong background in a wide range of technology development, including the use of Silicon Carbide for lightweight, stiff, space components, novel optical architectures/designs, precision line-of-sight control, focal plane array technologies, hyperspectral imagers and precision optical fabrication & metrology. His current interests include the validation and use of Commercial Off-The-Shelf components in order to realize lower-cost space instruments and payloads. Robichaud received a bachelor's degree in physics from UMass Lowell, holds a master's degree in electro-optics from Tufts University and has received certification as a Geospatial Analyst from Penn State University. Robichaud was acknowledged as a Fellow of the International Society of Optical Engineering (SPIE) in 2014 for his contributions in the area of SiC materials.



Gerald Louis Rafanelli

Gerald Rafanelli is currently a Senior Engineering Fellow in the Hardware Engineering Center, Optical and Laser Products Department, of Raytheon Space and Airborne Systems. He has over 33 years of professional experience in the defense sector, developing active and passive advanced infrared and visible instruments for a variety of operational and research applications. He holds nine patents, with several patents and publications withheld at government request. He received the Hughes Aerospace and Defense Sector Patent Award, the Hughes Electro Optical and Data Systems Patent Award, the Raytheon Space and Airborne Systems New Business Development Award and numerous other achievement awards. As a doctoral candidate at Stevens Institute of Technology, he was a multiple-year recipient of the Stanley Fellowship, a yearly grant given to the outstanding physics graduate student. Rafanelli is the originator and technical director for the development of patents, algorithms, and hardware implementations for the incoherent rotating synthetic aperture (RSA) approach described during this meeting.



James A. Abrahamson

Chairman of the Board at the Center for the Advancement of Science in Space, Lt. General James A. Abrahamson is considered one of the most broadly experienced and successful military program managers during the period of his Air Force career. Abrahamson began his military career as a fighter pilot in Vietnam and was selected to be an astronaut on the Air Force Manned Orbiting Laboratory (program was ultimately cancelled), then ascended to multiple key Air Force staff positions and also served within the Executive Office of the President of the United States. In 1981, NASA requested that Abrahamson be assigned Associate Administrator for Space Flight, making him responsible for the continued development of programs such as the Space Shuttle and other conventional rockets. Then in 1984, President Reagan asked Abrahamson to be his first Director for Strategic Defense Initiative ("Star Wars Program"), which he did until his retirement from the Air Force in 1989.

Upon retirement from the Air Force, Abrahamson held several leadership positions within the aviation industry, and formerly served as the Chairman of the Board for Oracle Corporation, GeoEye Corporation, and Global Relief Technologies. He has received multiple civil and professional awards during his career including the Goddard Space Flight Award, Engineering Society's "Man of the Year" and Aviation Week's Legends Award. Abrahamson earned a B.S. in aeronautical engineering from MIT and an M.S. in aeronautical engineering from the University of Oklahoma.



Steve Battel

Steve Battel is a graduate of the University of Michigan with 40 years of experience as a system engineer, designer and manager for NASA and DoD space projects. President of Battel Engineering since 1990, Battel previously held research, engineering and management positions at the University of Michigan, the Lockheed Palo Alto Research Laboratory, the University of California, Berkeley and the University of Arizona. He teaches on multiple engineering and management topics and works as a mentor for STEM students and young engineers at several universities and companies including the University of Michigan, General Electric, Spire Global, Planet Labs, Visuray and Google.

Mr. Battel has participated in more than 80 review and advisory boards for NASA missions and is well known within the space community for his science and engineering leadership related to the development of unique electronic systems and scientific space instruments for Earth observing, planetary geochemistry, space physics and astrophysics applications. Battel is a member of the National Academy of Engineering (NAE), a Fellow of the American Institute of Aeronautics and Astronautics (AIAA) and a Senior Member of IEEE. He is also a member of the Aerospace Science and Engineering Board (ASEB) for the National Academies, a National Advisory Board member for the University of Michigan Department for Climate and Space Sciences and Engineering (CLaSP), serves as a member of the Space Telescope Science Institute Council, is a board member for the BoldlyGo Institute and serves as a technical adviser to the B612 Committee.



Rahul Narayan

Rahul Narayan is the Founder of TeamIndus, which is engineering path-breaking solutions for tomorrow’s challenges. TeamIndus is building a spacecraft capable of soft-landing on the Moon, a mission planned for December 2017. TeamIndus has secured a dedicated PSLV launch vehicle, and has previously been awarded \$1 million as milestone prize in its bid to win the Google Lunar XPrize.



Adnan Mohamed Alrais

Adnan Alrais is Deputy Project Manager - Ground Networks, Emirates Mars Mission. At Mohammed bin Rashid Space Centre Ground Networks and the Emirates Mars Mission, Alrais is Acting Director of the Remote Sensing Department and Deputy Project Manager of Ground Networks, Emirates Mars Mission. He and his team are responsible for the development, design and implementation of the ground segment of the Emirates Mars Mission and also other future deep space missions undertaken by Mohammed bin Rashid Space Centre (MBRSC). In addition, Alrais is in charge of the teams managing all down-stream activities at MBRSC, including operating MBRSC’s Earth Observation Missions, ground networks operations, Image data receiving and processing, image applications development and commercialization of MBRSC projects. Alrais was part of the team that built the UAEs first ground station at the Emirates Institution for Advanced Science & Technology in 2007 and also worked with the team building the ground segment of the DubaiSat satellite series, introducing commercial ground support services and antenna hosting services at MBRSC’s Ground Station in Dubai. Alrais has published and presented a number of papers in the areas of remote sensing and satellite image applications. He holds a bachelor’s degree in computer engineering from Khalifa University, Sharjah.



Talbot Jaeger

Talbot Jaeger is founder and chief technologist of NovaWurks™ Inc., the vanguard developer and provider of NewSpace products and services. Jaeger is both visionary and inventor within NovaWurks’ team of pioneering engineers, software architects and technicians that deliver “Space for Everyone.” Jaeger’s vision of “cellularized” satellite technology has led to the development of his patented Hyper-Integrated Satlet, or HISat™. The biologically inspired HISat has all the attributes of a traditional satellite compressed into an 8” x 8” x 6” form factor, permitting aggregation and conformity to enable multiple HISats to “wrap” around any payload. Throughout his 30-plus years in the aerospace industry, Jaeger has successfully managed and directed project concepts, systems engineering, ground and 10 spaceflight operations. In addition, he led the development of the Mayflower CubeSat, one of the payloads launched onboard SpaceX’s first Falcon 9 rocket. Mayflower was a highly-integrated building block, delivering product from initial design to the launch integrator in just six months. Jaeger began his career at TRW as an electrical engineer immediately following his graduation from UC Irvine. At both TRW and Northrop Grumman he held increasingly complex positions, including Director of Novaworks, a sub-division of Northrop Grumman and precursor to his later company, NovaWurks, Inc. Jaeger holds bachelor degrees in biochemistry and information computer science with a minor in electrical engineering from the University of California, Irvine. He also holds a professional graduate certificate in optical sciences from the University of Arizona.



Robert D. Cabana

Robert Cabana is a former NASA astronaut, currently serving as director of NASA’s John F. Kennedy Space Center in Florida. Cabana manages all NASA facilities and activities at the spaceport. Cabana graduated from the U. S. Naval Academy in 1971 and was commissioned a second lieutenant in the USMC. Cabana then served as an A-6 bombardier/navigator with Marine Air Wings and was designated a naval aviator in 1976, earning the Daughters of the American Revolution award as the top Marine to complete flight training that year. He graduated with distinction from the U.S. Naval Test Pilot School in 1981 and served in the Flight Systems Branch at the Naval Air Test Center until 1984. Cabana was selected as an astronaut candidate in 1985 and completed his initial astronaut training in 1986. He was assigned to the Lyndon B. Johnson Space Center Astronaut Office, serving in a number of leadership positions, including lead astronaut in the Shuttle Avionics Integration Laboratory; Mission Control Spacecraft Communicator, famously known as CAPCOM; and chief of NASA’s Astronaut Office.

A veteran of four spaceflights, Cabana has logged 38 days in space, serving as the pilot on STS-41 and STS-53 and mission commander on STS-65 and STS-88. His fourth flight was the first assembly mission of the International Space Station in 1998. He served in numerous senior management positions at Johnson Space Center in Houston, and was appointed director of NASA’s John C. Stennis Space Center in Mississippi. A year later he was reassigned as the 10th director of the John F. Kennedy Space Center.

Cabana was inducted into the Astronaut Hall of Fame and was named an Associate Fellow in the American Institute of Aeronautics and Astronautics and a Fellow in the Society of Experimental Test Pilots. He has received numerous awards and decorations, including the Distinguished Flying Cross, the Presidential Distinguished Rank Award and the National Space Club Florida Committee’s Dr. Kurt H. Debus Award.



John Noto

John Noto, vice-president at Computational Physics Inc., has over 20 years of experience as an optical scientist and engineer, with expertise and patents awarded in optical telecommunications and optical remote sensing. Dr. Noto is a Specialist in the design and construction of optical interferometers. Currently operating at the Arecibo and Millstone Hill Observatories. Designed, built and tested the UV optical system in the CTIP photometer delivered to Boeing for SENSE SMC CubeSat mission. PI on the ExoCube CubeSat mission, which launched in December 2015. Co-Founder, DermaSensor LLC developing technology for optical biopsy. DermaSensor has raised \$2M in outside funding and is conducting clinical trials and preparing to bring a new cancer screening tool to market.



John Connolly

John Connolly leads NASA’s Human Mars Study team, which provides expert analysis of human Mars architectural options to inform NASA decisions on human Mars missions. Connolly’s team represents the agency’s long-term architectural perspective in coordination and support of technology investment and development activities for NASA’s. From 2014 to 2016, Connolly served as the Director of International Space University’s Space Studies Programs, Prior to his detachment to ISU, he served as Exploration Chief Scientist for NASA’s Human Exploration and Operations Mission Directorate.

Connolly has held a broad range of management and engineering positions related to future human exploration planning at both NASA’s Johnson Space Center and NASA HQ. He has served as Deputy Project Manager and Vehicle Engineering Manager for the Altair Lunar Lander Project, Deputy Manager of JSC’s Exploration and Mission Systems Office, Deputy of the Exploration Systems Architecture Study (ESAS) Team, Special Assistant to JSC’s Astronaut Office and Destination System lead for the Agency’s Human Spaceflight Architecture Team (HAT). Connolly’s NASA career has been devoted to defining future systems that will send human crews beyond Low Earth Orbit, return them to the moon, and lead them to Mars and beyond.

