AIAA Houston Section
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Student Paper Conference a Success!

The AIAA SPC Region IV award winners are pictured above. In the front row (l to r): Victor Hugo Soria (3rd – Graduate Division), Cynthia Hollingshead (1st – Aerospace History Division), Blanca Montoya (1st – Undergraduate Division), and Angela Braun (2nd – Undergraduate Division). In the back row (l to r): Patrick Goins (1st – Aerospace History Division), David Cusimano (3rd – Undergraduate Division), Daniel Georgiev (1st – Aerospace History Division), and Pat Chavez (1st – Graduate Division). The 2nd place Graduate Division winner is not pictured. See the article on page 4.

This will be the last issue of Horizons until September

Features

In Every Issue

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Chairman's Corner

By Dr. Merri Sanchez, Chairman

I want to take this opportunity and thank the entire section for your support toward AIAA this year. This is the last month in the term of this year's council. I know that I speak for the entire council when I say that we have all enjoyed working for you, hearing your comments, and trying to bring you interesting dinner meeting programs, lunch and learn programs, and symposiums. I appreciate the time you have taken as individuals to respond to our surveys, and to respond by volunteering your time in special activities such as the Student Paper Competition, science fairs, etc.

I have personally found this year as your Chair to be especially rewarding. With your help, and the help of the council we were able to achieve the three goals that I set when I took office. Those goals were:

To inform our membership of the benefits of AIAA.

We have put up display boards in 10 new buildings in the area to announce AIAA events, increased our publicity efforts for events, increased our e-mail distribution, and have made an electronic version of the newsletter available. And we have all benefited from the efforts of our web-master, Glenn Jenkinson, who continually amazes me with improvements and additions to the website. We have also tried to bring the rewards of membership to the members. This year Norman Chaffee and William Best were selected for the National "Sustained Service Award", Chester Vaughn was selected as the Section and Region IV "Engineer of the Year", and we supported the nomination of over 20 members for Associate Fellow, four members for Fellow, and four members for other national AIAA awards.

To inspire our student members.

With the help of Nicole Smith Mullins we nearly have all of the paper work completed to charter a Student Branch at UH and we are working towards establishing a Student Branch at Rice. We had over 60 students attend the first UH student branch meeting! The Texas A&M Student Branch continues to thrive with over 150 student members. In addition we have averaged over 5 student members at each of our dinner meetings, with the Texas A&M Student Branch making two special group trips to attend. With the help of Joy Conrad we've conducted two "Physics Is Fun" events averaging 60 students per event. Joy has also spear headed our involvement in the Mars Design contest and in judging local science fairs. And Darby Cooper and his committee deserve gold medals for the excellent job they did in conducting the Region IV Student Paper Competition.

To increase our membership to above 800 members, and to increase member participation in section events.

We achieved the over 800 goal several months ago, which is the first time in several years we have had this many members. To increase participation we decided we needed to find out what you wanted. So we sent out surveys on activities and speakers, and brought the membership three AIAA Distinguished lecturers as well as five other very interesting speakers. Our dinner meeting attendance has increased by 50% and we have averaged close to 90 members per dinner meeting. Our Technical Committee chairs have also brought a variety of Lunch and Learns, with almost two per month being held. We also had over 30 papers presented at our Annual Technical Symposium, and supported the Workshop on Automation and Robotics.

I have enjoyed the past year and look forward to continuing to serve the section in various capacities in the future. Thank you for the opportunity. And thank you to the council for your friendship, your support, your advice, and your involvement. You are the best team!

Student Paper Conference a Success!

By Darby Cooper, Student Paper Conference Committee Chair

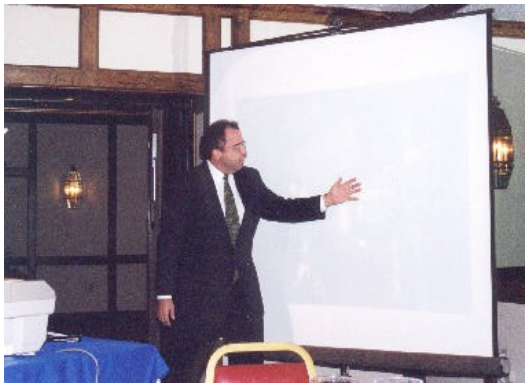
Student Paper Conference attendees on tour in Building 9 at JSC.

The Houston Section, along with the Texas A&M University student branch, hosted the Region IV Student Paper Conference April 6-7, 2000. 52 students and faculty advisors attended the two-day event held at the University of Houston Clear Lake and the Ramada Inn / NASA.

The students represented Texas A&M University, University of Texas – Austin, University of Texas – Arlington, Louisiana State University, Oklahoma State University, University of New Mexico, Rice University, and the University of Houston. Eighteen student papers were presented and scored by local judges in three divisions – undergraduate, graduate, and aerospace history. The judges selected the top papers in each category for special recognition and cash awards.

In addition to the student presentations, the conference was held concurrently with the Annual Technical Symposium. This allowed the students to interact with professional members and observe papers presented on the latest

Dr. Michael Gernhardt, a NASA Astronaut, talks about Extravehicular Activity (EVA).



Bill Bastedo, Booz Allen Civil Space Systems, overviews the first US ISS Assembly mission.

developments in the aerospace industry. The conference also featured several key speakers including Dr. Michael Gernhardt, NASA Astronaut, speaking about EVA, Mr. Bill Bastedo, Booz Allen Civil Space Systems, providing on overview of the first US mission to the International Space Station, and Mr. Brewster Shaw, Boeing, providing an excellent overview of what the future holds in human space exploration. The conference culminated in an exclusive behind-the-scenes tour of NASA/JSC that was a big hit with the students.

While sponsored by AIAA, the event was made possible by the generous support of aerospace companies throughout the region including The Boeing Company, Houston, TX, Lockheed Martin Missiles and Fire Control, Dallas, TX, Lockheed Martin Tactical Aircraft Systems, Ft. Worth, TX, Bell Helicopter Textron, Dallas, TX, Professional Aerospace Contractors Association (PACA) of New Mexico, Albuquerque, NM, Honeywell International, Inc., Houston, TX, Oceaneering Space Systems, Houston, TX, NASA Alumni League, Houston, TX, National Aeronautics and Space Administration - Johnson Space Center - Office of External Relations, University of Houston Clear Lake.

Brewster Shaw, Boeing, discusses the future of human spaceflight.

Graduate Division

1st Place	*Design of an Optical Diagnostic for Turbulent Shear Flow*	Pat Chavez University of New Mexico
2nd Place	*Receptivity Prediction Using Adjoint Methods*	Alexander Dobrinsky and S. Scott Collis Rice University
3rd Place	*Prediction of Flow Control using a Dynamically Deforming Airfoil*	Victor Hugo Soria University of New Mexico

Undergraduate Division

1st Place	*Thermal Conductivity Measurements of Metal Hydride and Porous Graphite Compacts*	Blanca Montoya University of New Mexico
2nd Place	*Drop Zone Aerodynamics*	Christopher Miller and Angela Braun University of Texas - Austin
3rd Place	*Modeling of Flows Over Airfoils at High Reynolds Numbers*	David Cusimano Louisiana State University

Aerospace History Division

1st Place (tie)	*NASP: The Paper Airplane*	Cynthia Hollingshead and Patrick Goins University of Texas at Arlington
	Development of a Photon Powered Sail	Daniel Georgiev University of New Mexico

Election Results

By Merri Sanchez, Chairman

I'd like to congratulate the following people for being elected to next year's council. Officers serve a one year term, councilors serve a two year term. Councilors are limited to two consecutive terms so I've indicated whether this is the first or second term for each person.

Vice-Chair Operations:	Jorge Molina, Boeing
Vice-Chair Technical:	Glenn Jenkinson, Boeing
Treasurer:	Michael Oelke, Oceaneering
Secretary:	William Proft, Lockheed Martin
Councilors:	William Atwell (term #2), Boeing
	Winston Goodrich (term #2), NASA
	Monica Visinsky (term #1), Oceaneering
	William Langdoc (term #2), NASA
	John Vollmer (term #1), Boeing

We had the highest voter turnout in several years with 87 members voting. This is about 11% of our total membership. I want to thank all of you who took the time to vote.

We had 9 folks running for councilor and could only elect 5. All of the candidates should feel proud to have volunteered their service. I hope that those who were not elected will volunteer to serve AIAA in other capacities.

I'd also like to pass my thanks on to the Nominating Committee and the Teller's Committee for their work in the election process in finding the candidates, preparing the ballots, and tabulating the results.

New Systems Engineering Degree Offered by UH – Clear Lake

By Stuart Corns, Systems Engineering Technical Committee Chair

UHCL is offering a new Systems Engineering degree with guidance from NASA and the local aerospace community. Information is available through our AIAA Website www.jsc.nasa.gov/aiaa.

Systems Engineering

The new systems engineering degree was designed with inputs and guidance from local aerospace and petrochemical communities to meet needs recognized by area high tech organizations, NASA headquarters, and national and international professional societies and institutions. This master's level program will provide a timely and innovative response to meet the need for an integrated program of instruction on research and service. Emphasis will be on concurrent and multi-disciplinary engineering, including analysis and design issues of risk management, trade-off and economic studies.

Software Engineering

This program focuses on the software engineering of mission and safety critical computing systems. The success of this program is a major factor that led to the recognition of software engineering as a discipline for licensed professional engineers in Texas.

Computer Engineering

The UHCL program in computer engineering complements the new systems engineering program and the existing software engineering program by focusing on the hardware and communication issues of modern computing control and communications systems. Current specialization includes computer control systems, automation and robotics, fault tolerant computing, telecommunications and networking.

Dinner Meeting with Max Faget
From NACA to NASA

By Bill Best

The Houston section had a real treat on May 25th when Max Faget gave an interesting talk on the early days of NASA. The short report below is my recollection of his address and any errors are mine and certainly cannot be attributed to Max. He focused on Langley at the time of the creation of NASA and the development of the Mercury capsule.

In 1917 Congress created a one-man agency, the National Advisory Committee on Aeronautics (NACA) because they believed that the European nations as a result of the WW I experience were getting ahead of the United States in the new field of aviation. Almost 40 years later the federal government created NASA as a result of another world power putting a satellite in orbit after WW II.

In 1922, NACA had been changed to the Langley Laboratories. And most of its history the primary customers of Langley was the military who were very interested in aeronautical research. But in 1958, then President Eisenhower wanted a civilian agency to respond to the Soviet challenge rather than permit the military to do so. Hence the National Aeronautic and Space Administration was born in October of 1958, a year after Sputnik.

Langley at that time was described by Max as a "bottom up" organization. He meant that the workers at the bottom came up with new ideas and projects and management would find the resources so that the project could proceed. The usual present day management arrangement is more of a "top down" structure.

Since Sputnik the people at Langley had been thinking about how to build a capsule to take a man to space. Harvey Allen at Ames argued that the best shape for ballistic missile warheads was a high drag blunt nose rather than a low drag pointed cone. Max went to Ames and Harvey convinced him in a few minutes. A blunt shape reduces the heat loads for reentry by spreading the heat load over a longer period of time and reduces the peak temperatures. The blunt shape also results in a higher altitude for any given velocity. Wind tunnel tests confirmed that the best 'bluntness' (ratio of diameter of vehicle to radius of nose) was about 0.5. By serendipity it turns out that the heat load is evenly distributed over a blunt nose so that the ablation material can be spread evenly over the nose simplifying the manufacturing process. Another feature of the design was that on ascent the crewman was in a supine position for the +G (6/7) loads, and was also in a supine position for the reentry and the negative Gs.

Langley had a wind tunnel called a "spin tunnel" since the hot research item at the time was understanding and preventing aircraft spins. The capsule design was believed to be dynamically unstable but statically stable (like a falling leaf), which tests confirmed. To reduce the instabilities, a rear end was added to the capsule and to provide additional capability, control jets were also added. By early 1958 the basic design was complete and a boilerplate was built as usual completely in house.

When it was determined that an Atlas missile (which had not had a successful flight) would be required for flight test, Max made a call to Convair to find out when a missile would be ready for use. He was given an August date so that became the flight test date. The flight test occurred in September and actually the Atlas failed to put the capsule in orbit but achieved enough velocity to prove the reentry design was good. In early 1960 McDonnell was put under contract and in 1962 John Glenn made the first U.S. orbital flight.

The design and test was done in a remarkably short time. Max attributes that to good people and the fact the bottom up organizational structure permitted failure: people were absolutely ready to try things that didn't work. As he says, "you learn a lot more from things that don't work than from things that do". I am very glad that I did not miss this particular evening and was present when Max was presented with the new Houston section coffee mug as a souvenir of the evening.

Space and Exploration Studies at UH – Clear Lake

By Prof. Gretchen Mieszkowski, Director of Humanities at UHCL

As an AIAA member, you know you're part of exploration history. Think how much satisfaction it would give you to know the history you're a part of.

Fall 2000, the University of Houston-Clear Lake is launching a concentration in Space and Exploration Studies as part of its M.A. in Humanities degree. Courses emphasize the historical, philosophical, and global meaning of the space pioneers' achievement. Application requirement for this program is a bachelor's degree in any field from an accredited institution. Classes are scheduled primarily in the evening to meet the needs of adult students, and all classes will be given at the University of Houston–Clear Lake campus.

Through study of the history, politics, and literature of exploration, this concentration's courses examine the relationship of space exploration to exploration throughout the ages. Concentration courses also investigate humanity's future in space and stress the intercultural understanding needed for international cooperation in space exploration. Courses in cultural diversity and writing for today's workplace are also available in this degree. As a final project, you may choose to write an oral history of a space traveler's experiences or a historical study of an as yet unchronicled NASA project.

The first course in this concentration, "The History of Exploration" from pre-history to the 21st century, will be offered Monday evenings in the fall of 2000. Taught by University of Houston-Clear Lake Professor Keith Parsons, it will include topics such as Lewis and Clark; the discovery of the Americas; and the peopling of the earth: the Arctic to Patagonia to Australia. Course books will include Boorstin's The Discoverers, Ambrose's Undaunted Courage, and McCurdy's Space and the American Imagination.

Evening courses in Writing for the Workplace and Cultural Diversity will also be available fall 2000 and can be included in the M.A. degree.

MASTER OF ARTS IN HUMANITIES

Space and Exploration Studies Concentration

Full Member: Association of Graduate Liberal Studies Programs

> *"That's one small step for man—*
> *one giant leap for mankind."*
>
> *Neil A. Armstrong, on the moon - 1969*

Does exploration send your imagination soaring? Space exploration, of course, but also the voyages of Odysseus, Marco Polo, Columbus, Lewis and Clark, Darwin, Cook, and Amundsen? Would you like to study exploration broadly conceived, with emphasis on technology, politics, international interaction, and the re-visioning of exploration as literary symbol and cultural myth? An M.A. in Humanities with a concentration in Space and Exploration Studies allows you to earn an advanced degree as you analyze space and exploration from a multi-disciplinary perspective.

This concentration welcomes all Humanities graduate students interested in exploration and space. It is designed in particular for the teams of space pioneers who are making exploration history with NASA and NASA's contractors. The aim of this concentration is to give you the depth and breadth of understanding to integrate your role into humankind's age-old enterprise of exploration and discovery.

The University of Houston-Clear Lake's M.A. in Humanities is a broad, interdisciplinary degree designed to help you unlock your creativity, develop your capacity for reflection and judgment, gain visual literacy, improve your writing skills, and acquire self-knowledge and cross-cultural understanding. It will enrich both your personal and professional life. You will elect 12 hours of Space and Exploration Studies courses within Track I of this degree. The rest of your electives can be any humanities courses you choose, but you may want them to support your Space and Exploration Studies concentration directly.

To be admitted to this degree program, you must hold a bachelor's degree from an accredited college or university. Participants come from a variety of occupations: engineering, business, law, teaching, homemaking, medicine, banking, nursing, retirement, and many others. Classes are scheduled primarily in the evening to meet the needs of adult students.

Requirements

Track I: Texts – Space and Exploration Studies Concentration (12 hrs.)

Choose 4 of the following courses:

- **Humn 5231: History of Exploration** (from the voyages of Odysseus, Columbus, and Darwin to the beginning of the space age)
- **Hist 5135: American Frontiers: Exploration, Politics, and Technology** (technology and the frontier; Lewis and Clark; the prairie state pioneers; space exploration)
- **Litr 5738: Literature of Exploration** (historical novels, memoirs, speculative fiction; terrestrial and space exploration; from *Robinson Crusoe* to *Red Mars*)
- **Humn 5232: Our Future in Space** (current trends, potential events, emerging issues; emphasis on space policy)
- **Hist 5531: International Politics and Technology** – may be repeated for credit (planned emphasis: space policy and Russia, China, and Japan)

Electives: Humanities courses (3 or 9 hrs. depending on Master's Option)

- 30 hr. degree: one elective may be a Human Sciences course.
- 36 hr. degree: up to three electives may be Human Sciences courses.

*Electives of Special Interest (**indicates Human Sciences course):*

- **Hist 5138: Local History Seminar** (recommended for master's option projects in oral history)
- **Humn 5131: Writing for Today's Workplace I**
- **Humn 5132: Writing for Today's Workplace II** (from instructions to e-mail to the formal report; the writing and presenting of professional documents)
- **Anth 5535: Cultures of Asia****
- **Crcl 5031: Cultural Diversity****
- **Futr 5334: World Futures****
- **Psyc 5338: Cross-cultural Communications****
- **Psyc 5439: International Training****
- **Soci 5238: Negotiating Across Cultures****

The Core - (9 hrs.)

The core of the M.A. in Humanities is a required sequence of three "Texts and Images" courses, which integrate the study of great works of literature and art. "Texts and Images I" begins with ancient epics such as the Gilgamesh and Homeric epics, matches them with Mesopotamian art and classical Greek sculpture, and concludes with medieval and Renaissance writers and artists such as Dante, Michelangelo, Christine de Pizan, and Artemesia Gentileschi. "Texts and Images II" concerns western culture from the 18th through the 20th century: writers and artists from Rousseau and Goya to Toni Morrison and Georgia O'Keeffe. "Texts and Images III," designed to increase awareness of cultural diversity, breaks away from traditional concentration on western civilization to study touchstones of literature and art from Asia, Africa, and Native America. These courses provide rich background for Space and Exploration studies.

Master's Options:

- **Thesis** - 6 hrs. (30 hrs. total)
- **Project** - 6 hrs plus 6 hrs. electives from HSH courses (36 hrs. total)
- **Internship** - 6 hrs. plus 6 hrs. electives from HSH courses (36 hrs. total)

The thesis, project, or internship serves as the culminating experience for each student's degree program. Students should choose a master's option with an interdisciplinary Space and Exploration focus. The thesis is ordinarily a substantial, documented research paper in a traditional subject area, or a creative work of poetry or fiction. A Space and Exploration Studies thesis might well be a history of a little-known NASA project, or a brief science-fiction novel. Projects take many forms: an oral history, for instance, that would preserve the memories of a space voyager, or lesson plans for a space and exploration unit for middle or high school students. Internships may be arranged by students to translate their interest in the humanities and Space and Exploration Studies into preparation for employment.

For more information contact:

Professor Gretchen Mieszkowski, Director of Humanities at (281) 283-3312 or mieszkowski@cl.uh.edu or Ms. Ann Hinojosa, Advising Coordinator at (281) 283-3333
2700 Bay Area Blvd., Houston, TX 77058

Lunch and Learn with Dr. Laurel Kirkland
Mars Spectroscopy

By Larry J. Friesen, Space Science and Astronomy Technical Committee Chair

On May 30, 2000, the Space Science and Astronomy Technical Committee held a Lunch and Learn from noon to 1:00 PM in the Hess Room at the Center for Advanced Space Studies (CASS). Dr. Laurel Kirkland, a planetary scientist at the Lunar and Planetary Institute (LPI), spoke about spectroscopic observations of the planet Mars, primarily in the infrared (IR) region of the spectrum, and what has been learned from such observations.

Dr. Kirkland first explained that there are two major infrared wavelength regions of interest for planetary observations, reflected IR and thermal IR, and that these give us different types of information. Reflected IR starts at the red end of the visible spectrum. The spectral bands in reflected IR are generated primarily by electrons changing to states of higher or lower energy within an atom or molecule, much as they are in the visible wavelength region. This region gives us primarily information about iron mineralogy.

Thermal IR is at longer wavelengths than reflected IR, and arises primarily from molecular vibrations. What we learn most about in thermal IR are particle size, surface roughness, and silicate mineralogy. Thus we see that the two wavelength regions give us complementary information.

Dr. Kirkland then took us through a brief history of infrared spectroscopic instruments that have been flown on various spacecraft which have visited Mars. Infrared instruments have been flown on Mariners 6 and 7, Mariner 9, the Russian Phobos 2 probe, and the Mars Global Surveyor. These instruments have covered different wavelength regions. Some covered both reflected and thermal IR, some looked only at the reflected region, and some looked only at thermal IR. The instruments have also had different spectral resolutions (meaning how many spectral slices they showed per wavelength interval, looking at an individual pixel) and different spatial resolutions (meaning how many pixels they resolve per unit area on the surface of Mars). The instruments with the best spectral resolution have NOT been the ones with the best spatial resolution. It is hard to get both at once within the weight and complexity constraints of a given spacecraft.

It is also important to be aware that in the thermal IR, there is a major transmission feature caused by dust aerosols in Mars's atmosphere which makes it difficult to distinguish what is actually on the surface.

Finally, Dr. Kirkland summarized a few of the things we have learned about Mars from IR spectroscopy. By the 1960's, mostly from ground-based telescopes, we learned that Mars's surface has iron oxides, chemically bound water, and might have a type of mineral called pyroxene. The information about iron oxides and pyroxene was supported by the 1989 Phobos 2 probe. In 1969, we learned from the instruments on Mariner 6 and 7 that the aerosol in the Martian atmosphere included silicates, that there was a haze in the atmosphere which was probably frozen carbon dioxide and ice, and confirmed that the south polar cap has frozen carbon dioxide. In 1971, the instrument on board Mariner 9 gave us more information about the aerosol composition and showed us that Mars has water ice clouds. However, the spectral resolution of the aerosols was not very precise, so many ideas have been put forward for materials that COULD be consistent with the spectra, and there has been a great deal of debate about the subject.

Report: Workshop on Automation and Robotics 2000

By Bill Best

The Automation and Robotics Technical Committee of the Houston section sponsored a Workshop on Automation and Robotics (WAR 2000) at the Gilruth Center on the morning of May 24th. The event was co-sponsored by the Instrument Society of America (ISA) and the Robotics and Expert Systems Division of JSC. WAR 2000 was followed by a luncheon keynote address for Innovations 2000, a seminar sponsored by the Clear Lake Council of Technical Societies. Dr. Gary Funk, consultant, served as general chairman for the workshop.

WAR 2000 included three presentations followed by a panel discussion. The panel was composed of the three speakers plus, Cliff Farmer, moderator from the Automation, Robotics and Simulation division, JSC. The first presentation by Dr. Steven E. Fredrickson (ER2) described the Autonomous Extravehicular Robotic Camera (AERCam). One form of the device flew on STS-87 and provided some spectacular pictures and proved the concept. An improved version (10 lbs and 7 inch diameter) should be ready for flight test in 2001. Dennis Lawler (ER2) gave the second presentation, "Robot Programming via Human Demonstration", describing some of the difficulties in writing programs for even simple tasks for a robot to perform. The third presentation on "Robonaut" was given by Dr. Robert Ambrose (ER4/Metrica Corp.). Robonaut is a robot which follows the motions of an instrumented human. Robonaut consists of a four fingered flexible hand, an opposed thumb, a wrist, elbow, shoulder, neck and torso and a head with binocular vision. Robonaut has astonishing dexterity, that enables it to pick up tools and manipulate them with the thumb and fingers. A version built to solve a particular problem could be ready to fly in two years since Robonaut has modular construction. The panel discussion focused on such topics as the present state of the art in robotics, limiting factors, problems with robotic programs etc. One limiting factor in the field, other than project funding, is the shortage of qualified people in the field. Another item of interest is that currently we separate the robot and the human (for safety). To make better use of robots we must learn to integrate the abilities of both.

Innovations 2000, General Chair Jane Malin, Ph.D, was a series of papers on a wide variety of topics. A few are listed:

- *Interactive Technical Manuals*
- *A Microwave Heart Catheter for Treatment of Ventricular Tachycardia*
- *An Introduction To Patent Law*
- *The Triage Process for Analyzing Risk*

The workshop and seminar were connected by a luncheon presentation by Gerald R. White, CEO GRTW, Inc., who has 27 years in the field of automation and process control. He described how the analysis process works by using the example of a chemical plant. He showed how the seven (usual) layers of disassociation can describe all the processes and interfaces involved. The information is necessary to understand the different levels of the processes involved before improvement can be implemented. The process can be applied to DOD projects as well. As an example the 13,000 feet of binder shelf space describing the B1 bomber was reduced to 5 feet!

A very useful day and for only $12 (speakers ate free) and a lunch! Wait until next year!

AIAA Life Sciences, Space Processes, and Human Factors Technical Committee

By Dr. Karin C. Loftin, Ph.D., Life Sciences, Space Processes and Human Factors Technical Committee Chair

The AIAA Life Sciences, Space Processes and Human Factors Technical Committee sponsored 3 sessions on space extra-vehicular activities (EVA) at the 2000 AIAA Annual Technical Symposium. On the afternoon of Thursday, April 6, Mr. William Atwell (Boeing) chaired the session, Medical Issues in EVA, and I chaired the later session on EVA Applications for ISS. On Friday morning, April 7, Dr. Frances Mount (NASA) chaired the session on EVA Technologies Outlook. All session had between 10 and 20 attendees, stimulating thoughtful discussions on these critical and timely topics.

One of the highlights was the luncheon seminar by Astronaut Michael Gernhardt (NASA) on 'The Biomedical and Operational Aspects of Performing the First Space Walks' from the International Space Station. Dr. Gernhardt presented the development of a new prebreathe protocol that will shorten the duration of oxygen prebreathe prior to six-hour space walks. As an interesting follow-up, Ms Lisa Holmesly (Barrios Technologies) outlined the schedule for the two-hour prebreathe during ISS operations later in an afternoon session.

The medical issues in EVA were reviewed by Dr. Johnny Conkin (NSBRI), myself (Wyle Life Sciences), and Dr. Michael Powell (NASA). Dr. Conkin reviewed the impact on EVA operations of classifying skin mottling as Type II (Severe) decompression sickness (DCS) as it is currently or Type I (minor bends or joint pain). He recommended a reevaluation of the current classification scheme based on a critical review of historical cases and of current practices in diving and flying operations around the world.

My discussion of the metabolic cost of EVA reminded us that exercise is an added risk for DCS, and an evaluation of the expenditure of metabolic energy in past missions allows us to plan for the future. Dr. Powell finished the session with a discussion of a bubble-detecting tool, the precordial Doppler Ultrasound Gas Bubble Detector. The amount of bubbles circulating in the blood has been correlated with increased risk of DCS in both animal and human decompression studies.

A special feature, especially for the students attending the session, was the demonstration of the EVA suit and liquid cooling garment. Retired Astronaut Don Peterson had arranged for this demonstration. He presented a talk entitled, 'An Astronaut's View of Extra-Vehicular Activity.' Dr. Suzanne Schneider (NASA) then gave us an overview of the ISS exercise protocols and hardware development. Exercise will be an important factor in keeping muscles conditioned for EVA.

Dr. Bowen Loftin (University of Houston) closed the Thursday afternoon session by focusing on the application of virtual reality technology in training and planning for EVA operations as well as for simulation-based space suit design. Studies are underway to increase the haptic (touch) capabilities of virtual environments and to understand better how to simulate the actions of specific muscle groups critical in EVA operations and suit fit.

On Friday morning, Dr. Frances Mead (NASA) opened the EVA Technologies Outlook session. Mr. Gerald E. Miller (USA) presented a very informative discussion of EVA Operations. As Lead of the Russian Operations until last year, he has been involved in orchestrating the Shuttle-Mir EVA and all aspects of planning ISS EVA. Cost-effective new technologies will have to be developed to meet the special requirements for EVA, e.g. EVA training at the Neutral Buoyancy Laboratory is very costly and virtual reality may become the primary tool in training for future EVA.

Dr. John Stanford (NASA) of the EVA Project Office then directed our thoughts to future planetary explorations of Mars beginning in the year of 2007. The EVA human factors that have to be considered are very different from Shuttle and ISS EVA.

…See Life Sciences Committee on Page 14

Lunch and Learn with Dr. Carlton Allen
Cosmic Pinball

By Dr. Larry J. Friesen, Space Science and Astronomy Technical Committee Chair

On Wednesday April 19, 2000, the AIAA Space Science and Astronomy Technical Committee held a "Lunch and Learn" as a joint event with the JSC Astronomy Brown Bag Seminar, chaired by Dr. Al Jackson. Dr. Carlton Allen spoke on "Cosmic Pinball", the title of a book written Dr. Allen and Dr. Carolyn Sumners of the Burke Baker Planetarium. The Lunch and Learn and the book dealt with comets, meteors, asteroids, and their possible impact hazard for Earth.

Dr. Allen first mentioned an educational package on meteors and related topics developed by JSC scientists called "Exploring Meteorite Mysteries", meant for elementary and high school teachers.

Dr. Allen then discussed comets and asteroids as sources of meteors and meteorites. Comets are small bodies of ice and dust in the outer solar system that didn't get swept up when the planets were forming, many of them in the Oort cloud, which extends out to a significant fraction of the distance to the nearest star. Occasionally a comet in the outer solar system gets nudged into a highly eccentric orbit that takes it into the inner solar system. When it gets near enough to the sun, some of its ice evaporates; it sheds some of its dust, and forms the coma and tail, which makes the sometimes-spectacular display we see from Earth. The dust shed forms streams that make meteor showers. Meteors in a shower are typically pinhead size or smaller and burn up high in the atmosphere.

Most meteorites that reach the ground are broken-off chunks not of comets, but of another form of "leftover" from the formation of the solar system: asteroids. However, about one in a thousand meteorites comes from the Moon and another one in a thousand comes from Mars. Most asteroids are in the "main belt" between the orbits of Mars and Jupiter, a region of the early solar system where the gravitational tugs of massive Jupiter kept things too stirred up for a planet to form. Every so often, collisions between main belt asteroids put debris fragments into orbits that cross the orbits of one or more of the inner planets. Most fragments in that sort of orbit are going to collide with one of the planets or get tossed out of the solar system altogether.

Meteorites give us samples of two kinds of asteroids: those large enough and hot enough early in their history to become differentiated, and those that were not. From differentiated asteroids we have samples of the iron-nickel cores, the silicate mantles and crusts, and stony-iron meteorites, which are samples from the interface region between the metallic cores and the rocky outer portions.

Large enough meteors, asteroids, or comets can cause local, regional, or global havoc if they collide with Earth, depending on the size of the impacting body. Earth bears the scars of numerous past encounters - one of which, 65 million years ago, wiped out the dinosaurs and many other kinds of living organisms. Some noteworthy collisions have happened in historic times as well, such as the 1908 Tunguska explosion in Siberia, fortunately not in a heavily populated area. We were able to see fragments of comet Shoemaker-Levy 9 making multiple impacts...fortunately into Jupiter's atmosphere instead of onto Earth's surface. On a large time scale, such impacts are virtually certain to happen again.

What are we citizens of Earth doing about this hazard? Surveys are under way to look for potentially Earth-threatening asteroids; however, funding is not consistent. Researchers are also seeking to develop methods for spotting threatening comets far out in the solar system - about the distance of Jupiter. It should be noted that surveys with current techniques can find kilometer-sized asteroids, but not building-size rocks of the size that made meteor crater, Arizona, and which would cause severe local damage if, for instance, one struck a city.

Thanks to Dr. Allen for his presentation and to everyone who attended.

Professional Development Classes Offered

By Merri Sanchez, Chairman

AIAA has several courses being offered this summer for professional development. For more information or to register you can contact the AIAA Customer Service at 800-639-2422, or www.aiaa.org. The upcoming courses are listed at the right.

Courses Offered This Summer

Liquid Rocket Propulsion - Evolution and Advancements II
July 20-21
Huntsville, AL

Future Flight Propulsion: Advanced Concepts in Rocket Propulsion, Nuclear Systems, Advanced Physics, adn High-Energy Density Propellants
July 20-2
Huntsville, AL

Solid Rocket Propulsion: Status and Evolution
July 20-21
Huntsville, AL

Development and Acquistion of Advanced Combat Aircraft
July 31-August 2
Arlington, VA

Fundamentals of Tacticial and Strategic Missile Guidance
July 31-August 2
Arlington, VA

Advanced Tactical and Strategic Missile Guidance
August 3-4
Arlington, VA

Fundamentals of Launch Vehicle and Missile Aerodynamics
August 12-13
Denver, CO

Tactical Missile Design
August 12-13
Denver, CO

Bootstrap Approach to Propeller Aircraft Performance
August 12-13
Denver, CO

Integrated Navigation and Guidance Systems
August 12-13
Denver, CO

Frequency-Domain Modeling and Testing Throughout the Flight Vehicle Development
August 13
Denver, CO

Optimal Design in Multidisciplinary Systems
September 9-10
Long Beach, CA

Aircraft Conceptual Design
September 11-15
Arlington, VA

Vulnerability of Ballistic Missiles to Direct Hit Warhead Technology
September 11-12
Arlington, VA

Life Sciences Committee

Continued from Page 12

Studies to develop human and robotic interfaces for planetary work and designing a transportation vehicle with a quick EMU interface for transfer are in the plans.

The final presentation by Dr. Powell returned us to the medical topic of the DCS risk during EVA. DCS risk is also increased dramatically if air-breaks occur during pure oxygen prebreathe. The purpose of prebreathe is to remove nitrogen from the tissues while air-breaks would introduce more nitrogen into the tissue. The question occurred, how much nitrogen. Dr. Powell estimated the amount of nitrogen that would be reabsorbed by the tissues depending on the length of oxygen prebreathe, length of the air-break, and tissue nitrogen saturation.

AIAA Life Sciences, Space Processes, and Human Factors Technical Committee would like to thank all the speakers for their participation in heightening our awareness of EVA issues, both medical and operations, and all of you who attended. It was a wonderful opportunity for students and professionals in EVA operations, engineering, and science to interact. Watch for announcements about future Lunch 'n' Learn topics to further stimulates your thoughts.

Technical Committee News

By John Vollmer, Vice Chair – Technical

We are currently in the process of identifying Technical Committee Chairs for next years activities. The following have accepted to continue as Committee Chairs for next year: Karin Loftin, Life Sciences Technical Committee, Larry Jay Friesen, Space Science and Astronomy Technical Committee, Kamlesh Lulla, In-Space Imaging and Crew Observations Tech Committee.

Safety & Mission Assurance - James Burrescia Committee Chair

We would like to welcome James Burrescia as the new Safety & Mission Assurance Technical Chair. James is the Director of S&MA for United Space Alliance (USA) Texas Region.

Space Science & Astronomy - Larry Friesen Committee Chair

A Lunch and Learn event was held as a joint event with the JSC Astronomy Brown Bag Seminar April 19 in building 31 at JSC. Dr. Carlton Allen spoke on "Cosmic Pinball", a book written by Dr. Allen and Dr. Carolyn Sumners of Burke Baker Planetarium. The event was well attended. Thanks to Dr. Albert Jackson for helping to organize this event.

A second Lunch and Learn was held May 30 at the Center for Advanced Space Studies (CASS) with speaker Dr. Laurel Kirkland, a planetary scientist at the Lunar and Planetary Institute (LPI).

In Space Imaging and Crew Observations - Dr. Kam Lulla Committee Chair

Dr. Kamiesh Lulla was Dinner Speaker for AIAA houston Section meeting in January and gave a presentation on "35 Years of Earth Observations from Space".

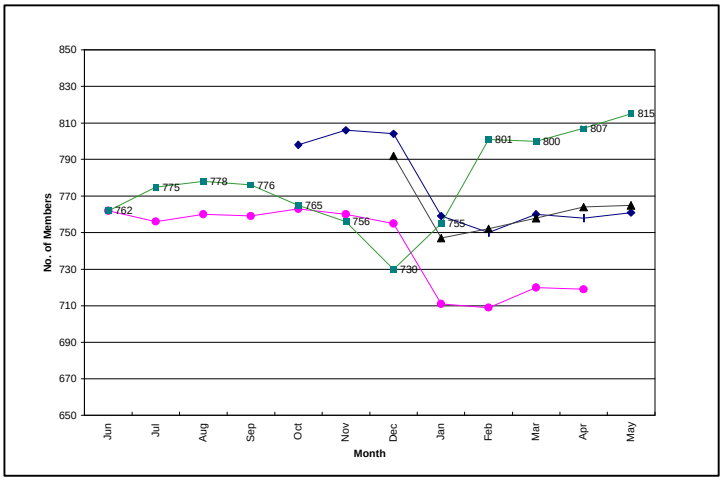
Automation and Robotics - Dr. Zafar Taqvi Committee Chair

Organized INNOVATIONS 2000 and Workshop on Automation and Robotics (WAR 2000). Gilruth Center JSC, May 24th. The WAR was held in the morning and Gerald R. White, C.E.O., GRTW Inc., Past President ICS is the keynote luncheon speaker. INNOVATIONS was held the second half of the day. This workshop was co-sponsored by the Instrument Society of America, Robotics and Expert Systems Division. AIAA has several excellent papers supporting this workshop.

Houston Membership at Record Level

By Darby Cooper, Membership Chair

The Houston Section Membership has reached a four year high! We now haveover 800 members for the first time since 1996! Please keep you membership current and continue to encourage your colleagues to join the leading aerospace professional society.



Calendar of Events

June 2000

TBD	Lunch and Learn
TBD	Telecon with Australian Section
6/1	Executive Council Meeting
6/2	Clear Lake City Technical Societies Annual Awards Banquet, Gilruth Center
6/7	Newsletter Inputs Due
6/15	Fellow and Honorary Fellow nominations due to National
6/22	Honor and Awards Banquet
6/30	Annual Report due to Regional and National
6/30	Award Forms due to Regional and National for Membership, Public Policy, Communication, Young Professionals, Career Enhancement, Newsletter
6/30	Budget and Audit Report due to Regional and National
6/30	Mailing Label Request Form due to Regional and National

July 2000

7/1	Award nominations due to National for: Aerospace Contribution, J. Leland Atwood, Haley Space Flight Award, Losey Atmospheric Sciences, Lawrence Sperry, National Faculty Advisor, Pendray Aerospace Literature, Space Processing, Space Science, Missile Systems, Systems Effectiveness & Safety, Speas Airport Award, Aerospace Communications
7/15	Fellow and Honorary Fellow References due to National
7/21-22	RAC meeting and Regional Leadership Conference, Las Vegas, Nevada

American Institute of Aeronautics and Astronautics

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as of 5/24/00

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713-977-7770 x1319, U. Ensco

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281-483-6904, USA

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281-538-6100 x20, NeoStar

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Joseph Mayer	281-336-5372, Boeing
Quin Shepperd	281-244-4953, Boeing
Phillip Puddy	281-326-1457

Conference Chairs

Student Paper Competition	Darby Cooper
Annual Technical Symposium	John Vollmer
Workshop on Automation and Robotics	Dr. Zafar Taqvi

Astrodynamics
Dr. Albert Jackson
281-483-5037, Lockheed

Automation & Robotics
Dr. Zafar Taqvi
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In-Space Imaging
Dr. Kamlesh Lulla
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May/June 2000
