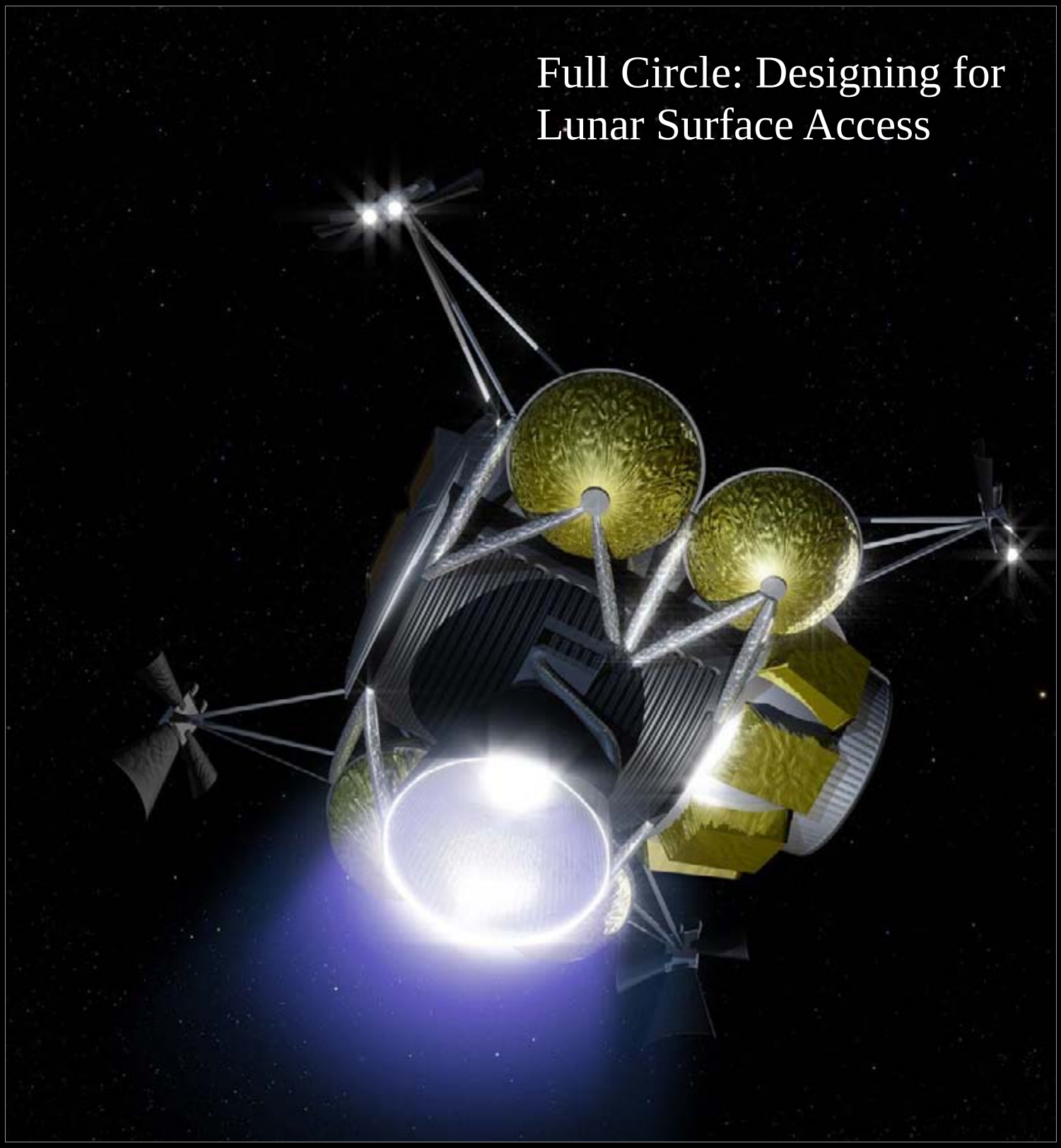
Horizons

Volume 31, Number 5 AIAA Houston Section www.aiaa-houston.org May / June 2006

Full Circle: Designing for Lunar Surface Access



AIAA HOUSTON

American Institute of Aeronautics and Astronautics

May/June 2006

Horizons is a bi-monthly publication of the Houston section of the American Institute of Aeronautics and Astronautics.

Jon S. Berndt
Editor

TABLE OF CONTENTS

Cover: LSAM ascent concept art, NASA/John Frassanito and Associates

Galveston Bay sunrise image at top by Cheryl Empey, Seabrook.

From the Editor

JON S. BERNDT

It might come as a surprise to read that there were flights of the Saturn V rising from the plains of North Dakota in the mid-70's. The ground crew consisted, typically, of a few kids ranging in age from 8 to 18. Launch preparations lasted just a few minutes, followed by a ten second countdown. Many readers will recount their own similar experiences with model rockets. The flights were short, reaching only a few hundred feet in altitude. But the effect was long duration.

For others, the sight and sound of an actual Saturn V launch, or the thrill of taking one's first demo ride in a private plane and taking the controls, or the excitement of seeing one's first airshow, was what planted a seed. Aviation and space travel have captivated young and old from their beginnings. Over a third of the top 20 grossing motion pictures of all time feature space-related themes, and over 700 episodes of Star Trek have been filmed. Some young people are moved at an early age to select engineering or science as a career choice. We've heard warnings over the years that not enough has been done to get more young people to consider pursuing engineering and science studies as they leave high school. The object, of course, is not to persuade them to choose any particular career path, but to show them what an engineer or scientist actually does, so they can make an informed decision. There are plenty of portrayals of law enforcement officers, lawyers, and doctors on television. Outside of "Scotty" and Lieutenant B'Elanna Torres (both from Star Trek), I can't think of any engineer characters portrayed in a series. Is there a better way?

I took my ten year old daughter, Kaia, to the recent Bring Our Children To Work day organized by JSC's Office of Education. There were some activities in the morning that helped to illustrate some interesting concepts for them. After that, I had the opportunity to show her one of the shuttle engineering simulators in action (one of the areas I have worked in), as it was being flown by some co-ops during a familiarization demo. She even got a turn to "fly the shuttle". The flight was short, but the impact will be long remembered.

We don't need to wait for a special day to show our children some of what we do. I know that some of my fellow engineers and scientists have spoken at local schools. I have visited my daughter's class and spoken to them about various aviation and space topics. It's always lots of fun, and very rewarding. Consider doing this for a local school - it's a win for everyone. Most companies are very supportive of this kind of activity, in a variety of ways.

We also need to ask if enough is being done once recent college graduates enter the engineering and science workforce. At the recent AIAA Awards Banquet, AIAA Associate Fellow and 43-year member, Chet Vaughan (who recently retired) was recognized for his service. In his comments, he emphasized the importance of mentoring younger employees. It's an important task to take up, and one that AIAA has taken an interest in with the E-Mentoring program. From the AIAA web site: "*The AIAA E-Mentoring Program is designed to provide AIAA Young Professionals (ages 35 and younger) with a chance to connect with more experienced industry professionals to get career advice, learn from another's experience, and learn about the industry from a different, more practiced perspective.*" You can learn more about the E-Mentoring program - including how to volunteer as an E-Mentor, or how to request one, at the AIAA web site:

http://www.aiaa.org/content.cfm?pageid=528&lmenu=1.

Some companies also provide a way for more experienced engineers to partner with a co-op as a mentor. Volunteers for such programs always express satisfaction at being able to serve in this way. In this issue we have three essays written by students, who share their excitement about their chosen field of study, and we learn something about why they chose aerospace as a career. Maybe, in reading these, we can remember a little bit about our own experiences, and draw from that some insight into how we might be better mentors to those around us who need it.

On a different topic, Horizons will now offer an "Employment Opportunities" section. We are still discussing the best way to implement this in Horizons. We are also discussing the implementation of a similar, but more responsive, capability at the AIAA-Houston web site. So, some aspects of this feature may change in the next couple of issues. For now, employers interested in posting employment opportunities should contact the editor at editor@aiaa-houston.org.

Many readers will recount their own similar experiences with model rockets. The flights were short, reaching only a few hundred feet in altitude. But the effect was long duration.

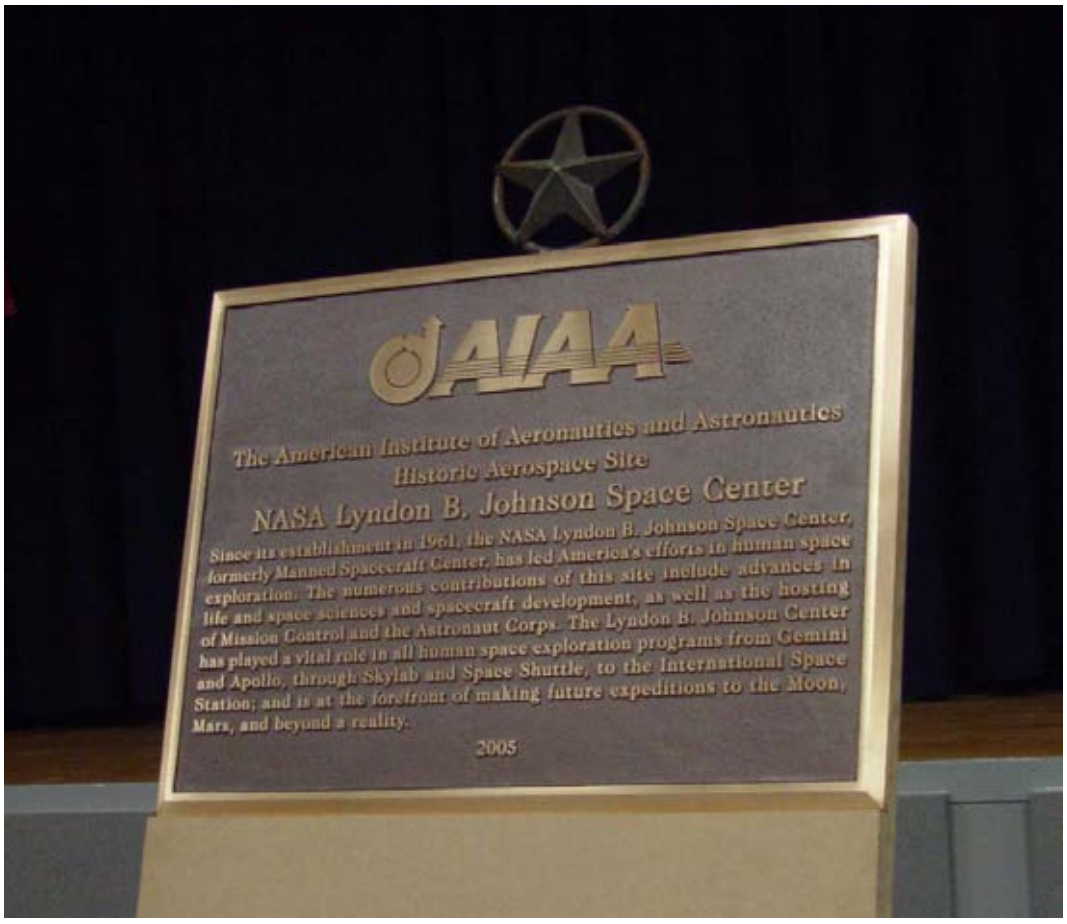
Chair's Corner

STEVE KING, AIAA HOUSTON CHAIR

As my term as Chair draws to a close, I would like to thank all that contributed to our success over this past year and allowed us to offer a diversity of events to serve the greater JSC community. These events ranged from a balsa glider workshop for kids, a National Engineers Week celebration, numerous lunch n' learn seminars, hosting this year's Student Paper Conference at Texas A&M University (whoop!), conducting yet another well received Annual Technical Symposium, seeing JSC dedicated as an AIAA Historic Aerospace Site (see below), to so much more. We continued our collaboration with several partner organizations and engaged others in holding joint events. Well attended dinner programs provided insightful presentations covering Apollo and Shuttle's past to visions of the future with Project Constellation. Our newsletter has truly become an online magazine and is receiving not only acclaim within the local community but also nationally.

Internally, the Houston Section infused some new blood into its leadership ranks, made progress with archiving its records/ property, continued to improve its communications means, and worked to ensure its financial stability. This was possible, through the most part, by the much appreciated time and energy given of my Executive Council members. It has been a lot of work for me personally, but it also has been a very rewarding experience. With the new term beginning July 1st, I am confident that it will be an even more successful one under the leadership of Dr. Jayant Ramakrishnan. He already has some outstanding events in planning, so stay tuned. I'll continue to serve the Section as an active Council member working special projects. Just remember that this is your organization as well, and your active participation is more than welcome in shaping it to better serve our aerospace community.

Let's continue the journey…



Full Circle: Designing for Lunar Surface Access

Feature Article

JOHN F. CONNOLLY, P.E., MEMBER, AIAA

Early Inspiration

On July 20, 1969, a fragile-looking 4-legged vehicle sat down upon a soft, unfamiliar surface. My little brother wasn't very happy with this – he was anticipating candles on his 3rd birthday cake, not the lunar module model I had constructed earlier that day. But that particular day was not just Kevin's 3rd birthday, it was also one of those days that would spark the fire within a budding young engineer.

There are events that each of us can identify as points that "started it all" for us – those times or places where we experienced some event that inspired us, that formed our interests and pointed the way toward our careers. Many of us grew up being fascinated watching airplanes or televised space missions, and channeled that interest into our hobbies, reading, education, and eventually, our profession. We saw not only the chance to participate in a bit of history and work in a field on the cutting edge of technology, but also to follow in the footsteps of giants.

Figure 1: July 20, 1969 in the Connolly household. From l to r, John, Saturn V, Kevin, Lunar Module (on cake)

One of those events in my life was watching Neil and Buzz walk on the moon on my parent's old black-and-white television from a distance that would likely be considered "unsafe." Luckily, my folks didn't mind that all they could see of this historical moment was the back of my head.

My other inspiration came from the toys of the time. Growing up with the space race showcased on TV, I was a moderate space junkie. Sputnik had flown a few years before I was born, and I was a toddler when Gagarin and Shepard rocketed into space. My first memories of space weren't the black-and-white broadcasts of Gemini flights, but of the plethora of space toys that filled the shelves in the mid 1960s. My parents fueled the fervor by supplying me with a G.I. Joe Mercury capsule and (my favorite) Major Matt Mason, "Mattel's Man in Space".

That alone could have set a child of the '60s on a path to the stars, but the other event that burned the wonder of astronautics into my psyche was the first time I paged through an Estes catalog. My older cousins always seemed to be on the cutting edge of kid-geek "coolness," with HAM radios, Heathkits, R/C airplanes and chemistry sets. But it was the ultimate thrill toy that took hold of me and has not let me go.

Consider the genius of the Estes rocket – a kit simple enough to be built by a 9-year-old, yet requiring a degree of patience and skill. Preparing for launch becomes your first introduction to launch "procedures" as you load your self-built rocket with a gunpowder engine, arm it with a nichrome wire igniter, and connected it to an electrical ignition system (complete with a safety key and "continuity check" lights). The adrenaline of anticipation builds. You count down, press the launch button , and then something amazing happens – fire shoots from the engine and the rocket disappears into the sky. If you're lucky, you get your rocket back, but it really didn't matter – you, a 9-year-old growing up in the space age, just built a rocket, loaded it with propellant, and then commanded it skyward on a tail of fire. And not only did my parent's not mind

(Continued on page 6)

American Institute of Aeronautics and Astronautics

(Continued from page 5)
this, they ENCOURAGED it! Truly, this was the coolest toy ever (and still is).

The Apollo program ended just as I was readying my Mars Snooper model rocket for launch. After three years of absorbing all things lunar, my 13-year-old brain was already making the transition to the Mars missions that many of us thought would logically follow the lunar voyages. It was unimaginable at the time that decades might pass before new boot prints would be pressed into a planetary body.

Walking in the Footsteps of Giants

Fast forward to NASA Headquarters in May 2005. Newly named NASA Administrator Mike Griffin has taken a look at the exploration program that he has inherited and sees some holes that need to be filled immediately. Specifically, Mike doesn't see an integrated plan for returning astronauts to the moon, including how a new system of boosters and space vehicles can first be used to take over the shuttle's capability to move crews and cargo to the International Space Station. He selects a small team of engineers, technologists, cost and risk analysts to answer four fundamental questions: What should the next human spacecraft look like, which launch vehicle family should we use to return to the moon and venture to Mars, what is the correct mission design for the return to the moon, and what technology investments are needed to make all this happen? This team was given 90 days to answer these questions and document the findings of their Exploration Systems Architecture Study (ESAS).

In many ways, these questions were the very same as those deliberated during the formative years of the space race. Von Braun, Houbolt, Seamans, Webb, Gilruth, and Faget were among the giants who wrestled with spacecraft and booster rocket design, lunar architecture and the programmatic challenges that shaped NASA's early existence. It struck the ESAS team that their first task should be to understand these early decisions – to figuratively walk the same paths of these men to understand how they shaped America's first steps on the moon, and to use this wisdom as the starting point for our deliberations.

We were privileged to have the combined wisdom of both pre- and post-Apollo NASA at our disposal. We had frequent contact with a team of Apollo "graybeards," including Apollo 16 Commander John Young, Apollo Flight Director Jay Greene, Apollo Launch Director Bob Sieck and former NASA Deputy Administrator Bob Seamans.

NASA has actively pursued human lunar and Mars mission designs since Apollo, with the attention to these activities approximating the political ebb and flow of re-introducing "exploration" back onto NASA's plate. One of the most complete return-to-the-moon studies in this series, 1992's "First Lunar Outpost" (FLO), was guided by then Associated Administrator for Exploration Mike Griffin. Now as NASA Administrator, Mike brought the past and present of NASA together.

So just as in 1962, a group of managers and engineers, again including Bob Seamans, was re-examining the mission mode question. For students of NASA history, the Apollo mission mode decision is the stuff of legend. It occurred to me that the mode our team converged upon was neither the Apollo mission mode nor the mode chosen by now Administrator Griffin during the 1992 FLO study. To add to the drama, Seamans handed me a copy of his book "Project Apollo: The Tough Decisions." Rather than an autograph, he circled the Lunar Orbit Rendezvous chapter heading with the annotation "This Works."

Left: John Houbolt explaining Lunar Orbit Rendezvous. Right: John Connolly converges on EOR-LOR dual rendezvous

Fortunately in the engineering world, data and analyses often rule the day and the return to the moon will not be via Apollo's Lunar Orbit Rendezvous, nor FLO's direct return, but rather by

(Continued on page 7)

(Continued from page 6)
a combination of EOR and LOR.

Our Time, Our Program, Our Vehicles

The folks who designed the Apollo mission were seriously smart. In addition to designing vehicles, missions, and entire disciplines of engineering that had never been before imagined, they got everything right. Today, the physics of returning to the moon are the same, and the technology has improved incrementally. This allows us some latitude for creative engineering designs that our Apollo forefathers did not enjoy.

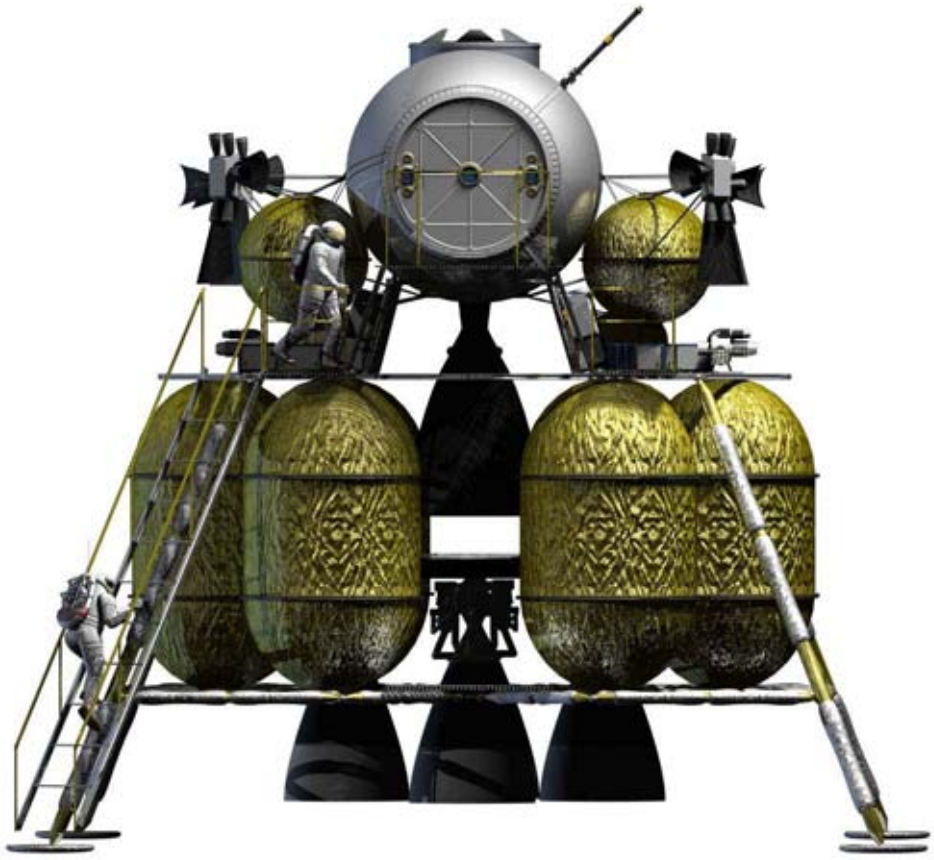
A fitting tribute to the Star Trek/ Star Wars world that many of us grew up in would have been to return to the moon in some vehicle resembling an X-wing fighter. Our technology has not yet reached that level of sophistication, but we do have the opportunity to investigate vehicles that combine new choices of propulsion, materials, avionics, energy storage, utilization of in-situ resources, reusability, and integration of cargo. A recent NASA in-house effort has spawned vehicle concepts with exotic names such as “Swing Hab,” “Crew Taxi,” “Descent-Assisted Split Habitat,” “Airlock Ascent” and “Habitank.”

One of the panel members reviewing these concepts is former NASA Lunar Module Project Manager Owen Morris. Others watching over the design of today’s lunar lander include Apollo 16 commander John Young and a team of former Grumman corporation veterans who built the original Lunar Modules. Their attitude is wistful of their past accomplishments and at the same time sharply focused on applying those past lessons on the future.

We’re fortunate to be the recipients of both the wisdom of the Apollo age and the technology of today. This combination opens up opportunities to explore mission and vehicle designs unattainable in the past. Just as our toys have grown up to become our profession, we have joined the footsteps of our Apollo forefathers and have begun to set our own prints on the road to the moon. And the cardboard lunar modules long ago landed atop birthday cakes stand ready to become the composite and titanium techno-wizardry that will next settle onto the dusty lunar regolith.

Above: Engineering Concept of the next lunar lander shortly after ascent stage ignition

Below: Crewmembers descend to the surface from the next generation lunar lander



Student Essay

Born to Fly

SATHYA SILVA, AEROSPACE ENGINEERING STUDENT, JUNIOR, GEORGIA TECH.

"Cessna 959 Golf Tango, cleared for takeoff runway 26." With those words, we climbed into the air, and my heart found a home. It was my first flying lesson on that cold November morning less than two years ago that solidified my decision to major in Aerospace Engineering at the Georgia Institute of Technology.

My interests in space root back to the third grade. Never in my life have I been as excited to wake up at 4 a.m. and trek halfway across Florida for a class trip. Kennedy Space Center made an immediate impression on me. I knew that I wanted to be part of such an endeavor that takes humans into space. I wanted to be one of those humans.

Throughout the rest of my schooling, the dreams of being an astronaut did not lull. Coming from a family of scientists, the curiosity in my personality was definitely prevalent. It amazed me in particular how man can defy gravity. This is what drove me to airports in my free time and ultimately to my studies at GA Tech.

The institute was appealing as an engineering school, but also as I soon learned as a haven for the aviation enthusiast. I had always wanted to get my pilot's license, but I thought that I would actually do so when I grew old and had money. The Yellow Jacket Flying Club caught my eye at freshman orientation, and since then I've become quite active in the club and a total aviation advocate (a.k.a. "Flying Nerd"). I made the bold decision to spend the $3,500 I had saved up in my 18 years of life on earning my Private Pilots License.

What I did not anticipate however, is the addiction that settles in. I earned my wings in October of 2005. It did not stop there. I came to Houston for a Co-op with JSC in January 2006 thinking I could survive for a few months without flying. After a week of work, the symptoms of withdrawal were setting in. I spent a week desperately looking for a flight school to satiate my need. I found one and earned my Instrument Rating that spring. Having learned that I cannot escape from flight, I hope to earn my Commercial License this summer and CFI by the end of the year.

I have learned an enormous amount by being a pilot. These lessons include not only the usual techniques of controlling the aircraft and preparing for emergencies, but there are also lessons of professionalism, attitude, and life itself. It teaches one to trust oneself. I've been through a few real emergencies including moderate/severe icing and loss of communications. The major contributing factor to handling these emergencies is having confidence yet understanding the level of criticality. Flying has made me stronger as an individual. It has also helped my studies. Actually working hands-on with the concepts of fluid dynamics and controls is one of the best ways to learn. As a junior in the AE program, I have already incorporated much of my experience as a pilot into understanding the material in my classes.

I am currently working the in summer of 2006 with the Systems Engineering Simulator at Johnson Space Center. My job includes operating the simulator in real-time and developing models for the next generation of flight simulation. I have also worked with the Shuttle/International Space Station resupply group, preparing microbiology kits that test the water and air in flight. In the summer of 2005, I traveled to Kennedy Space Center to participate in the Spaceflight and Life Sciences Training Program (SLSTP). There, I got to experience the buzzing excitement of KSC preparing for a launch. The natural high of working so close to astronauts and contributing to the mission is definitely a feeling to be matched. There is nothing that could beat the inspiration of launch time at KSC.

My ultimate goal is to fly to the moon someday. But in the mean time, I love working with the simulator and I also enjoy aircraft design. Hopefully, my engineering and piloting experience will get me a full time position working with the beauty that is the Space Shuttle before it is retired. As the buzz of NASA grows louder in the coming months, I am definitely excited to experience it all over again.

Why I am Seeking a Career in Aerospace

ALICIA BAKER, SENIOR, ELECTRICAL ENGINEERING, UNIVERSITY OF HOUSTON

Student Essay

Anyone who knows me knows that I'm a space nut and that I would not be happy working in any other industry! My name is Alicia Baker. I am a Senior Electrical Engineering student at the University of Houston (UH). I am specializing in Control Systems because of my love for robotics and my future interest in working with NASA in the robotic exploration of space.

As a young child, I remember watching video clips of male astronauts walking on the moon. I wanted to be the first female to walk on the moon! I found out that engineers helped design the spacecraft to get to the moon and that many of our astronauts are engineers, so I thought that engineering would be the field to get into. Ever since I first saw "Star Wars" as a child, I wanted to build my own R2-D2! I found out that studying Control Systems in Electrical Engineering would help me learn to build robots and spacecraft that would explore space and teach mankind about the universe.

I attended the High School for Engineering Professions (HSEP) at Booker T. Washington in Houston, Texas, so that I could start studying engineering in high school. The summer after my junior year in high school, I was accepted into NASA's Summer High School Apprenticeship Research Program (SHARP). I was so excited to be working at Johnson Space Center (JSC) as an engineering intern! That summer I worked in the Propulsion Division on translating a computer program from BASIC to FORTRAN for a proposed propulsion system for the future Space Station! The following summer I was fortunate to be accepted into NASA's Federal Junior Fellowship Program. I worked in the Safety Division on a project where I used R:BASE to create rules for data entry for a JSC hazardous materials database. It was always exciting to be onsite and to run into astronauts!

After graduating from high school, I began my undergraduate education at the Massachusetts Institute of Technology (MIT). The summer after my freshman year, I worked in the Flight Data Systems Division on creating a menu in C Programming Language for Space Station lab computers. The summer after my sophomore year, I also worked in Flight Data Systems on communication methods between Space Shuttle and Space Station computers using 68000 Assembly Language.

After a couple years at MIT, I transferred to the University of Houston so I could be closer to my family in Houston. As a part-time undergraduate student at UH, I am able to be actively involved with AIAA. I have been a student officer for many years, including Chair when UH received Outstanding Chapter in the Southwest! I help recruit aerospace speakers, organize aerospace tours, and make presentations to other students in order to promote aerospace. I helped out with First Robotics and Mars Rover Competitions for students during World Space Congress, an AIAA Student Paper Conference held at UH, and even appeared on NASA Connect TV-teaching children about the importance of using engineering skills to design space suits! I am also a member on the Houston Professional Chapter AIAA Guidance, Navigation, and Controls (GN&C) Committee.

I currently have another internship that allows me to work in the aerospace industry! I work for the NASA-funded Space Alliance Technology Outreach Program (SATOP)-run by the Bay Area Houston Economic Partnership (BAHEP). I'm learning project management skills while I help match inventors with NASA engineers. The engineers use their knowledge from working with the space program to help the inventors improve their inventions. I enjoy seeing how the space program can benefit everyone!
I recently returned from Washington D.C. on a trip with Citizens for Space Exploration-a volunteer group of citizens that support aerospace that is run by BAHEP. The mission of Citizens for Space Exploration is to promote the Vision for Space Exploration-the return to the Moon, the journey to Mars, and beyond. In order to achieve benefits from the human and robotic exploration of space, NASA's budget must be supported! So we talked with Congressmen/women about the importance of supporting our nation's space program.

I recently learned the joy of writing about some of my aerospace experiences. I attended an American Astronomical Society (AAS) Conference last year-where students presented recommendations on using the Space Station to test technologies that will lead to continued exploration to the Moon and Mars. I was fortunate to be published in Horizons and the AAS Space Times Magazine. I attended the NASA Project Management Conference this year. I wrote three articles from the student's perspective about presentations we heard about improving project management skills in the aerospace industry. Three articles of mine were published in their online magazine. So I was honored to be asked to contribute this article about why I'm seeking a career in aerospace!

I am making a career of supporting aerospace. I wouldn't be happy any other way! Once I graduate with my Bachelor's, I'll be ready for a full-time position (utilizing my hands on engineering and project management skills) and new adventures! I would like to continue my education by working towards a Ph.D. and one day even put in an application to the Astronaut Candidate program. I know only a special few are actually chosen but maybe I'll be able to at least build a robot that will be able to walk on the moon or other planets for me!

Student Essay

Fulfilling a Dream

AMANDA YOUNG, AEROSPACE ENGINEERING AND BUSINESS, UT

My name is Amanda Young, future astronaut hopeful. I am an undergraduate senior at the University of Texas studying Aerospace Engineering and Business Foundations. I grew up in Oak Ridge, TN and moved to the great state of Texas right before I started high school. I didn't know I would end up at NASA, but I knew I was going to try.

I did not initially dream of becoming an engineer, I wanted to be a fighter pilot. I was at an air show with my grandpa when I saw the Blue Angels soar for the first time. At that moment, I was convinced that would be me some day. I had always loved flying and my family already had its history of pilots; my mom's dad was a naval aviator, and my dad's dad was a pilot in the Air Force. I had it in me to fly.

A few months later I went to space camp. That put the icing on the cake. My life plan now was to become a naval aviator, eventually an astronaut, and spend my later years doing air shows as an Angel. I won't forget my parents telling me I had my whole life ahead of me to decide these things and my opinions and dreams would most likely change…. well, they were right because the next year I had to get glasses and thus I needed a new plan. But one thing was certain; I was going to get to space.

In middle school my dad created and fueled my interest in rockets. We built a few small models together and would shoot them off in a barren field over by where he worked. I was so fascinated that I built something that could fly. I didn't think I had it in me. This geared me toward a heavily based math and science curriculum in high school and an astronomy hobby on the side.

When it came time to apply for college, deciding a major was easy: Aerospace Engineer = Rocket Scientist/Astronaut. My mind was made up before I filled out any kind of questionnaire about what major suited me best. Being a pilot may have come and gone, but now I was shooting for the stars, literally. I learned I could still get there as a mission or payload specialist and engineering was a surefire way to get me to space.

Fall 2002 was the beginning of my career as a UT Longhorn. College at first was incredibly intimidating; I was always lost on the vastness of campus, classes were composed of 100+ students, and grades were only based on two tests. Even though freshmen year was a challenge of my adaptation skills, I loved it! The curriculum left me intrigued and craving more.

Come sophomore year, there was a fellow student, teacher, or staff member telling me that an internship/coop is "not required but highly advised." Therefore I was attending almost every workshop about resume building and interviewing I could fit into my schedule. I wanted to work at Johnson Space Center, but I thought it was too far of a reach for me. I still went through the process of applying with the Engineering Career Assistance Center and submitting my information to the resume database for recruiters. Somehow, and very unexpectedly, my resume was picked from the lot by a recruiter from United Space Alliance. After a brief phone interview, and five onsite interviews, I chose to start my coop adventure in Flight Systems.

I was overwhelmed. I was now working at JSC. My dreams were slowly becoming a reality. I had a step-goal to get here, but I didn't think it would be this soon. My first tour was a sampling of In-Flight Maintenance for the orbiter (IFM), Mechanical Systems for shuttle (MMACS), and the ISS maintenance group (OSO). I was like a kid in a candy store, in absolute awe.

My second tour I worked solely in MMACS, working on the Mech II operator position and learning all the ins and outs of the shuttle. I was amazed how intricate and complex the vehicle truly is: how time dependent certain functions are; the redundancy of systems and controls; and the auxiliary power units alone amazed me. It was also the first time I got to see a flight from mission control (MCC). Not just any flight, however, but the STS-114 Return to Flight mission. Those days in the MCC really solidify my want to become an astronaut.

This summer is my last tour with USA and I will be continuing my work from this past spring with the Booster Systems group. My focus is the Main Propulsion System (MPS) operator training flow. The MPS operator monitors the Solid Rocket Boosters, External Tank, and MPS (consisting of helium tanks and lines, liquid oxygen feed lines and liquid hydrogen feed lines) during prelaunch, launch and entry operations. Various MPS parameters (temperatures, pressures, valves, etc.) are monitored to determine system performance and condition. The MPS operator reports the system status (both nominal and off-nominal) to the Booster operator, who then relays the status to the Flight Director. I thoroughly enjoy working in this group and hope to gain an extensive understanding of the Main Propulsion System and the job of a Shuttle flight controller.

I have one more year until I receive my degree from UT. After graduation and taking a few months to tour Europe (if the job market will allow), I want to work in the space exploration industry, preferably with USA or NASA. I will pursue a MS degree, but I plan to wait three to five years to either accumulate some money to financially support myself or get company backing for graduate school. I also have the ambition to attain a doctorate degree, but that idea is still processing.

Co-oping at JSC has helped me plan my future and realize that I can never aim too high. The road might be long, bumpy, and have a few construction hold-ups here and there, but the end is well worth the journey.

2006 Annual Technical Symposium

Summary Report

TIM PROPP, VICE-CHAIR, TECHNICAL

The 2006 AIAA Houston Section Annual Technical Symposium (ATS) was held on Friday, May 19th at the JSC Gilruth Center. This all-day event was open to NASA civil servants, NASA contractors, industry, and academia. This year's theme was Human & Robotic Space Exploration: Past, Present, and Future. In all, 151 people attended the symposium throughout the day, representing over 20 different NASA and contractor organizations. Corporate sponsors for this year's symposium were: Platinum Level – EADS Astrium North America and MEI Technologies; Silver Level – Atec, Inc. SATOP and Atec, Inc. both provided exhibit booths at the symposium.

Attendees enjoyed thirty-five presentations on a variety of subjects. Some presentations were made to standing room only crowds. The event began at 7:45 a.m. with registration. A minimal fee of $5 was charged for presenters and $10 for all others who participated in the symposium.

Mark Geyer, Deputy Manager of the Constellation Program, kicked off the symposium at 8:15 a.m. Mr. Geyer reviewed the objectives of the Constellation Program, discussed program milestones and overviews of the CEV, CLV, and supporting architecture studies.

The morning sessions began promptly at 9:00 a.m. and consisted of the following topics: Shuttle Retirement (1 session), Software Tools (2 sessions), Lunar Reconnaissance Orbiter (1 session), Space Operations (1 session), Aeroscience and Flight Mechanics (1 session), and Aerospace Technology (3 sessions).

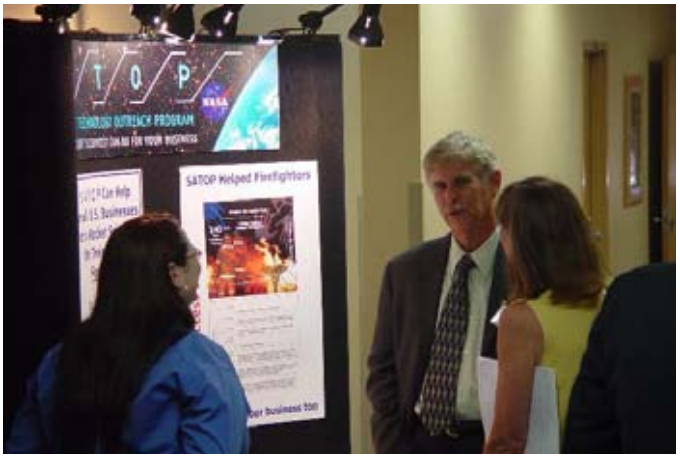
Lunch was served at noon in the Gilruth Alamo Ballroom, and was followed by a keynote speech by Dr. Mike Zolensky, Co-Investigator on the Stardust Program. Dr. Zolensky discussed the Stardust mission and recent findings from the aerogel collectors that have been removed from Stardust spacecraft. Following Dr. Zolensky's presentation, drawings were held for the Atec, Inc. Shuttle model and two AIAA Houston section door prizes. The winners were Eddie Paddock/NASA (Atec Shuttle model), and R. Leroy McHenry/Boeing and Dr. Kumar Krishen/NASA (AIAA door prizes). Congratulations gentlemen!

The afternoon sessions began at 1:30 p.m and ended at 4:30 p.m. Afternoon topics included: Space Operations (1 session), Lunar Missions (3 sessions), Special Topics (2 sessions), and Aerospace Technology (3 sessions).

The symposium was organized by the ATS Planning Committee: Tim Propp (General Chair), Douglas Yazell (Operations Chair), Norm Chaffee (NASA Interface), Gary Cowan & Amy Efting (Webmasters), and Ellen Gillespie. The planning committee wishes to thank all those who contributed to the success of the 2006 ATS, particularly the JSC Center Director's Office, the JSC Print Shop and Graphics teams, the two keynote speakers, 18 session chairs, 35 speakers, AIAA volunteers, Boeing Creative Services (for the ATS 2006 Logo) and Houston Desktop Systems, and finally our three corporate sponsors.

A copy of the 2006 ATS program can be found online at http://www.aiaa-houston.org/ats2006. Presentations from authors/speakers who have agreed to post their materials on our local website will be available in mid to late July.

Paul March presents "Mach-Lorentz Thrusters" at an Aerospace Technology session.



Bob Payne and Alicia Baker discuss the Space Alliance Technology Outreach Program with an ATS attendee.

Chau Phan presents "Performance Evaluation of a UWB-RFID System for Potential Space Applications" at an Aerospace Technology session.

Registration Opens for AIAA GNC Conference

Registration is now open for the **AIAA Guidance, Navigation, and Control (GN&C) Conference.** This conference provides a forum for the latest developments in GN&C Technology, with a unique focus on theory and applications in aeronautics and astronautics.

AIAA Guidance, Navigation, and Control
AIAA Modeling and Simulation Technologies
AIAA Atmospheric Flight Mechanics
AIAA/AAS Astrodynamics Specialist
21-24 August 2006
Keystone Resort & Conference Center
Keystone, CO

This year's GN&C technical program includes many sessions in the areas of control theory analysis and design, GN&C concepts in air traffic control systems, and multi-vehicle control. Other technical areas addressed in this year's conference include spacecraft GN&C; autonomous and unmanned systems; aircraft GN&C; guidance, navigation, and tracking theory and analysis; missile GN&C; guidance and control of hypersonic and reusable space launch vehicles; multidisciplinary control; multisensor data fusion, tracking, and control; intelligent control in aerospace applications; and general aviation and small aircraft transportation GN&C.

In the AFM conference, presentations will cover the topics of aircraft dynamics, unsteady and high angle-of-attack aerodynamics, flying qualities, system identification, aerospace vehicle flight testing, projectile and missile dynamics, unmanned aerospace vehicles, reusable launch vehicles, and reentry and aeroassist vehicles.

As simulation uses continue to expand, it is important to establish standards for data interchange, simulation tools, and levels of simulation fidelity for training. Substantial research continues into the optimization of the human/machine interface and technologies that better present the visual and vestibular cues to a pilot or operator. As the aerospace industry continues its research into uninhabited vehicles, new problems are posed which modeling and simulation is best suited to answer. A continued effort is being made to reduce the cost of high-fidelity simulation through the use of low-cost components such as personal computers and commercial-off-the-shelf visual systems. The increasing use of commercial-off-the-shelf simulation tools will also be discussed.

For more information, see:

http://www.aiaa.org/content.cfm?pageid=230&lumeetingid=1305

"The life scientists needed to do cutting edge research in 2015 are in high school today. How likely are they to choose career paths that would take them to NASA in light of recent decisions to minimize that field of work? A related aspect is that the university community that is the source of NASA's future workforce is already showing signs of steering their best students to other career paths because NASA commitments appear to be uncertain or unstable."

David C. Black, PhD.
Statement at the Subcommittee on Space and Aeronautics Hearing,
"The NASA Workforce …"
13 June 2006

Staying Informed

COMPILED BY THE EDITOR

This column points out useful web sites, documents, policy papers, periodicals, etc.

Engineering Workforce Commission
http://ewc-online.org

Workshop Presentations: Managing Your Career in the 21st Century
http://www.aiaa.org/content.cfm?pageid=354

Decadal Survey of Civil Aeronautics: Foundation for the Future
http://www.nap.edu/catalog/11664.html

The NASA Workforce: Does NASA Have the Right Strategy and Policies to Retain and Build the Workforce It Will Need? Testimony (June 13, 2006):
David C. Black, Ph.D. - http://www7.nationalacademies.org/ocga/testimony/NASA_Workforce.asp
John W. Douglass - http://www.aia-aerospace.org/aianews/speeches/2006/statement_douglass_061306.pdf
See also, NASA Office of Legislative Affairs: http://legislative.nasa.gov/hearings/index.html

"One Step Back, One Giant Leap Forward", John Connolly, P.E., *Mechanical Engineering Magazine*
http://www.memagazine.org/contents/current/features/onestep/onestep.html

"Son Of Apollo", Tony Reichhardt, *Air & Space (Smithsonian) Magazine*
http://www.airandspacemagazine.com/ASM/Mag/Index/2006/AM/soap.html

2006 Commercial Space Transportation Forecasts
http://ast.faa.gov/pdf/rep_study/2006_Combined_Forecast_Report_final_printable.pdf

New Members

ELIZABETH BLOME, MEMBERSHIP

We had a great month! If you see one of the folks at the next section event, please make them feel welcome.

James Boyd
Benjamin Doeckel
Franklin Drummand
Brent Evernden
Maksud Ismailov
Liang Li
Sofia Martinez Vilarino
Mark Messinger
James Meyer
Dustin Ochoa
Ozden Ochoa
Zoubeida Ounaies
Steve Perkins
Joseph Rogers
William Schneider
Niraj Shah
Victor Shum
Benjamin Spratling
Devin Stancliffe
Cataline Stern
Shashishekara Talya
Piyush Thakre
Hui Yam

Important notes:

- *Not a member? See the end page.*

Looking for Lost Members

ELIZABETH BLOME, MEMBERSHIP

We do not have current contact information for the following members, which means that either their email or mail addresses are no longer valid. If you know where they are, please either ask them to update their information on www.aiaa.org or send their new information to elizabeth.c.blome@nasa.gov.

Nick Baker
Sarah Bibeau
Jeff Cheek
Yuanyuan Ding

Help AIAA Help You - Update Your Membership Records

ELIZABETH BLOME, MEMBERSHIP

It is often said that the aerospace industry is the only place where you can have the same job for five years and work for five different companies. That is especially true given the industry wide consolidation that has happened in the last few years. As companies have changed so have the building signs and the business cards. Additionally, our environment provides most people with the ability to move from one company to another as we try to expand our occupational horizons.
With all of these potential changes have you verified if your AIAA member record is up to date? Knowing where our members are working is vital to the Houston Section in obtaining corporate support for local AIAA activities (such as our monthly dinner meeting, workshops, etc.). Please take a few minutes and visit the AIAA website at http://www.aiaa.org/ to update your member information or call customer service at 1-800-NEW-AIAA (639-2422). Feel free to also contact me at 281-244-7121 or by email at elizabeth.c.blome@nasa.gov.

Specials for AIAA Members

Aviation Week & Space Technology is the world's leading weekly magazine for aviation and aerospace professionals. Every issue provides an authoritative, in-depth source of industry news and analysis in the three major sectors: military, commercial and space. Each week you'll receive the technology, business and operations information that industry leaders require to stay informed.

As a subscriber you'll receive special issues such as the Aerospace Source Book, Paris/Farnborough Show Issues and the Photo Issue.

Plus, you gain FREE access to AWST Online, our subscriber-only web site that offers full search and query functions to the current issue and a three-month archive.

New subscribers: Special offer for AIAA Members (US, Canada, Mexico) $54 for one year (51 issues) (Regular Rate: $98)

Renewals: Special offer for AIAA Members (US, Canada, Mexico) $69 for one year (51 issues) (Regular Rate: $98)

To order see:
https://a1.ecom01.com/aweek/665f69643d312c70636f64653d6e6f6e652e617773745f3132385f30352c70723d34415735424e4149/FM.cgi?s_id=126

Local Industry News and Announcements

ANDREWS SPACE OPENS HOUSTON OFFICE TO SERVE NASA

SEATTLE, Wash., — June 27, 2006 Andrews Space, Inc. (Andrews) announced the opening of an office in Houston, TX near the NASA Johnson Space Center at 17625 El Camino Real, Suite 410. Marian Joh, Andrews CEO, said "Our Houston office will allow us to better serve NASA and our other customers with a local presence and direct interaction." Joh is also pleased to announce that Tom Short, who is the President of Anadarko Industries, has agreed to be a Consultant and Senior Advisor for Andrews. Short has worked on NASA programs for over 35 years and he will assist Andrews with their liaison activities with NASA and other customers in the Houston aerospace community. "We are excited about opening an office near NASA JSC and working with Tom Short. His experience and successful track record with NASA and the JSC community is invaluable," said Jason Andrews, President.

Andrews is a finalist for NASA's Commercial Orbital Transportation Services (COTS) program and plans to establish a major Management, Technical and Support organization in Houston when awarded a contract. Andrews also recently signed a contract with Boeing in Houston to provide systems engineering services in support of its NASA Project Constellation efforts.
[Source: Andrews Press Release]

SPACEHAB SUBSIDIARY OBTAINS NEW PAYLOAD PROCESSING CONTRACT

Astrotech Unveils Latest Award-Winning Spacecraft Processing Capability

Houston, Texas, May 24, 2006 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, announced today that its Astrotech Space Operations subsidiary has been awarded a new contract by The Boeing Company to provide payload processing services. The satellite will be processed at Astrotech's spacecraft processing campus at Vandenberg Air Force Base in California.

"We are pleased to be supporting a new mission for Boeing, a valued customer that has received benefit from our growing list of capabilities and services over the years," stated Jim Royston, Senior Vice President of Astrotech. "We look forward to assisting the entire team in their spacecraft processing, fueling, encapsulation, and logistics needs."

In related satellite processing news, Astrotech's Florida Spacecraft Processing Facility held a ribbon cutting ceremony to unveil its new horizontal laminar flow system. This ultra clean room capability provides customers a satellite processing environment that exceeds the most stringent contamination requirements. NASA presented Astrotech with an award, recognizing the Company for its professionalism and customer service in designing, developing, and certifying the world-class clean facility.

The new cleanroom system, suitable for wafer and chip processing, was recently put to the test when wildfires broke out in the surrounding area causing interstate and roadway closures. Astrotech's system was able to withstand the excessive smoke, maintain appropriate particulate count levels, and keep the processing of NASA's STEREO satellite on schedule. STEREO, an observatory designed to provide a unique and revolutionary view of the sun-earth system, arrived at the Astrotech site on May 5 and is schedule to launch this summer.
[Source: SPACEHAB]

ROYSTON NAMED SENIOR VICE PRESIDENT OF SPACEHAB SUBSIDIARY

Titusville, Florida, May 16, 2006 – SPACEHAB, Incorporated (NASDAQ: SPAB), a leading provider of commercial space services, announced today the appointment of James D. Royston to Senior Vice President and General Manager of the Company's Astrotech Space Operations subsidiary.

"Under Jim's keen leadership as Vice President over the last several years, we have seen Astrotech expand its service offerings, enhance its facility capabilities, and enlarge its business base," said Michael E. Kearney, SPACEHAB President and Chief Executive Officer, in announcing the promotion. "His experience in civil, military, and commercial space initiatives as well as his business acumen have been, and will continue to be, valuable to our organization."

In this expanded role Royston will coordinate and oversee planning, operation, and growth of the Company's spacecraft processing and facility services activities. Starting at the beginning of the fiscal year, he began implementation of a new growth strategy to increase overall satellite services capabilities to both commercial and government customers. Royston, 42, joined SPACEHAB in 2002 and has led ground operations at Astrotech's Florida and California locations.

Astrotech is the leading commercial provider of satellite launch processing services in the United States. With operating locations at all major U.S. launch locations, Astrotech accommodates a wide range of customer payloads as well as the payload fairings and payload adapter assemblies of the launch service providers. This approach allows for maximum flexibility in the processing of parallel missions and accommodating schedule changes. This SPACEHAB business unit's goal is to make its facilities a seamless extension of the customer's factory environment. In its twenty two-year history, Astrotech has supported the processing of more than 230 spacecraft without a single impact to a customer's mission launch schedule.
[Source: SPACEHAB]

Employment Opportunities

ESC GROUP SEEKS ENGINEERS

The Engineering and Sciences Contract Group (ESCG) at the NASA Johnson Space Center in Houston is currently interviewing for a number of open positions:

Analytical Chemist
Ascent GN&C Engineer
Chemical Process Simulation Engineer
Communication Engineer
Electromagnetic Compatibility Analyst
Engineering Assistant
Entry GN&C Engineer
Facility/Test Mechanical Engineer
ISS CHeCS Console Operator
ISS CHeCs EHS Sys Mgt Rep
ISS Computer Resources & Network Lead
Mechanical Engineer
Mechanical Project Engineer
Mechanical Project Engineer, Sr.
Project Engineer
Re-entry Aerothermal Analyst
Re-entry CFD Engineer
Resupply & Logistics Project Engineer Eng.
Robotic Operations Analyst
Structural Aerospace Engineer
System Safety Engineer
Systems Engineer (SW Analyst)
Test Engineer
Thermal Analyst

We are also looking for Materials and Processes Engineers, and Fracture Mechanics Engineers.

To apply for any of the positions listed above, or to obtain more information, please visit the ESCG Careers web site at: www.jacobs.com under the heading: "Careers", location "Houston (ESCG)". Equal Opportunity Employer M/F/H/V

LOCKHEED MARTIN PREPARES FOR POTENTIAL CEV CONTRACT AWARD

In anticipation of a contract award in support of the NASA Crew Exploration Vehicle (CEV) program in Houston , Lockheed Martin is seeking experienced professionals in the following areas:

Hardware Engineering
Integration & Test
Engineering Analysis
Safety & Mission Assurance
Information Systems
Modeling & Simulation
Systems Engineering
Program Planning
Risk Management

E-mail:

lmcads.jobs@lmco.com
(AD-HOUSTON must be in the subject line).

To apply online, visit the web site at:

www.lockheedmartin.com/careers

An equal opportunity employer.

EMPLOYERS:

Horizons now publishes job opportunities for local positions. Submissions should be less than 175 words, and must be approved by your company's Human Resources department (a contact to your HR should be provided). Submissions are only accepted electronically at this time. Please send submissions to: editor@aiaa-houston.org

Opportunity Closeup

Ascent GN&C Engineer Job Number: 018565, ENGINEERING AND SCIENCES CONTRACT GROUP (ESCG)

Job Requirements: Minimum of a BS in Aerospace Engineering and 5 years of directly applicable experience, MS degree preferred. Previous experience with Space Shuttle ascent/abort integrated Guidance, Navigation, and Control (GN&C) systems, knowledge of Shuttle ascent/abort mission design, flight procedures and ground rules. Experience developing real-time math models using the FORTRAN and C programming languages, and performing configuration control using the IBM ClearCase configuration management tool. Experience with batch, real-time, and Monte Carlo engineering analysis. Excellent communication skills and the ability to work in a team environment.
Job Responsibilities: Provide analysis of the integrated Guidance, Navigation, and Control (IGN&C) ascent/abort trajectory performance for the Space Shuttle and other advanced aerospace vehicles including the Crew Exploration Vehicle (CEV). Perform batch, real-time, and Monte Carlo analysis using 6-DOF spacecraft simulations to determine flight performance under various operating conditions. Provide maintenance and development of analysis tools including the real-time Ascent/Entry Shuttle Engineering Simulator (SES), the C-based SES-III batch simulation, and the Flexible Airframe Response (FAR) frequency domain analysis program. Interaction with the NASA customer along with other NASA support contractors is required. Perform other duties as required. To apply for this Houston ESCG position, please visit the ESCG Careers web site at: www.jacobs.com.

CALENDAR

Dates, events, and times are subject to change. See the AIAA Houston web site for more information at: www.aiaa-houston.org

July

13-14 Region Leadership Conference (Sacramento, CA)
TBD Executive Council Meeting (ARES Corp.)

August

All "August is for Aerospace Congressional Home District Blitz" (Houston specific events to be announced)

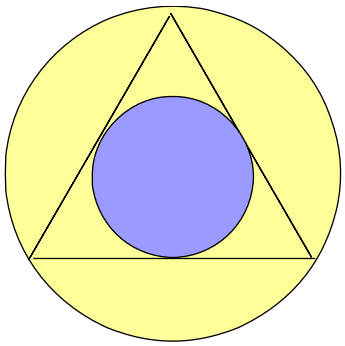
TBD Region Leadership Conference (Sacramento, CA)
TBD Executive Council Retreat

Contact chair@aiaa-houston.org or events@aiaa-houston.org for further details.

Cranium Cruncher

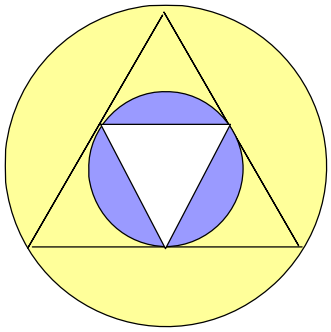
BILL MILLER, SENIOR MEMBER, NORM CHAFFEE

Previous Issue Puzzle
Bill Miller, Senior Member



Last month's geometry puzzle is from Martin Gardner's Science Fiction Puzzle Tales (1981). It's problem #23.

The problem was to find the ratio between the areas of the two circles, given that the triangle is equilateral. Gardner's solution is to inscribe a smaller triangle in the inner circle as shown below. "By inspection" you can see that the smaller triangle has one quarter the area of the larger triangle. Since the large circle and the small circle are in proportion, the small circle's area is also one quarter that of the larger one.



Correct solutions were received from

Glenn Jenkinson
Frank Baiamonte
Ronny Newman
Brian Schoonmaker

All had creative and different solutions.

Thanks to all who sent in solutions to this and my earlier columns. Due to a number of conflicting priorities I must stop writing this column for the summer at least. I have enjoyed the interaction with the membership resulting from these puzzles.

Current Issue Puzzle
Norm Chaffee

A group of AIAA members is relaxing after work in a local watering hole, and after a couple of beverages each, they decide to play a game of darts. The proprietor offers them a special dart board and challenge:

The circular board has three equally sized angular sectors - one with a point value of 1; one with a point value of 4; and the third with a point value of 7. Each player has the opportunity to throw three darts. They win a prize if all three darts hit the board and the total score of the three darts forms a prime number. What chance does a player have of winning if the darts are thrown at random and all three darts hit the board? How many different scores are possible?

Email your answers to Norm Chaffee at: norman.h.chaffee@nasa.gov

Odds and Ends

SPECIAL EVENTS, PICTORIALS, ETC.

Marine Ground Crew Finds F-100 'SuperSabre' Had An Unbelievable Starting Option

[*Source unknown*]

The F-100 SuperSabre had a large chamber to accept a large gas-generating cartridge. When ignited by electrical current, the expanding gas from the black powder-like pyrotechnic cartridge drove a starter turbine which brought the engine up to a self-sustaining RPM via a drive system.

This eliminated the need for heavy and bulky ground starting units, but the starter cartridge spewed out a characteristic dense cloud of choking black smoke, which was often mistaken by inexperienced ground crews for an engine fire.

The powder charge for the ground start came in a big sealed can, and upon opening and extracting the cartridge, you'd find two small metal tabs on the bottom of the cartridge. These tabs were the electrical contact that fired the cartridge when the pilot moved the throttle outboard on start, before bringing the throttle forward. As soon as a tiny RPM registered on the tach, you brought the throttle around the horn to feed fuel and engine ignition to the rapidly-building engine speed.

Sometimes the big metal receptacle that held the gas generator cartridge would get so dirty from repeated use that the metal tabs wouldn't make contact. Then the cartridge would refuse to fire, and the crewchief would give the starter receptacle a good healthy whack with a wooden wheel chock, usually curing the powder charge of any reluctance to detonate. We'd often take a can containing a starter cartridge along with us as an alternative starting means on cross-country.

Then- USAF Captain John Green flew his F-100 one day into the Marine Corps Air Station (aka NAS Millington) outside of Memphis one day, back in the early '70s, for fuel. He was met by a couple of young Marine ground crewmen, who asked what kind of plane he was flying. F-100 'Supersabre' only got him further puzzled looks. One of the ground crew said, " Sir, I don't think we have tech data on this bird. What do you need for start . . a huffer . . or just electrical"?

"Neither one," John replied with his tongue in his cheek. "If I can get, oh, about six of you guys to give me a push to start me rolling, I'll just 'pop the clutch' and get the engine started that way."

More and more doubtful looks, but, "Uhhh,Yessir," was the final comeback. What else would a young Marine say ?

The 'Hun' was pretty finely balanced aircraft on the two main gear struts, so when you tapped the toe brakes, the nose strut compressed so much that the nose would dip, just like the hood of cars used to dip when being clutch-started after a similar push from young friends.

So, now six Marines are standing at the ready, still doubtful, but not about to question an officer on 'procedure.'" Just get me going at about a fast walk," John called down from the cockpit. " I'll wave you all clear when we're fast enough, pop the clutch on this baby, and be on my way. And thanks for the good turnaround! "

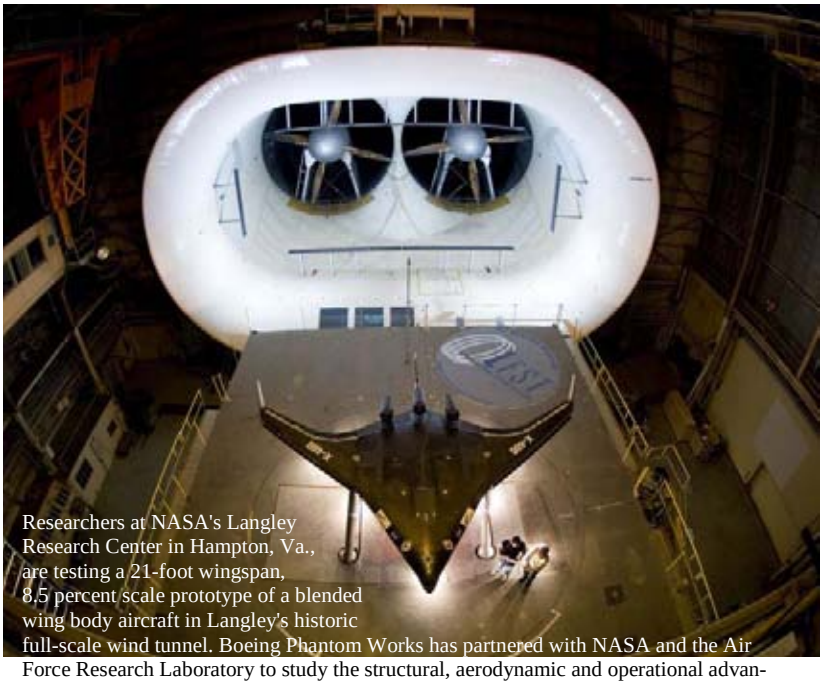
With six Marines pushing, they quickly get the bird up to a brisk-stepping speed. John waves his arms, and the Marines warily stand well clear.

The nose dips as John "pops the clutch." There is a huge cloud of choking black smoke as the starter cartridge goes off, the Hun's engine whines into life, and off goes Captain Green to the end of the runway, leaving six puzzled Marines in his wake.

Yet Another SuperSabre Story

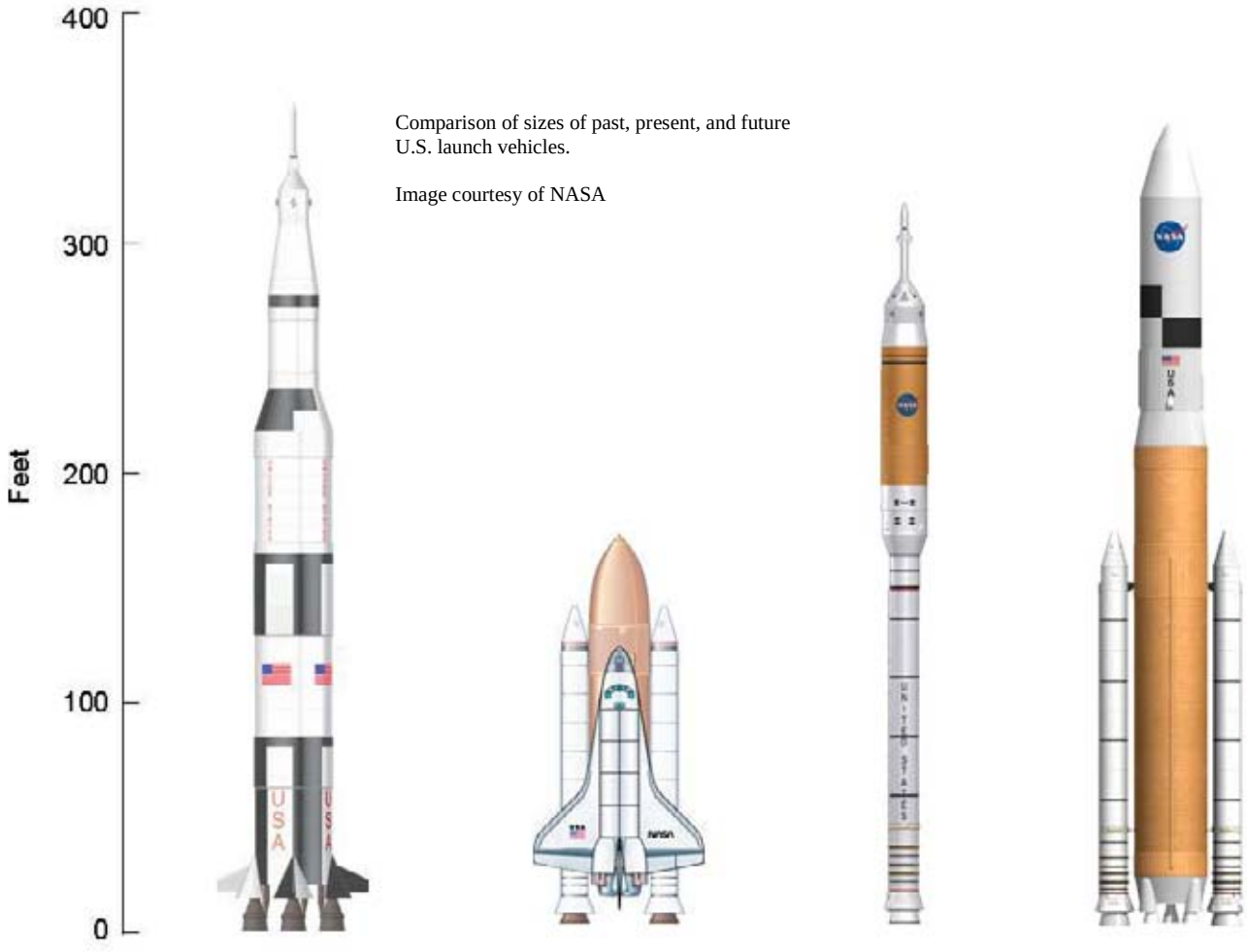
On the first NACA research flight of airplane #52-5778, pilot Scott Crossfield had to make a powerless "deadstick" landing following an engine fire warning. This was something North American's own test pilots doubted could be done, for the early F-100 lacked flaps and landed "hot as hell." Crossfield followed up the flawless approach and landing by coasting off the lakebed, up the ramp, and then through the front door of the NACA hangar, frantically trying to stop the F-100A, which had used up its emergency brake power. Crossfield missed the NACA X fleet, but crunched the nose of the aircraft through the hangar's side wall. It is reported that Chuck Yeager then proclaimed that while the sonic wall had been his, the hangar wall was Crossfield's! The hangar wall and the F-100A were repaired, and the airplane flew again.

[Image and text courtesy of NASA Dryden, http://www.dfrc.nasa.gov/Gallery/Photo/]



Researchers at NASA's Langley Research Center in Hampton, Va., are testing a 21-foot wingspan, 8.5 percent scale prototype of a blended wing body aircraft in Langley's historic full-scale wind tunnel. Boeing Phantom Works has partnered with NASA and the Air Force Research Laboratory to study the structural, aerodynamic and operational advantages of the advanced aircraft concept, a cross between a conventional plane and a flying wing design. The Air Force has designated the prototype the X-48B based on its interest in the design's potential as a multi-role, long-range, high-capacity military transport aircraft. [Image and text courtesy of NASA Dryden Flight Research Center]

You can build a model of the LSAM from instructions at this web site:
http://jleslie48.com/gallery_models_real.html
There are also model plans for a Saturn V, CLV, Delta IV Heavy, Atlas V, and many other spacecraft and rockets.



Comparison of sizes of past, present, and future U.S. launch vehicles.

Image courtesy of NASA

Upcoming Conference Presentations by Houston Section Members

COMPILED BY THE EDITOR FROM AIAA AGENDAS

Information here is taken from preliminary AIAA conference agendas. As such, it is subject to change.

SpaceOps 2006
19 - 23 Jun 2006, Grand Hotel Parco dei Principi, Rome, Italy

A Discussion on the Making of an EVA: What it Really Takes to Walk in Space
E. Bell, United Space Alliance, Houston, TX; D. Coan, Barrios Technology, Houston, TX; D. Oswald, United Space Alliance, Houston, TX

Extravehicular Activity (EVA) Operations as a System Design Driver
G. Miller and E. Rubio, United Space Alliance, Houston, TX

Progressive Autonomy for Optimized Mission Design and Operations
C. Kurt, United Space Alliance, Houston, TX

What Scale Measures Success - How to Quantitatively Determine Space Flight Operations Success
Z. Ney and C. Looper, United Space Alliance, Friendswood, TX

Moving Towards a Common Ground and Flight Data Systems Architecture for NASA's Exploration Missions
S. Rader, NASA Johnson Space Center, Houston, TX; M. Kearney, NASA Marshall Space Flight Center, Huntsville, AL; D. Smith, NASA Goddard Space Flight Center, Greenbelt, MD; T. McVittie, Jet Propulsion Laboratory, Pasadena, CA

Space Radiation Health Operations: From LEO to Beyond
S. Johnson, NASA Johnson Space Center, Houston, TX; W. Murtaugh, National Oceanic & Atmospheric Administration, Boulder, CO; T. Lin and M. Weyland, NASA Johnson Space Center, Houston, TX

Quantifying EVA Task Efficiency
C. Looper and Z. Ney, United Space Alliance, Houston, TX

Critical Management Needs in International Space Collaboration
M. Trujillo San Martin, NASA Ames Research Center, Moffet Field, CA; and W. Williams, NASA Johnson Space Center, Houston, TX

Automated Production of Flight Software for Space Exploration
W. Smithgall, United Space Alliance, Houston, TX

Exploration Systems Architecture Study: Overview of Architecture and Mission Operations Approach
D. Stanley, National Institute of Aerospace, Hampton, VA; S. Cook, NASA Marshall Space Flight Center, Huntsville, AL; J. Connolly and J. Hanley, NASA Johnson Space Center, Houston, TX

Crew- Centric Mission Objective and Detail Flight Planning
C. Leslie, United Space Alliance, Houston, TX

Lessons Learned from the Robotics Operations on STS- 114 (Return to Flight)
S. Aziz, Canadian Space Agency, Houston, TX

Staffing the ISS Control Center: Lessons Learned from Long- Duration Human Space Flight
C. Olsen, Mississippi State University, Mississippi State, MS; T. Horvath, NASA Marshall Space Flight Center, Huntsville, AL; and S. Davis, NASA Johnson Space Center, Houston, TX

Preparations for Autonomous Missions to the Moon
F. Hughes, Tietronix Software, Houston, TX

Wireless Communications and Interfaces on Board Spacecraft
P. Plancke, ESA, Noordwijk, The Netherlands; J. Saiz, NASA Johnson Space Center, Houston, TX; I. Hernandez-Velasco, ESA, Noordwijk, The Netherlands; K. Gifford, University of Colorado, Boulder, CO; and C. Carron, EADS Astrium Ltd., Toulouse, France

Essential Commonality for Effective Future Extravehicular Activity Operations
D. Coan, Barrios Technology, Pasadena, TX; E. Bell, United Space Alliance, Houston, TX

4th International Energy Conversion Engineering Conference and Exhibit (IECEC)
26 - 29 Jun 2006, Sheraton San Diego Hotel & Marina
San Diego, California

Integrated Electrical System Testing and Modeling for Risk Mitigation
H. Hoang, J. Fu and V. Dinh, The Boeing Company, Houston, TX

42nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference
9 - 12 Jul 2006, Sacramento Convention Center
Sacramento, California

Fredericksburg High School Aeroscience Program - Nozzle and Fuel Grain Material Study
E. Quezada, B. Williams, M. Maple, P. Moellering, J. Landis and B. Williams, Fredericksburg High School, Fredericksburg , TX

Flight of the Redbirds - 10 and 11
N. Bartel, M. Maple, J. Sharp, W. Luckenbach, B. Williams and B. Williams, Fredericksburg High School, Fredericksburg, TX

Physics of Plasma Detachment in a Magnetic Nozzle
C. Deline and B. Gilchrist, University of Michigan, Ann Arbor, MI; L. Cassady, University of Houston, Houston, TX; and G. Chavers, NASA Marshall Space Flight Center, Huntsville, AL

Economics of Separated Ascent Stage Launch Vehicles
C. Taylor, Jupiter Research and Development, Houston, TX

In Defense of External Tanks
C. Taylor, Jupiter Research and Development, Houston, TX

Space Shuttle Strategic Planning Status
E. Henderson and G. Norbraten, NASA Johnson Space Center, Houston, TX

(Continued on page 21)

(Continued from page 20)
Oral Presentation

An Assessment of Faster-Than-Light Spacetimes: Make or Break Issues
E. Davis, Institute for Advanced Studies at Austin, Austin, TX

Presentation
Null Tests of Breakthrough Energy Claims
S. Little, EarthTech International, Inc., Austin, TX

A Review of Ablation Modeling for Thermal Protection Systems
W. Ho, J. Koo, and O. Ezekoye, University of Texas at Austin, Austin, TX

Multi-Species Lattice- Boltzmann Models of Xe, Xe+, Xe++, e-Flow Through Ion Thruster Optics
J. Richard and B. Young, Texas A&M University, College Station, TX

Aerospace Patent Literature: An Interactive and Living History of Industrial Progress
W. Hulsey, University of Texas, Austin, TX

Orbiter Propulsion Safety for Space Shuttle Return to Flight
M. Kezirian, T. Thornton and D. Morsches, The Boeing Company, Houston, TX

A Parametric Study of Fast Cookoff Modeling for Tactical Missile Propulsion System
K. Nguyen, J. Koo, and O. Ezekoye, University of Texas at Austin, Austin, TX

Next Generation Education in Fredericksburg, Texas - The Fredericksburg High School Aeroscience Program
B. Williams, Fredericksburg High School, Fredericksburg, TX

Promoting Student Interest In Science and Engineering: Mars Rover Competition Grades 3- 8
J. Ramsey and E. Bering, University of Houston, Houston, TX

AIAA Guidance, Navigation, and Control Conference
AIAA Atmospheric Flight Mechanics Conference
AIAA Modeling and Simulation Technologies Conference
AIAA/AAS Astrodynamics Specialist Conference
and Exhibits
21 - 24 Aug 2006
Keystone Resort & Conference Center
Keystone, Colorado

Preliminary Study Using Forward Reaction Control System Jets During Space Shuttle Entry
C. Restrepo and J. Valasek, Texas A&M University, College Station, TX

Results of Entry Abort Determination Using Non- Adaptive Neural Networks for Mars Precision Landers
S. Graybeal, NASA Johnson Space Center, Houston, TX

Acceleration- Compensated Zero- Effort- Miss Guidance Law
V. Lam, Lockheed Martin Missiles and Fire Control, Grand Prairie, TX

Acceleration- Compensated Zero- Effort- Miss Guidance Law
V. Lam, Lockheed Martin Missiles and Fire Control, Grand Prairie, TX

Global Modeling of Pitch Damping from Flight Data
N. Favaregh, Old Dominion University, Plano, TX; E. Morelli, NASA Langley Research Center, Hampton, VA

An Object- Oriented Operator- Overloaded Quaternion Toolbox for Dynamics and Control
J. Turner, Dynacs Military & Defense, Houston, TX

Gyroless Attitude Control of Multi- Body Satellites Using an Unscented Kalman Filter
J. Fisher and S. Vadali, Texas A&M University, College Station, TX

Norm Constrained Kalman Filter for Quaternion Estimation
R. Zanetti and R. Bishop, University of Texas at Austin, Austin, TX

Neutral Density Measurements from the Grace Accelerometers
B. Tapley, S. Bettadpur, M. Cheng, and J. Ries, University of Texas at Austin, Austin, TX

Robust Control of Redundantly Actuated Dynamical Systems
M. Majji and J. Junkins, Texas A&M University, College Station, TX

H- Infinity Static Output- Feedback Control for Rotorcraft
J. Gadewadikar and F. Lewis, University of Texas at Arlington, Fort Worth, TX; and K. Subbarao, University of Texas at Arlington, Arlington, TX

HEL Plasma Extinction Processes by Asymmetric Missile Exhaust Plumes
C. Paiva, BSM Associates, California City, CA; and H. Slusher, University of Texas, El Paso, TX

Deterministic Data Access and Manipulation in Simulators with a VxWorks Target
W. Davidson, United Space Alliance LLC, Houston, TX

The Partition of Unity Finite Element Approach to the Stationary Fokker- Planck Equation
M. Kumar, P. Singla, S. Chakravorty and J. Junkins, Texas A&M University, College Station, TX

Dynamic Analysis and Control of a Stewart Platform Spacecraft Emulation Using Automatic Differentiation Method
X. Bai, Texas A&M University, College Station, TX; J. Turner, Dynacs Military and Defense, Houston, TX; and J. Junkins, Texas A&M University, College Station, TX

Satellite Breakup Risk Mitigation
D. Leleux, NASA Johnson Space Center, Houston, TX

Improved Characterization and Position Control of Shape Memory Alloys Using Reinforcement Learning
C. Haag, M. Tandale and J. Valasek, Texas A&M University, College Station, TX

Flutter Suppression via Nonlinear Infinite Horizon Regulation for the Morphable Aircraft Wing
K. Subbarao and M. Webb, University of Texas at Arlington, Arlington, TX

(Continued on page 22)

(Continued from page 21)

Mars Thermospheric Winds from MGS and Odyssey Accelerometers
G. Crowley, Atmospheric & Space Technology Research Associates, San Antonio, TX; R. Tolson, North Carolina State University, Raleigh, NC

Linear Feedback Control Using Quasi Velocities
A. Sinclair, Auburn University, Auburn, AL; J. Hurtado and J. Junkins, Texas A&M University, College Station, TX

Real- Time Cooperative Target Tracking for Autonomous UAVs in an Adversarial Environment
U. Zengin and A. Dogan, University of Texas at Arlington, Arlington, TX

The Mathematical Model of the Tri- Turbogan Airship for Autonomous Formation Control Research
S. Gammon, M. Frye and C. Qian, University of Texas at San Antonio, San Antonio, TX

Prediction of Icing Effects on the Lateral/Directional Stability and Control of Light Airplanes
J. Valasek and A. Lampton, Texas A&M University, College Station, TX

Debris Field Estimation Methods for the STS- 107 Columbia Investigation
S. Graybeal, R. Mrozinski and G. Mendeck, NASA Johnson Space Center, Houston, TX

Space Shuttle Public Entry Risk Assessment and Mitigation
R. Mrozinski, NASA Johnson Space Center, Houston, TX; G. Mendeck, , , United States

Boom and Receptacle Autonomous Air Refueling Using a Visual Pressure Snake Optical Sensor
J. Doebbler and J. Valasek, Texas A&M University, College Station, TX; M. Monda and H. Schaub, Virginia Polytechnic Institute and State University, Blacksburg, VA

Integrated FDI Enhancements for Inflight Failure Accommodation and Upset Recovery
T. Summers and J. Burkholder, Barron Associates Inc., Charlottesville, VA; J. Wadley and D. Hopper, Lockheed Martin Aeronautics Company, Fort Worth, TX

Real- Time Mars Approach Navigation Aided by the Mars Network
T. Ely, Jet Propulsion Laboratory, Pasadena, CA; G. Lightsey, University of Texas at Austin, Austin, TX; C. Duncan, Jet Propulsion Laboratory, Pasadena, CA; A. Mogensen, University of Texas at Austin, Austin, TX

Real- Time EDL Navigation Performance Using Spacecraft to Spacecraft Radiometric Data
P. Burkhart, T. Ely, and C. Duncan, Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA; E. Lightsey, T. Campbell, and A. Mogensen, University of Texas at Austin, Austin, TX

Hardware Validation of the Electra UHF Transceiver
E. Lightsey, A. Mogensen, and T. Campbell, University of Texas at Austin, Austin, TX; D. Burkhart, C. Duncan, and T. Ely, Jet Propulsion Laboratory, Pasadena, CA

Partial J2 Invariance for Spacecraft Formations
L. Breger and J. How, Massachusetts Institute of Technology, Cambridge, MA; and K. Alfriend, Texas A&M University, College Station, TX

Digital Autoland Control Laws Using Direct Digital Design and Quantitative Feedback Theory
T. Wagner and J. Valasek, Texas A&M University, College Station, TX

Modeling, Simulation and Rapid Prototyping of an Unmanned Mini-Helicopter
C. Vélez, Universidad Eafit, Medellin, Colombia; J. Alvarez, University of Texas at Austin, Austin, TX; and A. Agudelo, Universidad Eafit, Medellin, Colombia

The Development of a Rotorcraft UAV Simulation for Undergraduate Flight Control Research
N. Grady, M. Frye, and C. Qian, University of Texas at San Antonio, San Antonio, TX

LandingNav: A Precision Autonomous Landing Sensor for Planetary Bodies
A. Katake, C. Bruccoleri, and P. Singla, Texas A&M University, College Station, TX; J. Ochoa, StarVision Technologies Inc., College Station, TX; and J. Junkins, Texas A&M University, College Station, TX

Radiation Pressure Modeling for ICESat Precision Orbit Determination
H. Rim, C. Webb, S. Yoon and B. Schutz, Center for Space Research, Austin, TX

Sixth US/Russian Space Surveillance Workshop
P. Cefola, Massachusetts Institute of Technology, Sudbury, MA; and K. Alfriend, Texas A&M University, College Station, TX

Smooth Function Modeling for On- Line Constraint Estimation and Trajectory Reshaping
A. Verma and K. Vadakkeveedu, Knowledge Based Systems, Inc., College Station, TX; M. Oppenheimer and D. Doman, U.S. Air Force Research Laboratory, Dayton, OH

Control of a Receiver Aircraft Relative to the Tanker in Racetrack Maneuver
E. Kim and A. Dogan, University of Texas at Arlington, Arlington, TX; and W. Blake, U.S. Air Force Research Laboratory, Wright-Patterson AFB, OH

The Development and Use of COPERNICUS: A Comprehensive Trajectory Design and Optimization System
G. Condon, NASA Johnson Space Center, Houston, TX; C. Ocampo and J. Senent, University of Texas at Austin, Austin, TX

IPAC of a Satellite Via Magnetic Bearing Supported, Flexible Shaft Flywheels
J. Park and A. Palazzolo, Texas A&M University, College Station, TX; and R. Beach, NASA Glenn Research Center, Cleveland, OH

Disturbance Rejection for the Ice, Cloud, and Land Elevation Satellite One Hertz Pointing Oscillation
N. Smith, University of Texas at Austin, Austin, TX

AIAA Local Section News

The new section officers will begin their terms on July 1. They are:

Chair:	Dr. Jayant Ramakrishnan/ARES Corp.
Chair-Elect:	Douglas Yazell/Honeywell
Vice Chair-Operations:	James Johnson/Northrop Grumman
Vice Chair-Technical:	Ellen Gillespie/United Space Alliance
Secretary:	Tim Propp/The Boeing Company
Treasurer:	Dr. Brad Files/NASA
Councilors (7):	Brett Anderson/The Boeing Company
	Shirley Brandt/Hernandez Engineering
	Gary Johnson/Northrop Grumman
	Bob McCormick/Barrios
	Aaron Morris/Barrios
	Dr. Merri Sanchez/NASA
	Brenda Weber/Honeywell

At the recent Annual AIAA Awards Banquet, Sustained Membership Honorees were announced:

60 years:
Joseph W. Coddou

50 years:
William D. Best
Prof. Alan Powell
William H. Simmons

40 years:
Harold E. Benson
Dr. John J. Bertin
Dr. Leland A. Carlson
Dr. L. S. Fletcher
John E. French
Dr. James S. Noel
John P. Shea

25 years:
James H. Booker
Miguel A. Hernandez
Jeffrey S. Tave
Timothy. H Braithwaite
Daryl T. Hester
John T. Taylor
Blaine W. Brown
Nicholas L. Johnson
Kevin C. Templin
Robert Castle
Paul March
Marvin E. White
Chris J. Cerimele
Steven R. Nagel
S N. Vidyasagar
Dr. Edwin Z. Crues
Thomas V. Sanzone
John F. Yoder
William L. Davidson
Henry E. Schneider
Joe D. Gamble
Ronald K. Swim

Executive Council (EC) Sustained Service Recognition:

- Daniel Nobles	Programs Chair
- Dr. Zafar Taqvi	A&R Chair and C&T Chair
- Brett Anderson	Councilor
- Bill Atwell	Life Science, Space Processing & HF Chr.
- Dr. Rakesh Bhargava	Honors & Awards Chair
- T. Sophia Bright	Past-Chair
- Gary Brown	Systems Engineering Chair
- Dr. Al Jackson	Astrodynamics Chair
- Glenn Jenkinson	Councilor
- Dr. Michael Lembeck	Space Operations Chair
- Dr. Kamlesh Lulla	In-Space Imaging & Crew Observ. Chair
- Padraig Moloney	Int'l Space Activities Committee Chair
- Paul Nielsen	Safety, Reliability & QA Chair
- Mike Oelke	Councilor
- Andy Petro	Propulsion & Power Systems Chair
- JR Reyna	Councilor
- Dr. Merri Sanchez	Councilor
- Barry Tobias	Councilor
- William West	Extra-Vehicular Activity Chair
- Liz Zapata	Professional Development Chair

Executive Council Outstanding Contributions & Dedicated Service Recognition:

- Jon Berndt	Newsletter Editor
- Dr. Brad Files	Treasurer
- Ellen Gillespie	Councilor and GN&C Chair
- Joy Conrad King	Pre-College Outreach Chair
- Dr. Syri Koelfgen	Secretary
- Albert Meza	Councilor/Vice Chair-Operations (Act.)
- Tim Propp	Vice Chair – Technical
- Dr. Jayant Ramakrishnan	Chair-Elect
- Laura Slovey	Young Professionals Chair
- Douglas Yazell	Councilor
- Mike Begley	E-mail Communications
- Elizabeth Blome	Councilor & Membership Chair
- Gary Cowan	Webmaster
- Amy Efting	Assistant Webmaster
- Aaron Morris	History Chair
- Dr. Doug Schwaab	Scholarship Chair
- Nicole Smith	Public Policy Chair
- Dr. John Valasek	College & Co-op Chair

Seeking Volunteers

The Houston Section is seeking volunteers interested in participating in the following areas:

Pre-College Outreach (K-12)
Professional Development
Programs
Publicity

Opportunity for community service, personal & leadership development, networking, etc.

Contact chair@aiaa-houston.org

Houston Section
P.O. Box 57524
Webster, TX 77598

Non-Profit
Organization
U.S. POSTAGE PAID
PERMIT NO. 1
Webster , Texas

AIAA Mission

Advance the arts, sciences, and technology of aerospace, and nurture and promote the professionalism of those engaged in these pursuits. AIAA seeks to meet the professional needs and interests of its members, as well as to improve the public understanding of the profession and its contributions.

American Institute of Aeronautics and Astronautics

Become a Member of AIAA

Are you interested in becoming a member of AIAA, or renewing your membership? You can fill out your membership application online at the AIAA national web site:

www.aiaa.org

Select the AIAA membership option.