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The Longhorn Liftoff

A Newsletter for Alumni & Friends of the Department of Aerospace Engineering & Engineering Mechanics

Four Teams of ASE Undergrads Go Weightless

Members of the "Nanosat" team watch as their satellites separate in zero gravity.

NASA selected four teams of undergraduate students from The University of Texas at Austin Aerospace Engineering Department to participate in NASA's KC-135 Reduced Gravity Student Flight Opportunities Program this past spring. The program offers undergraduate students a unique experience – to design and perform an experiment aboard the KC-135, the aircraft that engineers use to simulate zero gravity.

The "Nanosat" team designed a project to complement research underway at the University of Texas concerning formations of small satellites that, by working together, can accomplish more than a large satellite working alone. Many formation-flying space mission concepts begin with two or more satellites attached (or "stacked") to one another during launch on the Space Shuttle or other launch vehicle. Once in orbit, these "stacked" satellites must separate from each other in a way that is both reliable and predictable. The zero-gravity environment on the KC-135, lasting for about 30 seconds, is ideal to study this very important event. The analysis was done by designing two small 30-pound satellites and integrating the necessary sensors and electronics to wirelessly command them to separate several times in conditions very similar to what would occur in space. The data collected by the team in Houston is currently being used to design an actual space mission that is currently under development in the UT Austin ASE/EM Department.

"FLOAT" team members enjoy being weightless with Bevo.

The "Particle Damping" team with its experiment aboard the KC-135.

The "Particle Damping" team designed an experiment to quantify the effectiveness of particle damping in microgravity. Particle damping involves filling structures with particles to allow the frictional and viscoelastic effects from particle interactions to damp out unwanted vibrations. The equipment for the experiment consisted of 10 different copper pipe samples filled with different amounts and types of BBs and sand that were mounted on a shaker. The shaker shook each sample, and an accelerometer mounted on the tip of the sample recorded the system output. This data allowed team members to estimate a transfer function and calculate the damping in each sample. Although software error prevented the team from gathering data from the first flight, modifications were made and the second flight went without a hitch. Team member Tim Allison says, "Designing and performing a KC-135 experiment was a great learning

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LIVE MUSIC with Sara Hickman
FREE FOOD from O's

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Chairman's Corner

Robert H. Bishop, ASE/EM Chairman

Louis Armstrong once said "Man, if you have to ask what it [jazz] is, you'll never know." I hear that. I don't understand jazz—never will. I say, "Man, if you have to ask what it [the wonder of flight] is, you'll never know." You either comprehend the splendor of flight or you do not. The notion of transporting humans from the cradle of civilization to the moon and beyond either thrills you or it leaves you cold. One thing that has become crystal clear to me during my first year as Chairman is that our students understand the true meaning of flight—and they are telling me that they want to be directly involved in designing, constructing, and operating small aircraft and spacecraft while at UT.

Some student teams actually do build things as part of their capstone design experience, but more is needed, both within the classroom and as part of the pallet of extracurricular activities that students can choose from. A more innovative approach to engaging students in the academic setting would include providing multi-disciplinary student teams with the resources to fly vehicles of their own design and construction. With financial support of the department, this year our students flew a small UAV of their own design with a live video downlink. Students also worked in the satellite clean room testing subsystems on their small satellite (20 kg) design for the FASTRAC program. Several other student projects were supported by the department, including four micro-gravity flight experiments on the NASA KC-135. We are on the right path.

This year our national ranking in aerospace engineering graduate programs moved up to 6th overall (up from 8th) and our undergraduate program moved up to 9th overall (up from 10th). This places our department firmly in the upper echelons of aerospace engineering departments nationally. Our national ranking is important because it reaffirms our position as a "player" on the national scene. It situates us strategically to impact the future of aerospace engineering education. As good as we are, though, It's time to make a move.

My goal is to expand the opportunity for students and faculty to design, build, and fly small aircraft and spacecraft. I have asked the students to develop two Texas Longhorn UAVs to fly autonomously in formation along a prescribed path. To accomplish this objective (and others in the long run), we need to develop a viable UAV design program within the department. The trend towards micro- and nano- sensors, and actuators, along with embedded flight computers, makes this feasible. The educational infrastructure in the department is not yet in place—I'll need the help of our alumni in seeing this happen. Your thoughts and comments are solicited.

We will celebrate this semester with a Fall Festival to include BBQ from O's Restaurant and live music provided by Sara Hickman, a renowned Texas singer/songwriter. I invite you to visit the department and join the fun for the weekend.

(KC-135 continued)

experience for everyone on the team. We learned a lot about structural dynamics and teamwork and were able to gather and interpret good data from our flight."

The "Microgravity" team in front of NASA's "Weightless Wonder".

The "FLOAT" team explored the capability of a Fluidic Momentum Controller (FMC) in microgravity. An FMC is an alternative device for spacecraft attitude control that uses the angular acceleration of fluid within loops to transfer angular momentum, offering potential benefits over conventional spacecraft attitude controllers. The FLOAT team designed an FMC control system, using National Instruments Compact FieldPoint hardware, to accept inputs from 6 PCB accelerometers and to provide outputs to 6 Jabsco pumps. The team programmed 26 LabVIEW subroutines to examine various rotation combinations of yaw, pitch, and roll. A stationary video camera recorded the duration of the flight for qualitative analysis, and a CompactFlash memory card recorded the control variables for quantitative analysis. The FLOAT team achieved 6 successful runs of the FMC during microgravity testing on the KC-135. While laying the groundwork for future FMC research, the team was also able to enjoy the rare and exhilarating sensation of being weightless.

The "Combustion" team examined how buoyancy affects a pulsed laminar jet flame in microgravity. To observe the flame, a Schlieren imaging system was used to get a glimpse of what was occurring inside the flame, rather that trying to discern the effect by observing the luminosity alone. Visualizing the flame in microgravity proved to be easier said than done, as the flame expanded greatly and faded to a transparent blue color. This phenomenon, coupled with the disorienting sensation of weightlessness, made performing the experiment somewhat difficult, but the team eventually got the routine down. Team lead Eric Rogstad says, "The actual flight aboard 'The Weightless Wonder' was like nothing else! And yes, we did the same hop that Apollo astronauts did on the Moon landings back in the 60's and 70's – we successfully studied flames in microgravity and had a lot of fun doing it."

Faculty Awards & Recognition

Ivo Babuska has been listed by the Institute for Scientific Information for being among the most highly cited researchers in the world. Dr. Babuska specializes in numerical solution of partial differential equations, especially the finite element method, and applied mathematics in general; his major field of application is continuum mechanics. Dr. Babuska has served on the College of Engineering faculty since 1995.

Jeffrey Bennighof was honored for his support and guidance to students with disabilities by Services with Disabilities in May, 2004. Dr. Bennighof has served on the College of Engineering faculty since 1986. His research focuses on computation and modeling of structural dynamics and on control of flexible structures.

Thomas J.R. Hughes, Professor of Aerospace Engineering and Engineering Mechanics and Computational and Applied Mathematics Chair II was recently honored on his 60th birthday with a conference and a published book of articles.

Professor Thomas J.R. Hughes

Rice University held a conference from April 7 - 9, to celebrate Dr. Hughes' 60th birthday. Speakers from across the world gathered to speak during the conference. A book of articles was also published in honor of Dr. Hughes' birthday entitled: *The Finite Element Method - 1970's and Beyond.*

Professor Hughes is an internationally known expert in computational engineering and sciences and has published over 300 scientific works on computational mechanics, and is the author or editor of eighteen books. He was also recently listed by the Institute for Scientific Information as being among the most highly cited researchers in the world.

Hans Mark, Professor of Aerospace Engineering and Engineering Mechanics, was recently awarded an Honorary Degree from the Royal Military College of Science in Shriveham, England in July of this year. This is the fifth time he has been recognized with an honorary degree. The degree is being awarded in recognition for Dr. Mark's work as the Director of Defense Research and Engineering from 1998 – 2001, and for his work with weapons development in recent years.

Professor Mark specializes in the study of spacecraft and aircraft design, hypervelocity projectiles and impact, and national defense policy. He has served on the faculty of the College of Engineering since 1988 and has served as chancellor of The University of Texas System from 1984 to 1992. Dr. Mark has also served as director of the NASA-Ames Research Center, Secretary of the Air Force, deputy administrator of NASA and most recently, the Director of Defense Research and Engineering.

Cesar Ocampo was this year's recipient of the Aerospace Engineering and Engineering Mechanics Departmental Teaching Award. Dr. Ocampo's research interests include astrodynamics and celestial mechanics, spacecraft trajectory optimization in multibody gravity fields, mission design and analysis for multiple spacecraft missions, dynamical systems, and numerical methods. He joined the College of Engineering faculty in 2000.

J. Tinsley Oden, Director of the Institute for Computational Engineering and Sciences and Professor of Aerospace Engineering and Engineering Mechanics, was recently listed by the Institute for Scientific Information for being among the most highly cited researchers in the world. He was also elected an honorary member of the American Society of Mechanical Engineers. This is the highest award given by the 120,000 member ASME. Dr. Oden was selected for "the establishment of the Institute of Computational Engineering and Sciences, and for pioneering a simulation based engineering called 'Goal-Oriented Adaptivity,' the impact of which promises to be enormous."

Professor Oden's research focuses on developing the theory and implementation of finite element models of problems in fluid mechanics and nonlinear solid mechanics. He has served on the College of Engineering faculty since 1973.

Student Awards & Recognition

Philip Andrew Eckhoff was the department nominee for the College of Engineering Scholar Award leader in May, 2004. Professors who wrote recommendations for Philip praised him for his outstanding performance academically and as a strong leader. Philip participated in a student-built satellite team and was recognized with a position of leadership for the team of Systems Engineers, despite the fact that the team is composed largely of graduate students. He double-majored in Mathematics and Aerospace Engineering with a perfect 4.0 grade point average. Philip has been awarded prestigious national fellowships for graduate study and has achieved several other accomplishments and awards.

David Nathaniel Wiese was able to spend the summer working for the Air Force Research Laboratory in Maui, Hawaii through the Space Scholars Program. He has also been a part of three NASA cooperative education programs, which he says have been the most rewarding in his life and have helped him understand the realities of working in a technical environment.

ASE/EM Spring Happening Fun for All!

Texas guitar legend, Van Wilks, performs during the Spring Happening 2004.

This past spring semester, the Department of Aerospace Engineering and Engineering Mechanics celebrated the end of the semester on the last class day with another eventful outdoor party for all members of the community. Close to 300 people attended the event, including ASE/EM students, faculty, staff and alumni. It was a great way to kick off the summer and to say good-bye to our graduating seniors.

During the "Spring Happening 2004", attendees were able to participate in a variety of activities while enjoying live music from local Texas guitar legend Van Wilks. Activities included a balloon-popping contest with Sigma Gamma Tau, and a star shaped piñata decorated in a space theme with the AIAA student chapter. An ongoing volleyball game kept students on their toes, while a Twister tournament kept the little ones busy too. The department was gracious enough to provide free BBQ food from Fuschak's as well as the live music entertainment. The end of the evening closed with a free drawing to win free CDs and gift certificates which were donated from the ASE/EM Department, the University CO-OP, O's Restaurant and Hyde Park Bar and Grill.

The AIAA student chapter provided a piñata during the Spring Happening.

Thanks to all of the students and staff members who helped to make this event possible–we couldn't have done it without you! Look for the ASE/EM Fall Festival to take place during the Fall 2004 semester on Friday, October 15th from 4 - 7 p.m. The very talented local musician, Sara Hickman, will perform live, and free food and activities will abound!

For more information about this and other special events, contact Kendra Harris, Special Projects Coordinator, at kendra.harris@mail.utexas.edu or 512-471-4234.

Aerospace Engineers Receive $5 Million to Explore Propulsion Systems for Next-Generation Space Vehicles

From left to right: Drs. Maruthi Akella, Noel Clemens, David Dolling and Laxminarayan Raja in the new supersonic wind tunnel lab.

Four University of Texas at Austin aerospace engineering professors, Drs. Maruthi Akella, Noel Clemens, David Dolling and Laxminarayan Raja, have received a $5 million, five-year grant from the U.S. Air Force Office of Scientific Research to develop more efficient engine concepts for space vehicles.

"If we don't improve the cost efficiency of launching vehicles into space, we will never be able to take advantage of the potential that space offers for scientific, commercial and military applications," said Dr. David Dolling, professor of aerospace engineering and the project's principal investigator.

The engineers will seek to combine propulsion methods used in commercial airliners and advanced research-grade engines to create an engine that is the most efficient for each point in the flight through the earth's atmosphere, until rocket engines take over to boost the vehicle into orbit. Such an engine would save fuel and reduce structural weight, Dolling said.

Engines use only one kind of "propulsion cycle" – a way of mixing fuel and oxidizer, combusting it and producing hot, high energy gas to propel the vehicle. Commercial aircraft, for example, use gas turbine cycles and a few supersonic systems use ramjet propulsion cycles, in which the speed of the vehicle is so high that the air is compressed in the intake without a mechanical compressor. In the future, aircraft may be propelled by "scramjet" cycles in which combustion of the fuel and oxidizer will occur at supersonic speeds. The scramjet cycle is most efficient at very high speeds. Each of these cycles provides optimal efficiency over a different range of speeds. By combining cycles, the engine maximizes its efficiency at all points in the flight.

Another benefit of combined-cycle engines is that they "breathe" air from the atmosphere directly, reducing significantly the weight of the vehicle. Space shuttles now must carry not only fuel but also oxygen, increasing their overall weight and the amount of fuel needed to propel them.

Dynamics and Control of Micro Air Vehicles Inspired from Hummingbird Flight

Work supported by Texas ARP, NSF, and AFRL

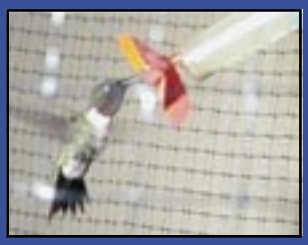

Figure 1: Ruby-throated hummingbird flying in mesh cage

Micro air vehicles (MAVs) with wing spans of 15-20 cm, and flight speeds of 30-60 kph are of increasing interest for various civilian and military applications such as reconnaissance, urban warfare, and deployment of micro-payloads. The dynamics and control of MAV flight are affected by two unique aspects: (i) aerodynamically unfavorable low Reynolds numbers (Re ~ 10,000 - 100,000); and (ii) small physical dimensions, resulting in certain favorable scaling characteristics including structural strength and low inertia. Flapping wing motion and flexible airfoils are therefore key attributes for low Re flight, a fact that can be readily confirmed by observing the natural flight of smaller size birds. Consequently, the main challenge currently encountered by MAV designers is that of identifying efficient wing motion patterns and energy transfer mechanisms that sustain the unsteady low Re flight regime.

Dr. Maruthi Akella's UT ASE research group, together with biology professor Robert Dudley (UC Berkeley), has recently proposed the hummingbird flight exemplar to elucidate the flapping kinematics and dynamics of MAV control. The objective is to delineate the envelopes of hummingbird maneuverability and consequently to use their extraordinary flight capabilities as a novel source of MAV control mechanisms. Parametric investigations and a 3-D analysis of the flapping kinematics have been performed upon hummingbirds (Figure 1). A four camera infrared imaging system is adopted to mathematically reconstruct 3-D body position and orientation by tracking reflective markers (1.0 mm diameter) attached non-invasively to the bird's back. Free flight within a mesh cage reveals a stereotypical maneuver that involves 180-degree direction change within 0.175 s. The trajectory is characterized by a displacement of 10.5 cm largely within the XY-plane (Figure 2). Our math models reveal that substantial alteration of flight speed and body orientation is initiated by the temporal coupling of roll and yaw moments. Current studies also suggest that the body experiences sideslip until inertial momentum is overcome by thrust.

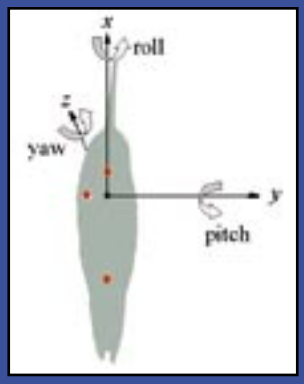

Figure 2: Hummingbird acrobatics 180 degree turn

The research group's efforts are expected to ultimately lead the design of biomimetic wings that exploit unsteady aerodynamics for generation of dynamic lift. The underlying synergy between experimental biology, unsteady aerodynamics, and mathematical control theory has the potential to allow substantial gains in all of these areas and would greatly increase our ability to design and operate the increasingly complex aerospace systems of the 21st century.

Texas Student-Built Satellite is on the FASTRAC

Texas engineering students are reaching for the final frontier as they begin the integration and testing phase of the University's first student-built satellite. The Formation Autonomy Spacecraft with Thrust, Relnav, Attitude, and Crosslink (FASTRAC) project is based in the Satellite Design Laboratory on the fourth floor of the ASE building. UT is one of twelve schools competing in the Air Force-sponsored University Nanosatellite Program, where each student team is given $100K and 24 months to build a fully functional satellite with a mass of less than 20 kilograms. The UT project is primarily a technology demonstration mission for satellite formation flying. The mission consists of twin nanosatellites that separate in orbit and perform GPS relative navigation, all the while tracked by a network of university ground stations linked to the UT tracking station on the roof of the ASE building.

Thomas Campbell and Greg Holt in the cleanroom with the FASTRAC Nanosatellite

There have been numerous subsystem tests thus far, including separation tests on NASA's KC-135 Microgravity "Weightless Wonder," near-space balloon flights, and structural vibration tests. ASE student Thomas Campbell comments the project "teaches us to be well-rounded engineers," and "gives us a hard lesson in practical design." All integration will take place in the newly constructed cleanroom facility in the Satellite Design Lab and is slated to be completed by January 2005. Pending safety approval and further testing, the satellites will launch in March 2006. The project is sponsored by ASE faculty member Dr. E. Glenn Lightsey and is managed by ASE Ph.D. student Greg Holt. The student team is composed of members from the Aerospace, Mechanical, and Electrical Engineering departments.

Blast From the Past

1960's

Robert Michael Massey, BS ASE 1966, writes that he retired from Lockheed Martin in Fort Worth, TX in 2000 after 34 years of service. He is enjoying his grandkids and hobbies.
rmmut@aol.com

1970's

David A. Baker, BS ASE, 1972, is a Systems Engineer for Northrop Grumman in Colorado Springs, CO.
dave@bakers.com

1980's

David Walker, BS ASE 1979, MS ASE 1980, writes that he recently returned to Wright-Patterson AFB OH to take the position of Vice Commander of the Air Force Research Laboratory. AFRL consists of over 9500 military, civilians and contractors executing all science and technology development for the US Air Force.
davew3@sbcglobal.net

Bruce Chesley, MS ASE 1988, is the Director of Systems Architecture for The Boeing Company in Seal Beach, CA.
bruce.c.chesley@boeing.com

1990's

Jason Cox, BS ASE 1997, is an Aerospace Engineer for The Boeing Company in Arlington, VA.
jcox@alumni.utexas.net

Ido Dubrawsky, BS ASE 1990, MS ASE 1992, is a Network Security Architect in San Jose, CA.
ido@dubrawsky.org

Neil Erian, BS ASE 1991, writes that he graduated from Fordham University in May 2004 with an MA in Philosophy. He is currently teaching business ethics at Concordia College and methods of reasoning at SUNY Purchase.
ursusphilosophe@optonline.net

Caroline Franklin, BS ASE 1998, is a Flight Instructor in Austin, TX. She has nine years of experience instructing and is teaching primary, instrument, multi-engine, commercial and instructor candidates.
franklincmr@yahoo.com

Shiaw-Wuu Perng, PhD ASE, 1996, is Associate Professor and Chairman of Business Administration at Ling-Tung College in Taiwan, ROC.
sw.perng@msa.hinet.net

Spencer Swift, BS 1988, MS ASE 1992, is a Parallel Applications Analyst for Silicon Graphics, Inc. in Dallas, TX.
vfrspencer@sbcglobal.net

James A. Westgate, BS ASE 1996, writes that he is serving in the US Army as a Captain assigned to the 65th Engineer Battalion, Schofield Barracks, Hawaii. He is currently deployed to Afghanistan as the Facilities Engineer for the Combined Forces Command - Afghanistan, in support of Operation Enduring Freedom.

2000's


Emily Elizabeth Marek

Matthew G. Marek, BS ASE, 2003, is a Senior Aeronautical Engineer at MIT Lincoln Laboratory in Lexington, MA. He writes that his first child, Emily Elizabeth Marek, was born on June 14th, 2004, at 3:04 am, weighing in at 6 lbs 10 oz and 19 inches long. After taking the summer off, his wife Vanessa will begin her second year of law school in at Northeastern University in the fall. He says they are both a bit sleep deprived, but their new wonderful bundle of joy is worth waking for.
matthew.marek@alumni.utexas.net

Andrea Sargeant, BS ASE 2004, is a Systems Engineer for Bell Helicopter. She writes, "I moved back to my hometown...and I am very excited!"
superandu@hotmail.com

John Vogel, BS ASE 2004, works for Bell Helicopter in Texas.
johnmvogel@netscape.net

Apologies to **Nick Huynh**, who was not listed on our 2003 graduates list. He received his BS in ASE in December 2003.

Where Are They Now?

Armando Gonzalez, BS ASE, 1989

Since graduating in 1989 with my BS in ASE, I've been lucky to have stayed employed by Boeing's Commercial Airplane Division. I spent my first two years in the Weights Engineering Organization tracking estimated empty weights for the 767-X (which became the 777) and providing support to the Aerodynamics and Sales/Marketing groups.

I transferred to Flight Operations Engineering in 1992 and worked on most of the group's products, including flight manuals, airplane performance software, performance training courses, and various airplane performance publications.

In addition to producing a variety of manuals, software, and training courses, Flight Ops provides technical operations support to the airlines, allowing us to visit airlines in their real world environment. I've had the opportunity to visit many foreign airlines and provide consultation and training to pilots, dispatchers and flight ops engineers on a variety of subjects.

Occasional rides in the Boeing simulators provide the ultimate video game experience.

I recently left Flight Operations Engineering for a new position supporting the Boeing-Jeppesen Electronic Flight Bag (EFB). The EFB is a slick little computer with a touch screen monitor mounted as a side display on the flight deck. It hosts a number of electronic documents, performance calculators, moving map displays, and electronic navigation charts for the "paperless flight deck" of the future.

Outside of Boeing, I enjoy staying involved with my church, water skiing, and serving as board chairman of a non-profit children's camp. I love the Northwest but really miss BBQ, Tex-Mex, and Whataburgers…and my folks, of course.

Mr. Gonzalez begins serving his first term on the UT ASE/EM External Advisory Committee this fall. Welcome back Armando!

Tim Crain, PhD ASE, 2000

My workdays usually begin with the following exchange between my two daughters and myself:

"Bye kids, I'm off to work!"
"Bye Daddy (in unison), have fun working on the spaceships!"

Tim with his wife Melissa, their newborn Connor, and daughters Jessica (back) and Isabella (front).

That is advice that I have the good fortune of being able to realize almost every day at my job at NASA. Since graduating from UT with my Ph.D. in Aerospace Engineering in August 2000, I have been working at the Johnson Space Center in Houston, Texas in the Advanced Mission Design Branch of the Aeroscience and Flight Mechanics Division. My main responsibility has been in supporting the development of a real-time entry, descent, and landing navigation system for the 2009 Mars Science Laboratory lander. Fortunately, I have been able to maintain close ties to the UT Aerospace Engineering department through a support grant with Dr. Bishop and his team, which we have used to design and implement Kalman filters, trade landing radar system options, and support guided entry performance analysis. This work is very challenging and additionally fulfilling because we work on a multi-center team with members from JPL and Langley Research Center as well.

Other projects I have worked on in the past 3 1/2 years include continuous propulsion system trajectory design (with UT), adaptive navigation system research under the Space Launch Initiative program (with UT), Mini AERCam autonomous free flyer relative navigation for Shuttle inspection, and Hubble Space Telescope autonomous rendezvous and docking for rescue and decommissioning. With the new space exploration vision in the early planning stages I have also participated in a number of technology and architecture planning and strategy sessions that could end up being the foundation for our return to the Moon and Mars.

In addition to my professional efforts, I also try to pull my own share of duties raising my three beautiful children (Jessica 5 yrs, Isabella 3 yrs, and Connor 4 months) with my wife Melissa, teach astrodynamics at the University of Houston-Clear Lake, organize a JSC technical seminar series, and play bass in a rock band. Life is busy but couldn't be any better at JSC. The education and skills I received while at UT as an undergraduate and graduate student have enabled me to be a contributing member of an exciting endeavor. I encourage UT engineering students to take advantage of the NASA Coop program and come down and help me have fun working on the spaceships!

Hook'em Horns!

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The department always welcomes your alumni news and comments. Please send them attention to:

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Keep in Touch!

We enjoy receiving your alumni news, and need more from you to keep the "Blast From the Past" column up to date. If you are interested in keeping in touch, please complete the on-line update form at **www.ae.utexas.edu/alumniupdateform.html**. Thank you for your interest in the department. We look forward to hearing from you soon!

ASE/EM Fall Festival 2004!

Local artist Sara Hickman
Photo by Todd Wolfson

SAVE THE DATE NOW!

Friday, October 15, 2004

To celebrate the Fall semester, the ASE/EM Department invites you to attend its annual Fall Festival 2004!

What: **LIVE MUSIC by the local and very talented artist, Sara Hickman, FREE FOOD from O's, student-led activities, a drawing for free prizes, with a grand prize pair of UT vs. Missouri football tickets!**

When: **Friday, October 15th, 2004, 4 – 7 pm**

Where: **Outdoors Engineering Complex beneath the BIG TENT (near ENS building)**

Please be sure to register for this event! Visit www.ae.utexas.edu/fallfestival for online registration and more information.