



Providing a diverse group of Colorado students with experiences in space to prepare them for our nation's future space programs.

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Colorado Space Grant Consortium

Student News

DemoSat V -- From Balloon Launch to Shuttle Launch

On August 4, 2007, six DemoSat V payloads were launched from Deer Trail, Colorado. Students are now analyzing the data and reviewing successes and failures. Advanced BalloonSats are flown in the DemoSat program. Students design, build, and fly payloads to demonstrate technologies and experiments suggested by NASA engineers and scientists. This year eight Colorado colleges participated in the program: Adams State College, Colorado School of Mines, Colorado State University, University of Colorado at Boulder, Fort Lewis College, Metro State College, University of Northern Colorado, and Western State College.



DemoSat V launch

Fort Lewis College students built a DemoSat that successfully measured both the thermodynamic properties of Earth's atmosphere and the deviation from the Earth's surface gravity at high altitude. Data analysis and reporting will continue until mid-October when they will present their results to the faculty and students of the FLC physics and engineering department. Preliminary results show a reduction in the acceleration due to gravity at high altitude; analysis will help determine the statistical significance of these results.

The University of Colorado at Boulder students' DemoSat payload had two primary objectives: test CubeSat's high speed communication system and to refine a solar deployment system that might be used on future CubeSat missions. The communications system worked, allowing the students to gather excellent data for CubeSat. The students proved that a NiChrome deployment system is feasible for small satellites, which means the CubeSat team will now be considering a NiChrome deployment system for their antennas.

DemoSat continued on page 3

COSGC Spring 2007 Symposium

COSGC's Annual Undergraduate Student Space Research Symposium was held on April 4, 2007. Thirty COSGC students from around the state presented research papers to panels of industry engineers and scientists. Industry partners also volunteered their time to read and judge student papers prior to the presentations. Students competed for cash prizes sponsored by local aerospace companies.

The Grand Prize winner was Brian Kester (United State Air Force Academy) with his paper on "The Ethics of Space Weaponization." Session winners were David Fifield and Matt Hanley (Metropolitan State College), "Inertial Measurement and Realistic



Grand Prize winner Brian Kester (left) stands with Brian Sanders (right)

Symposium continued on page 6

Colorado Space Grant Affiliates

Adams State College
Randall Emmons

Colorado School of Mines
Robert Knecht

Colorado State University
Azer Yalin

Colorado State University—Pueblo
Huseyin Sarper

Fort Lewis College
Craig Tyler

Mesa State College
Phil Kavanagh

Metro State College of Denver
Keith Norwood

Pikes Peak Community College
George Tessmer

Space Foundation
Iain Probert

University of Colorado at Boulder
Brian Sanders

University of Colorado at Colorado Springs
Steve Tragesser

University of Northern Colorado
Robert Walch

Western State College
Theodore Violett

Director's Corner

This August, I had the privilege to take 19 Colorado Space Grant Consortium Demosat V students from the Colorado School of Mines, Fort Lewis College, Colorado State University, the University of Northern Colorado, Metro State College, and the University of Colorado at Boulder to the launch of the Space Shuttle Endeavour at Kennedy Space Center. This was a recharging experience for me and a life-changing one for the students. As Endeavour roared out of sight, I turned around to look at the students. I could see the excitement in their eyes and the wonder in their minds. I found this sight more powerful than the one occurring behind me. I knew at that moment that all the efforts and expense to bring these students to this event was worth it.

Looking at those students at the shuttle launch is something I will never forget. I only hope that the experience they had will inspire and engage them with a renewed belief that they can be a part something greater and bigger than themselves.

Students today need to see that what they are doing can lead to great achievements in exploration and discovery. It is vital to their future and this country's future. Students involved in Colorado Space Grant Consortium today are able to be creative with their minds and productive with their hands. I believe the Colorado Space Grant Consortium is providing students across Colorado with unique opportunities to gain valuable hands-on experiences with real-world, space payloads, and satellites.

The Colorado Space Grant Consortium is stronger and more engaging than ever before because of the students involved. Our new RocketSat program, which provides students the next step after BalloonSats, was developed by COSGC students. The new 50 kg DANDE satellite was designed and proposed by COSGC students and is providing students coming up from RocketSat and CubeSat programs with more challenging and demanding experiences. Our statewide DemoSat program, now in its sixth year, continues to be a great way for students to begin and then expand their experiences at COSGC. We have been working for the last year to convert the RocketSat program into a statewide program, which will hopefully be offered next year.

I welcome three new affiliate directors to the COSGC family. Dr. Huseyin Sarper, professor of engineering, has been with the COSGC program for many years and is taking over as affiliate director at Colorado State University-Pueblo. Dr. Sarper is taking over for Dr. Wolfgang Saver who retired in May 2007, after leading the CSU-Pueblo program for over 10 years. Dr. Steven Tragesser, assistant professor of aerospace and mechanical engineering, is replacing Dr. Jason Roney as affiliate director at the University of Colorado at Colorado Springs. And Dr. Azer Yalin, professor mechanical engineering is replacing Dr. Paul Wilbur as affiliate director for Colorado State University in Fort Collins. Dr. Wilbur is on his way to retirement after serving as affiliate director for seven years.

Our partnerships with Colorado aerospace industries continue to bring new programs to COSGC students. Our EduSourcing program has placed 17 students in six companies since its inception in 2006. We have been writing proposals with companies like Ball Aerospace and Southwest Research Institute for future student projects. Redefine Technologies partnered with COSGC on a Small business Technology TRansfer (STTR) Phase I proposal which successfully led to a larger Phase II award this year. A big thanks to Steve Wichman (former COSGC staff member) for including COSGC in this partnership. We continue to get tremendous mentor and test support from companies like MicroSat Systems, Lockheed Martin, Starsys, Ball, Design_Net, STK, SwRI, EOSS, and Redefine Technologies. Without our industry friends, COSGC students would not have the same experiences.

The future of COSGC is very bright. The students involved with COSGC are this country's future workforce. I have the wonderful opportunity to interact with this future workforce everyday and I can tell you, without a doubt, that they will do great things and they will be part of something bigger and greater than themselves. I hope you enjoy reading this edition of the COSGC Student News and learning about all the amazing things that are happening in our program and in the lives of our students.

Chris Koehler

Chris Koehler



COSGC students watch the Endeavour space shuttle launch.

DemoSat V

continued from page 1

The finale of the DemoSat V program took place August 5 - 8 as Chris Koehler, COSGC Director, and 19 DemoSat V students traveled to Denver International Airport directly from the payload recovery site following the DemoSat V launch. The group participated in a two-day NASA educational conference and attended the Endeavour space shuttle launch in Orlando, Florida. COSGC DemoSat students presented their findings to NASA officials during the conference. The conference included speakers from NASA and sessions on educational topics. The main focus of the conference was STEM (Science Technology Engineering Mathematics), as well as future workforce development issues. Space Grant students were given a special tour of the Kennedy Space Center.



COSGC students visit the Kennedy Space Center in Orlando, Florida.

DemoSat V student Andrew Berg stated, "This trip was amazing. The challenges that we've overcome to go to space are monumental, and to meet the people who keep taking them on, one by one, was truly inspiring. We saw the tools that our predecessors used to go to the moon. We met the people who make shuttle flights possible beneath Discovery's belly. And we felt Endeavour hurling itself from planet Earth. No vacation I've ever taken compares."

COSGC Affiliates



Colorado Space Grant Consortium (COSGC) uses the excitement of our Nation's aeronautics and space programs to inspire, educate, and develop America's future technological workforce by enabling a diverse community of college and university students.

COSGC consists of 12 universities and colleges and 1 foundation in Colorado. COSGC students have access to faculty and lab resources, including access to a clean room, assembly labs, mission operations and control centers and ground tracking stations as well as numerous partnerships with industry.

Students will make progressive steps throughout their time with COSGC. As a student progresses, projects become more complex and relevant to current space projects. Students at COSGC gain valuable job skills that place them ahead of other individuals in the workforce.



Metro student holds his team's DemoSat V payload.



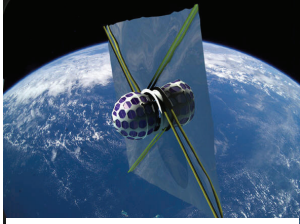
UNC student holds her team's DemoSat V payload.



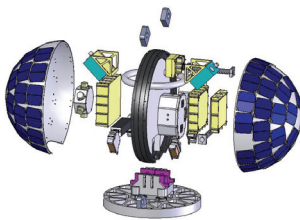
DemoSat V students standing under space shuttle Discovery.



STS-118 Mission Patch



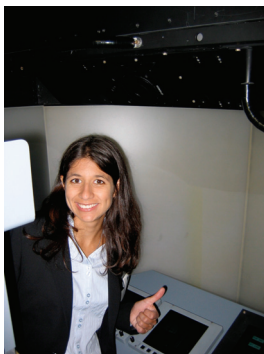
Artist's rendition of DANDE above Earth with its "space parachute" deployed



3D model of DANDE



The DANDE team answers questions after the PDR presentation at the Small Satellite Conference in Logan, Utah



ESMD student Kathryn Hamera inside the Ames Vertical Motion Simulator

Isn't That DANDE

COSGC students awarded grant from Air Force Research Lab, and work on the Drag and Atmospheric Neutral Density Explorer (DANDE) is under way.

Out of the 40 schools that proposed for the AFRL competition 11 schools were chosen, COSGC being one of them. Each of the 11 schools will be given two years and equal amounts of funding to design and build a 50 kg nanosatellite. At the end of the two year period, each school will present its final design, competing for a free launch in 2011 and two more years of funding.

DANDE will be a density, wind, and composition-measuring satellite that will provide data for the calibration of models, improve our understanding of the thermosphere, and demonstrate novel and low-cost measurement techniques. DANDE will be a spherical spacecraft equipped with accelerometers, pressure sensors, and a mass spectrometer



The DANDE team culminated the system concept development phase with the System Concept Review (SCR) teleconference with AFRL in April 2007.

which will provide timely daily-average and in-situ data over a span of several months.

COSGC students are collaborating with the University of Colorado at Boulder Aerospace Engineering Sciences department, Air Force Space Command - Space Analysis/A9A, and research faculty at the National Oceanic and Atmospheric Administration. COSGC Director Chris Koehler is the principle investigator while, Dr. Jeffrey Forbes and Dr. Scott Palo from the CU aerospace department are the co-investigators.

Collaborators include Bruce Bowman, a senior astrodynamist, and Dr. Tim Fuller-Rowell, a senior research associate and fellow of the Cooperative Institute for Research in Environmental Sciences.

In August, the DANDE team held its Preliminary Design Review in Logan, Utah during the Small Satellite Conference. Their Critical Design Review is on February 25, 2008 and satellite construction will begin in summer 2008.

COSGC Exploration Systems Mission Directorate Effort

Funding through the NASA Exploration Systems Mission Directorate (ESMD) provided new opportunities for Colorado Space Grant students. Several programs have been supported through this supplemental grant, including Senior Design Pro-

jects, Engineering Challenge Opportunities, and Exploration Internships.

For Senior Design Projects, engineering students at the University of Colorado at Colorado Springs designed and prototyped exercise hardware systems for the Constellation Program.



ESMD students Mark Gefreh, Kate Hamera, Todd Mosher (MSI), Robert Paul, Joseph Trojan, and Leon Slavkin meet Peter Worden, the director of NASA Ames Research Center.

moving vehicle as part of their senior design project.

ESMD support made possible student participation in the COSGC Robotics Challenge, which challenged students to design, build, and demonstrate a fully autonomous rover on the extreme terrain at the Great Sand Dunes National Park (see page 6 for more detail).

CSM student Mark Gefreh and University of Colorado at Boulder students Kathryn Hamera, Robert Paul, Joseph Trojan, and Leon Slavkin participated in an internship with MicroSat Systems, Inc. (MSI) in which they worked with MSI engineers on preliminary research and design of a Lunar Navigation and Communication System.

Students at the Colorado School of Mines (CSM) designed and constructed a prototype lunar utility and science rover to demonstrate soil preparation on the lunar surface and to test the effects of the lunar terrain on a

Up, Up, and Away – RocketSats II & III Launch

COSGC students at the University of Colorado at Boulder have built and launched three RocketSat payloads and are currently working on a fourth.

RocketSat II launched on April 28, 2007 after a year of development. The purpose of RocketSat II was to design an easily modified system that could fly multiple payloads into space at one time for multiple science and engineering applications. A six tier, modifiable structure was built, command and data handling/power subsystem was developed, science experiments were chosen, and software was written for the payload. Data was obtained for this mission including acceleration, temperature, and pressure profiles of the flight. Clear video footage of the

flight was also taken by the team. University professor Dennis Akos also flew a GPS receiver with the payload. New Mexico Space Grant helped cover the costs of this launch.

The third generation of RocketSat contained one large plate with redesigned equipment, which built on what was learned from RocketSats I and II. RocketSat III was launched June 20, 2007. The redesigned equipment on

RocketSat III performed flawlessly, providing valuable information for the next generation of RocketSat. RocketSat experiments included measurement of acceleration, pressure, temperature, and stress. There was also a Geiger counter and microwave detector on the payload. Experiments were used to characterize the flight environment.

Currently the RocketSat team is developing a fourth generation RocketSat that is due to launch in late 2008. The flight will last 15 minutes and reach an altitude of around 70 miles (113 km). A typical payload weighs roughly a pound and must fit within a 9.5-inch diameter, one-inch tall cylinder. RocketSat is being developed into a state-wide program like the DemoSat program and will begin in 2008.



COSGC students attend the RocketSat II launch in New Mexico.

COSGC Student Attends NASA Academy Internship

University of Colorado at Boulder aerospace engineering Senior and former COSGC student Farheen Rizvi spent this past summer as a NASA Academy intern at the Goddard Academy outside Washington, DC.

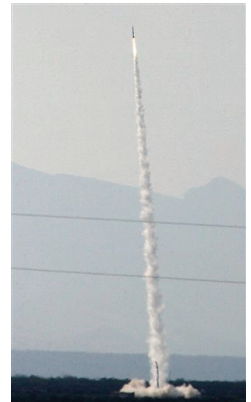
For Farheen, the NASA Academy internship was one of the most exciting experiences that she has ever had. Farheen's team was made up of 16 other men and women from around the country, Europe and Puerto Rico. Each of the students worked on an individual project with an engineer or scientist at Goddard Space Flight Center. Farheen's project was conducting analysis on flight dynamics for the Lunar Reconnaissance Orbiter. This spacecraft will be launched next year in a 50 km, polar, circular orbit around the moon. Due to the uneven surface of the moon, gravity will eventually cause the spacecraft to crash into its surface if the orbit is not

corrected periodically. Farheen's job was to determine where in orbit the propulsion systems should fire the thrusters and how fast the system should fire the thrusters to correct the spacecraft's orbit. Farheen's previous experience at Space Grant came in useful during her internship. "I am glad to have been a part of Space Grant because familiarity with Satellite Tool Kit was a big plus and I had the opportunity to use it while I was at Space Grant," she said. NASA Academy interns also worked on a group project. Farheen was a part of the group that focused on a Venus Sample Return Mission.

Interns visited the Kennedy Space Center, saw the Atlantis shuttle launch, and took a tour of the Endeavour shuttle. Interns also visited the Johnson Space Center where they toured the astronaut training facilities, went inside the flight simulator and

saw the inside of the space shuttle. Interns were even treated to a tour of the aircraft hangar by Astronaut Stephen Robinson. While at the Johnson Space Center, interns learned how astronaut suits are made, visited the neutral buoyancy tank where they simulate O_g environment, and heard presentations from engineers about upcoming research and development (including the head of the astronaut selection committee informing interns what they look for in astronauts). Interns also traveled to Colorado where they visited Lockheed Martin, Ball Aerospace, NOAA, and the Air Force Academy.

"Goddard had a very warm environment among the people," explained Farheen. "I enjoyed my time very much...truly an amazing and life changing experience."



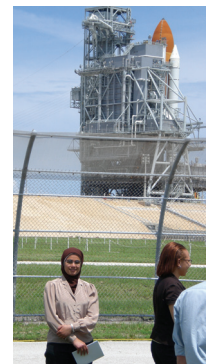
RocketSat II launches in Las Cruces, New Mexico



RocketSat III payload



Picture of Earth taken by RocketSat II



Farheen Rizvi stands in front of the Atlantis space shuttle.



Student pictures from the Fort Lewis Observatory



Special thanks to our symposium sponsors!



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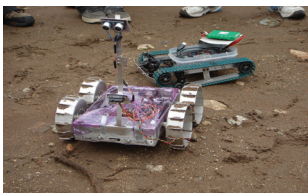
MicroSat
Systems



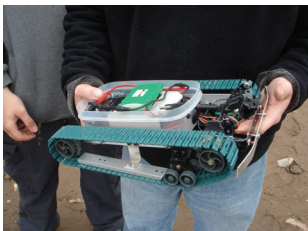
Design_Net
Engineering



CSU-Pueblo students test robot in the sand dunes



CSU-Pueblo student robots in action



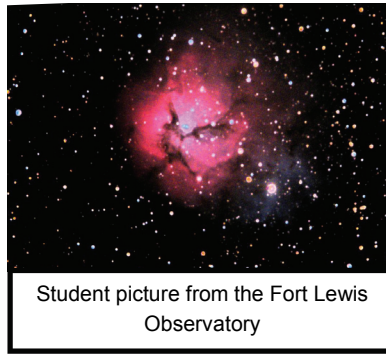
CSU-Pueblo student robot

Exciting Student Research at Fort Lewis College

Space Grant students at Fort Lewis College (FLC) have been busy this past spring semester. Several research projects have been completed, started, or are under way.

Utilizing the FLC Observatory, recent physics graduate Joanna Gordon completed a successful research project to measure the light curve for a distant supernova.

Joanna also worked with current physics student Shane Mayer-



Student picture from the Fort Lewis Observatory

Gawlick on a DemoSat V balloon payload that successfully measured both the thermodynamic properties of Earth's atmosphere and the deviation from the Earth's surface gravity at high altitude. Data analysis and reporting will continue until mid-October when they will present their results to the faculty and students of the FLC physics & engineering department.

Symposium continued from page 1

Post-flight Visualization," Matt Larson (Colorado State University), "Real-Time Control and Power Supply for a Self-Contained Plasma Contactor System," and Steven D. Stein (U.S. Air Force Academy), "Benefits of the Star Grain Configuration for a Sounding Rocket." Awards were also given to student teams for the winners of a hardware demonstration session - First Prize honors were for



The F.A.S.T. Pallet team from CSU took first place in the hardware demonstration session.

"F.A.S.T. Pallet" (Colorado State University), and the runner-up

was "RocketSat" (University of Colorado at Boulder).

Robot Challenge in the Dunes

The Colorado Space Grant program at Adams State College hosted the first COSGC Robot Challenge on April 7, 2007 at the Great Sand Dunes National Park. Student teams were challenged with designing and building an autonomous robot, capable of tracking a homing beacon and maneuvering the harsh environment of the dunes. The challenge was designed by COSGC Affiliate Director, Dr. Randall Emmons, professor of physics at Adams State College. "Over 30 years ago, NASA tested the Viking Lander on the dunes," explained Dr.

Emmons. "Engineers were looking for an environment similar to what they thought the Viking Landers would find on Mars. Like us, they thought the area near the dunes was perfect." Two

student teams from Colorado State University-Pueblo participated in the event, which had nearly 50 spectators from around the state. "Unlike the Viking Lander, student robots must be

fully autonomous," Dr. Emmons said. "This year's event included some extremely talented students. We hope even more students will accept the challenge and participate in the event next year." The Robot Challenge is part of the COSGC's state-wide Workforce Development Initiative.



Spectators watch as COSGC students from CSU-Pueblo demonstrate their autonomous robots.

Space Grant Student Part of Inspiration at JPL

University of Colorado at Boulder aerospace junior and COSGC student Emily Walters spent the summer as an intern at the Jet Propulsion Laboratory (JPL) in Pasadena, California. Here is her story:

*This summer, I had the opportunity to work at NASA's Jet Propulsion Laboratory as a part of a nine-person team whose goal was to design a stand-alone climate and weather station to be delivered to Mars by a future rover mission. The mission is called **Inspiration: Mars Student Climate Lander (MSCL)** and is a low-mass lander that can both observe Martian weather at the surface, as well as probe the structure and composition of Mars' planetary boundary layer. The lander itself is designed to fit within a 1.0 x 1.0 x 0.15-meter envelope, allowing it to ride to Mars in 2016 on the bottom of JPL's Astrobiology Field Laboratory (AFL) rover. After the rover lands, MSCL will be dropped off on the Martian surface to independently perform its mission, while AFL drives away. For the summer, I worked on the thermal subsystem design to keep the rover warm in the cold Martian conditions.*

My work for the summer involved developing thermal models for the lander and creating a system-wide design for the thermal aspects of the lander. Since it is still early in its design phase, I focused on the higher level modeling. In designing the thermal aspects of the lander, I had to constantly work with all of the other subsystems for the best system



JPL Intern and Space Grant student Emily Walters stands in the Mars yard at JPL. In the background is the new MSCL rover.

design. While at JPL, I had the opportunity to get advice from many different engineers. Not only did this help me for the lander design, but also, interacting with the engineers allowed me to glimpse into other work at JPL.

This experience has taught me a lot about working on the conceptual design for a project. I thoroughly enjoyed being a part of a planetary mission and hope to work on these types of projects in my career. My advice for Space Grant students is to get involved with projects that you are interested in and work hard with your team. My experience was great and from it I not only learned a lot about working on these projects, but also, realized an interest in working for JPL in my future. To think that someday my design may end up on Mars makes this experience amazing.

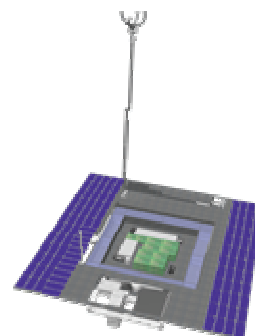
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Emily was able to attend the JPL internship because she was awarded the Elaine Hansen NASA Internship. Emily is the second recipient of the award, which provides winners the opportunity to attend the NASA Academy of their choice. Colorado School of Mines student Chris Meehan was the first recipient of the Elaine Hansen Award. Meehan had an internship at the Exploration of the Universe Division of NASA at the Goddard Space Flight Center in Greenbelt, Maryland where he repaired and modernized an infrared spectrometer. Applications for the third Elaine Hansen NASA Internship Award will be distributed to active members November 30, 2007.

JPL



*"To think that
someday my design
may end up on
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amazing."*



Drawing of the MSCL

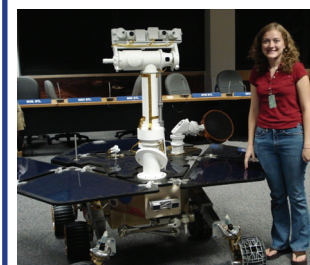
New Student Opportunities at Western State

Undergraduate students at Western State College participated in a new Gateway to Space Science class based on the successful BalloonSat program and the COSGC developed C-SMARTS (Colorado Students and Mentors Applying Research and Technol-

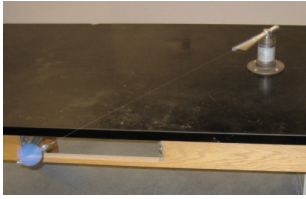
ogy in Space) curriculum. Space Grant at Western State sponsored the course through a workforce development grant to support eight students working on start-up research projects.

During the summer 2007 term,

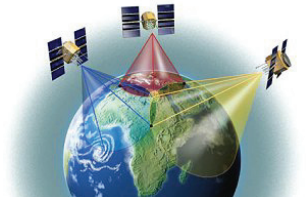
WSC Space Grant offered a solar system astronomy course as part of its K-12 Teacher Training Institute. Fourteen pre- and in-service teachers, primarily from rural Colorado school districts, completed the course.



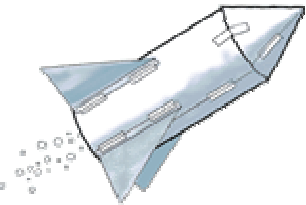
Emily Walters standing next to a model of the Mars rover



Working model of UCCS Space Sling



NASA Global Voyagers To-Go kits will include GPS activities.



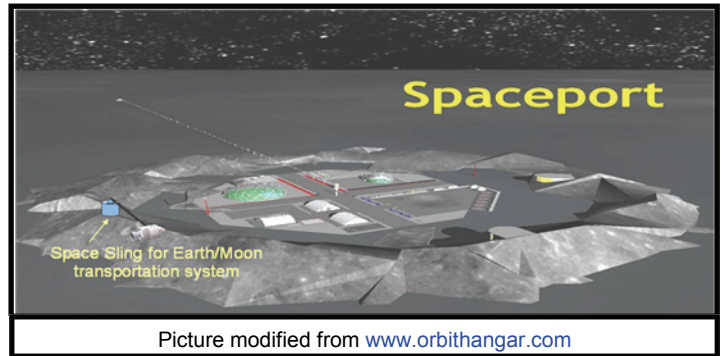
NASA Global Voyagers To-Go Kits will include the Pop Rocket activities!



Panelists from the Colorado Space Business Roundtable event take a tour of the Boulder COSGC facilities.

UCCS Students Demonstrate a Space Sling

Space Grant students and faculty at the University of Colorado at Colorado Springs (UCCS) began a project to demonstrate the basics of a "space sling" – a device that can accelerate payloads to high speeds for lunar and interplanetary travel without the use of an expensive, single-shot rocket. The space sling consists of a motor, a tether with the payload attached to the end, and a platform that transfers the energy from the motor into the spinning tether. Since the space sling uses only replenishable electrical power (provided by solar cells), this sys-



Picture modified from www.orbithangar.com

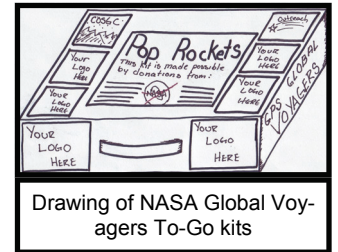
tem could be used to help establish a colony on the Moon or Mars. The demo at UCCS is scaled down, but it tests many

of the challenges that an actual system would need to overcome.

Focus on Outreach

City on Mars ~ Colorado Space Grant at Fort Lewis College provided educational resources to enable students from Durango High School to participate in the International Space Settlement Design Competition July 21-23, 2007 at NASA's Johnson Space Center. The Durango Aerospace Design Team worked with teammates from around the globe to design a complete city on the planet Mars. The team finished the task in 42 hours and walked away with Grand Prize honors!

To-Go Kits ~ Through collaboration with Dr. Scott Palo (CU, Aerospace Engineering) and sponsored by an education and public outreach grant from NASA, COSGC has developed and packaged "To-Go Kits." The kits are designed to be used by 4th and 5th grade teachers in the classroom or in after-school programs. Activities include Pop-Rockets (experiment on which rocket fuel is most efficient), Operation Communication (how satellites receive and understand data), and Navigation Extravaganza (triangulation and direct use of GPS technology). Kits will



be available by November 2007 and will be distributed to teachers around the country. Teachers will be able to receive the kits free of charge, but will be required to submit an essay of interest. Updated information will be available at <http://spacegrant.colorado.edu/outreach> in early fall.

Academia + Industry = Ideal Workforce Development

COSGC hosted an exciting forum called "Aerospace Workforce Development: Universities & Industry Working Together" in February 2007. The forum was sponsored by the Colorado Space Business Roundtable and the Laboratory for Atmosphere and Space Physics at CU-Boulder. Administrators, faculty, and students from Colorado institutions of higher education engaged with community leaders and scientists, engineers, and business managers from Colorado industries. They explored

current collaborations, discussed lessons learned, and brainstormed new opportunities for industry and academia to create networks that strengthen the experiences students have while in college and create a more robust pool of applicants to fill positions in science, technology, and engineering fields.

Attendees participated in a "reverse-panel" with panelists asking the audience questions and facilitating discussions. Students participated in the event by engaging in the dialogue and providing

demonstrations of the space hardware projects they are a part of in the Space Grant Program.

The result of the forum was a list of specific action items to begin addressing the most pertinent issues around workforce development, industry, and academic partnerships.

The next event will be December 4, 2007 at the Museum of Nature and Science in Denver.

EduSourcing Program Supports Students and Companies

The EduSourcing program began in the spring of 2006 with the purpose of creating and supporting opportunities for COSGC students to work with engineers and scientists from Colorado aerospace companies. The EduSourcing program started with two companies offering six student positions. By the end of the first year, the program had expanded to four companies and 10 positions, and in 2007 the program added two more companies and seven new positions. By 2010, it is expected that at least 12 companies will be involved, offering 48 student positions per year.

Students in the EduSourcing program work with industry mentors on campus or at the company facilities to develop, design, and demonstrate technologies, concepts, and ideas. The companies involved provide funding to COSGC to compensate the students involved and to support the COSGC organization. The companies involved benefit from this relationship by gaining access to recruit students from each of the COSGC's 12 campuses, essentially building a workforce recruitment pipeline

directly to the students. Several EduSourcing students have been hired into companies after graduation.

"I am really enjoying the internship. I have been helping with the testing and integration of their DSX satellite. I have been learning a lot about testing and integration and really enjoy the experience."—**Mark Gefreh** (Colorado School of Mines) current EduSourcing student at MicroSat Systems.

Since the beginning of the program COSGC EduSourcing students have worked with MicroSat Systems, Inc., Lockheed Martin, Composite Technologies Development (CTD), Advanced Solutions, Inc. (ASI), Design_Net Engineering, ExoTerra, and Redefine Technologies.

"EduSourcing has proven to be an economical surge labor force with the capability to solve engineering problems while simultaneously providing us the opportunity to recruit our workforce of the future."—**Brett Tobey**, Lockheed Martin

COSGC is always looking to add new companies to this program. If you think your company would be interested, please contact us. It is

very easy to get involved and to gain direct access to the future workforce.

"The EduSourcing program offered by the Colorado Space Grant Consortium has been outstanding for MicroSat Systems. Not only does it provide very competent and productive engineering students that support our programs, but also the mentoring relationships our engineering staff forms with the students, and the students' energy, creates a positive atmosphere around the company that gives everyone a boost. Add to that our ability to then hire great new graduates that can come in and be productive the first day on the job, and it is easy to see why we will continue to participate in the program." **John Roth** President and Chief Operating Officer at MicroSat Systems.

"Through EduSourcing, I was able to find an internship during the school year which continued until I graduated. I was eventually offered an employment with the company. I am glad to have taken advantage of the opportunities that EduSourcing provided." **Ponphet Homchanh** former EduSourcing student at MicroSat Systems now employed there.

EduSourcing Companies



MICROSAT
SYSTEMS



TREADS Gets Traction

COSGC students at CU-Boulder are working on the Testbed for Responsive Experiments and Demonstrations in Space (TREADS) program. TREADS is a collaboration between Redefine Technologies and Professor Dan Connors (ECE) funded through a Phase II NASA Small business Technology Transfer (STTR) grant. TREADS is the follow-on program that grew from the Triple 3 Redundant Space System (T3RSS) Phase I STTR program that COSGC and Redefine Technologies completed in 2006. The TREADS program is a technology demonstrating and scientific gathering platform specifically designed to allow investigators to easily and

quickly integrate and fly their instrumentation on a "full-service" operational satellite. Students are working in conjunction with Rede-



fine Technologies to produce the framework (power, communications, command and data handling, heat and structural support) necessary to support customer's devices in space.

Graduate and undergraduate students are currently working together on the preliminary design of the TREADS system, particularly the communications system, the power system, the structural hardware, and the thermal analysis.

The TREADS project is an exciting and unique opportunity for COSGC students that provides them with experience in a contractor-type arrangement with an external customer. It is a chance for students to work on a satellite from design to delivery, while also offering them a view into 'market driven design choice.'



TREADS team meeting

Support Tomorrow's Workforce Through a Gift to Space Grant

Support from our former students who are now successful engineers and scientists is increasing every year. So is the support from our industry partners. We would like to support an additional 10 students every year through this fund-raising effort. A typical student working the entire year at Space Grant receives about \$13,000 in paid wages. Every contribution, no matter the amount, contributes toward this goal and is tax deductible in most cases. If you would like to support the students at the Colorado Space Grant Consortium, please complete the card below and send it in today! Or call the CU Foundation at 1-800-405-9488.

The Colorado Space Grant Consortium is moving forward into a new phase of development and growth. You can see our strategic plan at http://spacegrant.colorado.edu/strategic_plan.htm. We believe we are making a significant difference to students from all backgrounds and areas of study. With additional support, we can do much more for current and future higher education students in Colorado. We would be pleased to explore ways to collaborate with you.

Our nation needs good engineers and scientists with degrees from great colleges and universities to fill the vacancies being created by the "graying of the workforce." Through our student hands-on programs and partnerships with Colorado colleges and universities, NASA, and aerospace companies, COSGC can help give our nation the best. Please join us in making this happen.



"Space Grant provided me an opportunity to work on exciting projects that the traditional education path didn't offer. I was on the ESCAPE II shuttle payload team and found the experience unrivaled by anything I did in class. Building and testing a real payload gave me insight into what the aerospace industry was going to be like. On programs I have worked since college I can see similarities between tasks I have now and work that I did with Space Grant. I want to see this program continue to be available for other students who want to enter this field so that is why I financially support Space Grant each year."

Jason Baugher, 1995 COSGC Graduate (Stellar Solutions Inc.)

We have different levels of support:

Balloon	\$1-\$99	includes newsletter and Space Grant tour
Rocket	\$100-\$299	includes items above plus a T-shirt
CubeSat	\$300-\$499	includes items above plus a coffee mug
Satellite	\$500-\$749	includes items above plus a COSGC Space Pen
Moon	\$750-\$999	includes items above plus the donors name and year on the Student Support Plaque
Mars	\$1,000 & up	includes items above plus a special lunch with students in your honor.

To sponsor COSGC students you can send a check, donate online, or make a gift by phone at: 1-800-405-9488



Space Grant College Fund 0121379:

Please send your support by making your tax-deductible gift today.

☐ \$100 ☐ \$300 ☐ \$500 ☐ \$700 ☐ \$1,000 ☐ _____

Please make your check payable to: CU Foundation

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Under Getting Started click on the University of Colorado—Boulder link. Scroll to the bottom of the page and click Give Online in the Other box. When entering a *Description of Gift* make sure to note that it is for "Space Grant College Fund" and include description number 0121379.

To support by check please mail the form on the left:

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Space Grant College Fund
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Boulder, CO 80309-0520**

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Life After Space Grant—What They're Doing Now



Jennifer Rocca is a senior flight systems engineer at JPL. Jennifer was hired at JPL after graduate school in 2000 (she has a B.S. in aerospace engineering from CU-Boulder and an M.S. in aeronautics and astronautics from Stanford). Jennifer originally started in the Mission & Systems Architecture Section working on Mars Advanced Studies, including Mars Sample Return and Mars Outpost, and serving as a systems and cost engineer for Team X. She moved to the Flight Systems Engineering Section to be the Instrument Systems Engineer on the GRACE mission, a set of twin Earth-orbiting satellites that would go on to map gravity over 1,000 times more accurately than the previous 30 years of gravity research. For this assignment Jennifer lived in Germany for two years at the spacecraft contractor location. After GRACE launched, she joined the Deep Impact program where she was in charge of Mis-

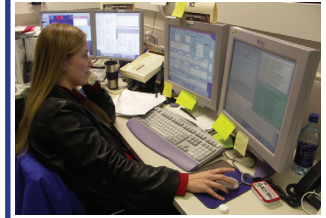
sion Scenario Testing, the Launch Phase, and the Comet Encounter Approach Phase. After the comet encounter, Jennifer put the spacecraft to sleep, but still checks in on it from time to time until NASA decides whether it will have an extended mission. She worked on the Space Interferometry Mission (SIM-PlanetQuest) for almost a year as the spacecraft systems engineer (this project is in its design phase). Jennifer currently works on the Dawn mission as the launch flight director and phase lead. Dawn launched on September 27, 2007 of this year, so needless to say she has been VERY busy in addition to welcoming her new daughter into the world. "I absolutely love working here at JPL," Jennifer beams, "and I am looking forward to introducing the world to deep space exploration, JPL-style." Dawn, part of NASA's Discovery Program, is a project destined to rendezvous with two asteroids. To learn more about the Dawn mission, visit <http://dawn.jpl.nasa.gov/>.

Jennifer's experience with the Colorado Space Grant Consortium started when she was a freshman with the EOR (Educational Ozone Researcher) proposal. Jennifer was impressed with Space Grant facilities, students, staff and how much students were able to do for these small space missions. Jennifer became part of the core team for the HOMER rocket working on the proposal all the way through to the Coast Guard recovery post-flight. She was the power team lead on HOMER and went on to build not only the power system, but also a part of the main wiring harness. She spent six weeks at the launch site in Virginia performing environmental tests, and was in the block house when HOMER launched. Working on the HOMER mission was her first introduction to the engineering of space flight. "HOMER taught me about using teamwork to solve challenging engineering problems," Jennifer said. After HOMER Jennifer helped with Data-Chaser, the space shuttle GAS CAN payload, eventually becoming the project manager and lead systems engineer for the Citizen Explorer satellite mission. She graduated right around the critical design review for Citizen Explorer (CX), and her Space Grant experience allowed her to jump right in at the small satellite lab at Stanford where she was the telecom lead engineer and part of the systems team for OPAL.

While at CU Space Grant Jennifer got to fly on the KC-135, testing the gravity gradient boom for CX. She went to a United States congressional poster session in Washington D.C. and met more than 50 senators and representatives from various states. The topic of her poster was HOMER, and it was one of the most crowd-pleasing posters presented because of how many students were involved and how "real" the project was.

Jennifer explains, "I can say without hesitation that the hand-on experience of Space Grant was absolutely the best part of my undergraduate education. During interviews at grad schools and for jobs, I had several people tell me that I had more experience coming out of school than some people have after years in industry. While the scale of projects we worked on at Space Grant was not nearly as large as those I have worked on at JPL, certainly the basic concepts, team approach to design and development, operations concepts, etc. are the same whether you are working on a small suborbital balloon payload or a large-scale, manned space vehicle."

Jennifer considers hands-on programs like Space Grant integral to college education. "I'd advise students to get involved as soon as possible so by the time you graduate you know what parts of the wide field of engineering most interests you. Know that paper work is part of "real" engineering. Our business really is on the details-I can tell you that on Deep Impact, one keystroke could have kept us from hitting that comet. And I'd say that sometimes, if you stick it out through those long shifts, tedious tests, etc., you will one day have an opportunity to experience that feeling that I know the winning super bowl quarterback feels. That was awesome, and I had something to do with it."



Jennifer Rocca sends the 500th command to the Deep Impact flyby spacecraft just one week after launch. Image credit: Ben Toyoshima

*"I can say without
hesitation that the
hands-on
experience of Space
Grant was
absolutely the best
part of my
undergraduate
education."*



Jennifer and other Space Grant alumni visit the CU-Boulder Space Grant for the HOMER reunion.

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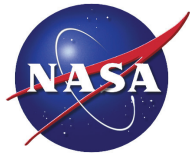
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