

# COLORADO COMMUNICATOR



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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## Autonomous Robots Take Over

2012 marked the 6th year of the Annual Colorado Robotics Challenge. For the first time, the lead-up to the annual event included two statewide workshops designed to get teams started and provide the tools to enable students to design and program autonomous robots.

The Challenge itself was preceded by a MakerSpace where participants worked on their robots while comparing designs and sharing lessons learned with each other in an open format.

The 2012 Colorado Robotics Challenge was highly successful. The Challenge takes place at the Great Sand Dunes National Park. This location provide both difficult challenges (fine, blowing sand; cold temperatures; and this year even an ever growing water hazard from snow runoff) and fun history (the Dunes were the test location for NASA's Viking missions). Robots must be able to reach a beacon while avoiding obstacles that include soft sand, rocks of various sizes, and ditches and hills.

For more information or to get involved and register for the 2013 Colorado Robotics Challenge please visit [spacegrant.colorado.edu/statewide](http://spacegrant.colorado.edu/statewide) programs. The Challenge is open to everyone at no cost.



Participants of 2012 workshops at Pueblo Community College (top) and CU Boulder (middle); Participants in the first COSGC MakerSpace (bottom).

**COLORADO SPACE GRANT AFFILIATES**

**Adams State University**

*George Sellman*

**Colorado Mesa University**

*Phil Kavanagh  
Warren MacEvoy*

**Colorado School of Mines**

*Bob Knecht*

**Colorado State University**

*Azer Yalin*

**Colorado State University Pueblo**

*Huseyin Sarper*

**Community College of Aurora**

*Victor Andersen*

**Community College of Denver**

*Laona Burk*

**Fort Lewis College**

*Charlie Hakes*

**Metropolitan State University**

*Aaron Brown*

**Pikes Peak Community College**

*Liz Coelho*

**Pueblo Community College**

*Bill Hardwick*

**Space Foundation**

*Iain Probert*

**Trinidad State Junior College**

*Cindy Clements*

*Bob Philbin*

**University of Colorado Boulder**

*Brian Sanders*

**University of Colorado Colorado Springs**

*Steve Tragesser*

**University of Northern Colorado**

*Bob Walch*

**Western State Colorado University**

*Suzanne Taylor*

**Director's Corner**

Each year, I have the opportunity to share with you my thoughts on the Colorado Space Grant Consortium as I welcome you to the newest edition of the our annual newsletter. I am always amazed at all that happens in just one year. I truly appreciate my good fortune to be in the position I am to be part of many remarkable experiences with students from all over Colorado. Here are some of my favorite ones from last year.



At the end of February 2012, I went to Washington, DC with three students and one Affiliate Director. They were Mario Gonzalez from Pueblo Community College, Onorio Franco from Trinidad State Junior College, and Nick Laitsch from Fort Lewis College and our Affiliate Director from the same school, Charlie Hakes. They all attended the National Space Grant meeting with me and visited with members of Congress. They each shared the value of Space Grant and NASA Education in

Colorado. I could not have been more proud of these individuals and what they shared.

Our sounding rocket programs continue to grow and reach more students. The picture to the right was taken in August with students and NASA technicians at the Wallops Flight Facility. Everyone is standing around the experiment section of their rocket that was launched in September. It amazes me what students can accomplish when given the opportunity to put their ideas into space.



was the picture on the left taken by a student payload. The image is not the best quality but it was successfully transmitted down during the flight. This image, and several others like it, was on the computer screens of students, faculty, industry, and NASA hours before the rocket was recovered from the ocean. That was so cool.

The picture to the right was taken on July 17<sup>th</sup> and is one of my favorites of 2012. I could talk about this picture for pages but I will summarize. The picture is the taken at the Bon Voyage celebration for our student satellite, DANDE. The student christening the shipping box is Kyle Kemble (see page 12). I met Kyle



when he was a freshman in 2007 and I have had the privilege of seeing him grow through our Space Grant programs ever since. In the audience, are current and former Colorado Space Grant students as well as faculty and industry partners who made the DANDE project possible. Even some of the parents of the students were there, including the parent that took this picture.

I truly believe Colorado Space Grant would not be the great program that it is without the dedication of our Affiliate Directors. The picture to the left was taken from our annual state-wide meeting in September held at the Pueblo Community College campus.

2012 was a great year for Colorado Space Grant. I am very excited for you to see and read about all the wonderful experiences that COSGC students and Affiliate Directors have had over the past year.

*Chris Koll*



### 2012 Undergraduate Space Research Symposium

COSGC's annual Undergraduate Space Research Symposium was held April 21, 2012. Students from COSGC institutions across 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 "The Lazarus Project: Developing a Robust Framework for Future Robotics Research" by Rob Shiely (University of Northern Colorado). Session winners were Quinn McGehan, Michael Mozingo, Megan O'Sullivan and Michael Trowbridge (University of Colorado) with "A Distributed Common Ground Segment for Education Nanosatellites"; Bryan Barnhart, Brian Ibeling, Christopher Nie, and Sushia Rahimizadeh (University of Colorado) with "Selective Pointing Apparatus for Research of Turbulence and Atmospheric Noise Variation"; and Aaron Adamson, Jordan Aken, Motoaki Honda, Casey Kuhns, Rob Shiely, and Maurice Woods (University of Northern Colorado) with "Reentry Experiment Sat-X" [which also won the Most Interdisciplinary Paper honors]. The winners of the hardware demonstration and poster session were Trinidad State Junior College students, Onorio Franco, Jr. & Zach Scott for "Spherical Preemptive Autonomous Rover: S.P.A.R." and Colorado State University students, Michael Finch, Adam Friss, Andrew Kustas and Jason Slavik with "Development of a Near-Infrared Cavity Ring-Down Spectroscopy System for CO<sub>2</sub> Isotope Detection."



The **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 16 institutions of higher education and 1 non-profit foundation in Colorado. COSGC students have access to resources including faculty and industry mentors, a clean room, assembly and integration labs, faculty research labs, a mission operations and control center, ground satellite tracking stations, observatories, as well as numerous partnerships with NASA Centers and industry.

## AFFILIATE UPDATES

### Adams State University

ASU facilitates a thriving robotics program - offering various opportunities for ASU students from all disciplines, K-12 students, and even the general public to get involved. The established program was instrumental in ASU winning a Title V grant for increasing student engagement and success in STEM disciplines. ASU is located in Alamosa, CO - site of the Colorado Robotics Challenge - and was integral at the development of the annual event. ASU Space Grant students work on autonomous rover projects in addition to supporting K-12 and community outreach focused on robotics.



(above) The ASU Robotics Team poses at the Robotics Challenge;  
(below) Participants of the Summer Academy for high school students at ASU.



### Community College of Aurora

The Space Grant program at CCA has implemented an Engineering Club focused on autonomous robot projects. Students built a robot from scratch - hand fabricating an aluminum structure and using both basic stamp and Arduino microcontrollers. In collaboration with Colorado School of Mines (CSM) faculty member, Eric Toberer, CCA is exploring a “2-sided mentoring” approach to providing community college students with research experience leading up to enrollment in a degree program at a 4-year



CCA students holding robot components as they work in the pre-Challenge MakerSpace in Alamosa, CO

institution (see article on page 10). Thus far, one student has participated in the program and is starting his degree program at CSM following a semester-long internship at Kennedy Space Center (see Jaime Corchado in Student Focus, page 14). CCA Affiliate Director, Victor Anderson, is developing a research course at CCA in which students will design and build balloon payloads. The course is based on the Gateway to Space course taught at University of Colorado at Boulder and Metropolitan State University of Denver.

### Pikes Peak Community College

Space Grant students at PPCC designed and launched a balloon payload as a DemoSat team. PPCC Space Grant also engaged PPCC students as tutors in science and mathematics courses and continues to facilitate Star Parties for PPCC students and the general public, while utilizing the PPCC observatory for use by all astronomy classes.



PPCC students and faculty directly following recovery of their balloon payload.

### Community College of Denver

Space Grant students at CCD designed and built a balloon payload that launched with the statewide DemoSat program in April 2012. The goal of the

mission was to collect data using various sensors, while at the same time proving systems that will be built upon by future CCD balloon payload teams. CCD students, along with new affiliate director, Laona Burk, facilitated a Rocket Day for K-12 students from the surrounding area.



*CCD students doing final pre-launch steps on their payload (left); CCD student helping 4th grade students launch their rocket (right)*

**Colorado State University**

A senior design team is working on the ASCENDS CO<sub>2</sub> Laser Sensor project. The CSU student project directly contributes to NASA Langley’s ACSENDs (Active Sensing of CO<sub>2</sub> Emissions over Nights, Days, and Seasons) research. A CSU team participated in the Colorado Robotics Challenge - designing and building an autonomous rover. Two student teams participated in summer research projects: designing and building a high altitude balloon payload to take air samples from the stratosphere and also designing and testing an autonomous Quad Copter.



*CSU students pose with their balloon payload following launch and recovery (above); the CSU Quad Copter in action (below)*



**Colorado State University - Pueblo**

Space Grant students at CSU-Pueblo completed their work with faculty examining dietary effects on bone density in microgravity. Student teams are engaged in autonomous robotics projects. The multidisciplinary student and faculty team working on the Mars Return Fuel project were successful at adding solar electrolysis to the process.



*CSU-Pueblo students and faculty following their presentation at The Mars Society conference.*

**The Space Foundation**

The Space Foundation is excited to offer a full complement of standards-based courses for PreK-12 students using their new Science on a Sphere at their Northrop Grumman Science Center. In addition, the Space Foundation continues to offer student courses in their Mars Yard and Robotics Lab (located at the Jack Swigert Aerospace Academy). The Space Foundation continues to support professional development for in-service teachers through the Space Across the Curriculum offering intensive graduate-level courses with STEM content designed to be instantly transferable to the classroom. Participating teachers also have access to the Teacher Liaison network to link educators together providing networking, support, and exchange.



*Teachers collaborate in Space Across the Curriculum Courses (above); and students doing coursework at the Mars Yard (below).*



### **Fort Lewis College**

Autonomous robotics projects are the focus of the Engineering Design Class at FLC. Student designed and built robots must be able to traverse a labyrinth without student intervention. Space Grant students at FLC flew a balloon payload as part of the summer DemoSat launch and had two robots for the Colorado Robotics Challenge. Students continue to utilize the observatory (and Durango's dark skies) to complete student observations and research.



*A photo of the FLC observatory in action (above); FLC students pose with their balloon payload after recovery (below).*



### **Colorado School of Mines**

Space Grant students at CSM, working with mentors from Lockheed Martin, built and launched a balloon payload designed to measure Earth's albedo. The albedo mission was one of two Habitation Strategy student research projects which also included a Mars Habitat project. CSM's newest Space Grant effort is summer student research projects. The first two projects were Laser Induced Breakdown Spectroscopy and Lunar Multi-Ring Basis.

### **University of Colorado - Boulder**

CU Space Grant students delivered the DANDE satellite to the Air Force Research Laboratory and are now in the process of final testing leading up to a

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*Students of the DANDE team pose next to the shipping crate that contains the DANDE satellite inside the truck ready to deliver the spacecraft to AFRL.*

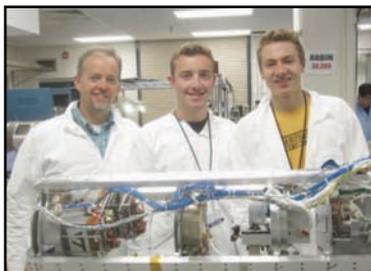
2013 launch. The ALL-STAR satellite team continues work with Lockheed Martin mentors - completing final reviews, testing, and working toward a 2013 launch. The HELIOS team launched their high altitude balloon payload as part of the HASP (High Altitude Student Platform) effort in September 2012 to study sun dynamics, partnering with the Center for Astrophysics and Space Astronomy. A new team is has submitted a proposal for the 2013 HASP launch. The RocketSat 8 mission was a collaboration between CU students and engineers from Composite Technologies Development (CTD) to test a deployable structure. The RocketSat 8 payload launched as part of the RockSat-X effort in September 2012 from Wallops Flight Facility. The RocketSat 9 mission is



*The HELIOS team.*

scheduled to begin in spring 2013. CU Space Grant has begun a new 3U CubeSat mission called PolarCube in collaboration with the National Snow and Ice Data Center and CU's Center for Environmental Technology. Lockheed Martin supported initial development of the mission through

a senior design effort. Students continue to prepare the ground station on the CU campus and the S-band station in a rural area in preparation of DANDE and ALL-STAR launches.



*RocketSat 8 students and COSGC Director, Chris Koehler during payload integration (left); CU Space Grant students visit the S-band ground station (below).*



**Western State Colorado University**

WSCU Space Grant students continued efforts detecting exoplanet transit light curves utilizing the local observatory. The team has begun considering utilization of a different telescope after discovering the current telescope is not sufficient for the task. In addition, students built and launched a balloon payload with the DemoSat program in April 2012.



*WSCU students open their payload at the recovery site.*

**Trinidad State Junior College**

Space Grant at TSJC focused on autonomous robotics projects. Student teams included post-secondary students fully enrolled at TSJC and high school students taking TSJC courses for credit while completing their final year in high school. Both teams entered robots in the Colorado Robotics Challenge in



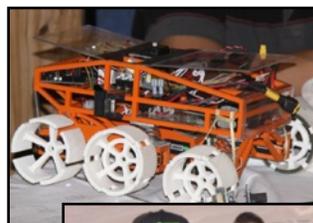
*TSJC post-secondary students (above) and high school students (right) discuss strategy and troubleshoot their robots during the 2012 Colorado Robotics Challenge.*



April 2012. TSJC student, Zach Scott, was chosen as the first student in the COSGC pilot pipeline program bringing students from Space Grant programs at community colleges to Space Grant programs at 4-year institutions (more information on pages 10 and 12).

**Pueblo Community College**

PCC Space Grant students designed and built an autonomous robot for the Colorado Robotics Challenge. In addition, students have been



*PCC Robot undergoing final check-out (left); part of the PCC team explaining their design during the Colorado Robotics Challenge (below).*



machining parts for use by Space Grant students in institutions across the state. These include parts for autonomous robots and orbiting nanosatellites as well.

**University of Northern Colorado**

Space Grant students at UNC continue work on robotics projects. These include a student team that developed an autonomous robot for the Challenge. The other robotics program includes robots that are controlled both wired and wirelessly and is designed to engage students at the university level, as well as high school and the general public.



*UNC students demonstrate their remote controlled educational robot (left); the UNC Robotics Challenge team explains the design of their autonomous robot (below)*



**University of Colorado Colorado Springs**

Students and faculty at UCCS have embarked on a new research endeavor - Biomechanics. The team is exploring low gravity motion & gait/stride analysis. Over the past year, UCCS students have developed a video capture system in the initial stages of the project.

**Colorado Mesa University**



*CMU students and faculty show off their class projects - autonomous robots developed in the Intro to Space Sciences course.*

CMU students continue to work on robotics projects - as course work (in Intro to Space Sciences) and as extracurricular activities. CMU students also engage with the wider community as they help facilitate outreach activities with various formal and informal education groups.

**Metropolitan State University**

MSU Space Grant students participated in various projects. This past year's efforts included a team that produced a robot for the Colorado Robotics Challenge; a balloon payload that launched with the April DemoSat launch; as well as a team that focused on the design of an electric vehicle. In addition, MSU Space Grant facilitated the Intro to Space course.



*MSU students show off their robot at the Colorado Robotics Challenge (above); Making last minute changes to the balloon payload just before launch (below)*



**In Memoriam: Dr. Robert Day**

The COSGC family honors the memory of Bob Day who passed away spring 2012. Bob was the Affiliate Director for the Space Grant program at Pikes Peak Community College and was instrumental at establishing a balloon payload program for PCC students.

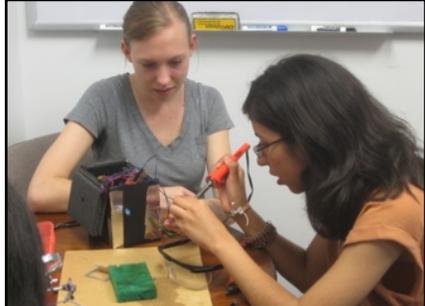


## **Traveling from Earth to Space with the PreCollegiate Development Program**

As a new pilot program for recruiting a higher number of students underrepresented in STEM disciplines, Colorado Space Grant at the University of Colorado at Boulder (CU) has established a collaboration with the CU PreCollegiate Development Program (PCDP). PCDP is an institutionally funded academic enhancement program for targeted middle and high school students. It is designed to motivate and prepare first generation students in pursuit of their higher education goals. PCDP is structured to ensure that students are academically prepared to enroll and be successful at any postsecondary institution of the student's choice. In addition to working with students to explore college/career opportunities, provide leadership development and preparatory assistance for college entrance exams, PCDP provides parents with tools to assist in the educational endeavors of their children.

CU Space Grant developed and facilitated a 5-week class called Earth to Space co-taught by Associate Director, Bernadette Garcia Galvez and Deputy Director, Brian Sanders. The class is a science elective in the required PCDP Summer Residential Program for rising high school seniors - where students live on campus and take a full load of classes. Earth to Space includes lectures and hands-on explorations of atmospheric and space science and introductory programming and electronics design. Students work in teams to design and build balloon payloads that are launched at the end of the 4th week. Students also complete data analysis and prepare final reports that are presented to family and friends at the end of the program. Undergraduate Space Grant students who are working on satellite and other space hardware missions serve as teaching assistants in the class - which is one of the most popular aspects of the class according to post class surveys.

For many years PCDP has been highly successful at recruiting first generation students into CU degree programs. This student population has high percentages of Latino, African American, and women students. The CU Space Grant program is actively recruiting these students to participate in established space hardware programs at COSGC institutions as they begin their degree programs at Colorado institutions of higher education. The first round of PCDP Earth to Space students will be entering college in the fall of 2013. CU Space Grant will offer Earth to Space in summer 2013.



*Pictures from top down: (top) COSGC Deputy Director, Brian Sanders helps PCDP students think through the design of a heater for their payload; CU undergraduate helps PCDP student troubleshoot a malfunctioning sensor; CU undergraduate helps PCDP students use a multimeter to test a newly built flight computer; PCDP students doing final payload integration; (bottom) PCDP students and teachers show off their payloads following launch and recovery.*

## **Pipeline from COSGC Community Colleges to Four Year Institutions**

Colorado Space Grant is making the first steps toward establishing a pipeline to connect COSGC students at community colleges to Space Grant programs at 4-year institutions in an effort to help recruitment and retention efforts in STEM disciplines. The journey began in 2009 with an augmentation grant from the National Space Grant Program that enabled COSGC to add four community colleges to the Colorado Space Grant family - which at the time had only one active community college in the consortium. Following an introductory year to acclimate them to the COSGC family, affiliate directors hit the ground running - engaging talented, driven students and developing a Space Grant presence on their campuses. As students finished their two year degrees and looked toward four year institutions, it became clear that the COSGC network was ideal for providing continuity and support for the students as they completed their education careers and joined the workforce.

COSGC students participate in hands-on projects at their community college campuses. These are typically the first project experiences in which they are engaged and include robotics projects, balloon payloads and/or space focused projects at a similar level. Students develop skills that are ideal for application in more complicated space hardware and other research projects - both at their community colleges and in 4 year institutions. Two pilot programs were undertaken in 2012. The first was a collaboration between Community College of Aurora (CCA) and Colorado School of Mines (CSM); the second between Trinidad State Junior College (TSJC) and University of Colorado, Boulder (CU). In the first program CCA Affiliate Director, Victor Andersen, was approached by CSM professor, Eric Toberer who was interested in providing a summer research experience and scholarship to a CCA student ready to transfer to CSM to continue her/his education. It just so happened that a very talented CCA student, Jaime Corchado, had expressed interest in moving on to earn a bachelors degree. Victor suggested Jaime was the ideal student for the effort, as he had completed both an autonomous robot project and a biology experiment that flew on a microgravity flight as part of NASA's Minority Innovations Challenge Institute. The projects helped Jaime hone skills that Eric was looking for in a research assistant. Victor and Eric entered into a "2-sided mentoring" effort - where Jaime was receiving support from both CCA and CSM as he completed research in Eric's lab in the summer following his graduation from CCA. The design was that Jaime would be integrated with CSM students prior to starting at CSM. Jaime was invited to an internship at Kennedy Space Center fall 2012 semester and is preparing to enter CSM spring 2013 - where he will earn a bachelors degree and participate in the CSM Space Grant program.



*Jaime Corchado on a Microgravity flight (left); holding autonomous robot with team from CCA including faculty mentor, Victor Andersen (middle); with Colorado School of Mines professor and research mentor, Eric Toberer (right).*

The second pilot program was developed starting in fall 2011 and implemented spring 2012. Students engaged in Space Grant projects at all COSGC institutions were invited to apply to the program. The project was designed to take advantage of the Guaranteed Transfer program between community colleges and 4 year institutions in the state of Colorado. Two students applied from TSJC and both were enrolled in CU and offered participation in the program. One student, Zach Scott, accepted (see page 13). Zach entered CU as a sophomore in aerospace engineering and joined the PolarCube project (see page 6).

Both transfer projects were developed and piloted separately; however, they have the same goal - to provide students support in an effort to encourage them to attend four year institutions and once there to provide experiences and a community that will aid in retention in STEM fields. Thus far, the programs are small and have limited data supporting their effectiveness; however, initial results are promising. COSGC plans to combine the two pilot programs into a consortium-wide effort that will provide students opportunities regardless of the



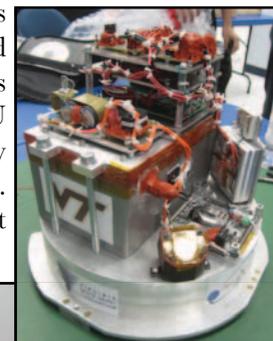
*Zach Scott poses with his project teams: (left) April 2012, as a student at Trinidad State Junior College with his S.P.A.R. teammates and their robot at the 2012 Colorado Robotics Challenge; and (right) November, 2012, as a student at University of Colorado at Boulder with his PolarCube teammates and the model of their 3U CubeSat payload.*

COSGC institution they choose to attend. COSGC leadership is in the process of securing funding to support the next step in the program - recruiting a larger number of students at a wider range of COSGC campuses. Ultimately, the goal is to have an active pipeline engaging diverse students from community college through universities across Colorado and into careers in STEM fields.

## Rocket Programs Thriving

Many people laughed when they first heard the idea of building a sounding rocket payload in three days - from chips and resistors, nuts and bolts, and in teams of 3. They would flat-out guffaw when they heard, “and then launch them to 100 kilometers on day 5.” That is the basic idea of the RockOn workshop and that idea has now been successfully conducted for 5 years. This past summer was the 5<sup>th</sup> RockOn workshop. Since that first workshop in 2008, 192 people have participated in the RockOn workshops, launching over 64 payloads to space. A 6<sup>th</sup> workshop is planned for June 15<sup>th</sup> – 20<sup>th</sup>, 2013. While the results of the RockOn workshop are impressive, the outcomes from 192 participants are even more impressive. RockOn is merely a stepping-stone for students and their faculty advisors because what they learn at RockOn can be directly applied to the RockSat-C and RockSat-X follow-on programs. RockSat-C and RockSat-X provide students and their faculty advisors with real flight opportunities to launch their uniquely designed sounding rocket payloads, built and tested at their own institutions. The RockSat-C and RockSat-X programs are managed by COSGC Director, Chris Koehler, and students at CU Space Grant. RockOn is collaboration between COSGC and the Virginia Space Grant Consortium. Both RockOn and RockSat programs are only possible with the generous partnership with NASA’s Wallops Flight Facility. Unlike the small and relatively simple RockOn payloads, RockSat payloads are bigger in size (12 to 30 pounds) and have limited to full access to the space environment. Students

involved with the RockSat programs are mentored and led through an elaborate design review and test review process conducted by the RockSat management team at CU Space Grant. RockSat-C payloads are launched every June and RockSat-X payloads are launched every August. Much more detail on both the RockOn and RockSat programs can be found at the COSGC website.



*RockSat-X payload built by students at Virginia Tech (above right); Participants of the 2012 RockOn! Workshop and RockSat-C program at NASA's Wallops launch site.*

### Student Focus

Colorado Space Grant engages over 500 Colorado students each year in space hardware missions and research projects, of which you have read about a few in the preceding pages. Introducing them all to our readers would take a newsletter all its own (an extremely thick one). Instead, we present a random sampling to give our readers an idea of the high caliber of students that are a part of the Colorado Space Grant family, the projects they are working on, and their plans for the future.

**Austen Knapp** is a senior in mechanical engineering at University of Colorado at Colorado Springs (UCCS). He is minoring in aerospace engineering and mathematics. At UCCS he worked on a space tether research project and is currently involved in the development of a video-capture system to analyze human body mechanics. Austen won the COSGC Elaine Hansen NASA Internship competition and spent summer 2012 at the NASA Ames Aerospace Academy working on conceptual designs of civilian transport tiltrotor aircraft. His future plans include working in the aerospace industry, earning a graduate degree, becoming a test pilot and ultimately an astronaut.



**Gabrielle Massone** is a sophomore majoring in aerospace engineering with a minor in computer science at the University of Colorado Boulder (CU). She was introduced to COSGC when she took the Gateway to Space Class as a freshman. During her first semester at CU, she joined the HELIOS team and became project manager. Under her leadership, the HELIOS team completed the project through launch and data analysis. In addition to her role as project manager, Gabrielle has spent two semesters on the team of CU students who travel to elementary schools to facilitate after school science programs. She is currently working on flight software on the ALL-STAR mission. Gabrielle plans to earn a BS/MS degree and then work in the aerospace industry.



**Kyle Kemble** is working on his masters degree in aerospace engineering at CU Boulder as a BS/MS student. He started at CU Space Grant as a freshman - taking the Gateway to Space class and then working on a long duration balloon payload mission through the HASP program. Kyle moved to the DANDE satellite mission on which he is currently project manager and working closely with engineers at Air Force Research Labs on final testing of the DANDE spacecraft as it is prepared for launch in 2013. Kyle is also mentoring student missions including HASP and the MiniCam project. Following graduation, Kyle would like to work for NASA or the supporting aerospace industry.



**Mario Gonzalez** is a student at Pueblo Community College (PCC). In December 2012 he earned two associates degrees: one in renewable energy and the other in industrial electronics. He first joined PCC Space Grant after interviewing for a work study position. Mario has been part of two autonomous robot projects - the second of which is currently in the build and test phase preparing for the Colorado Robotics Challenge in 2013. He is also currently working on a balloon payload team designing a mission to test the atmosphere for heavy metals, which is scheduled to launch in April 2013. In March 2012, Mario was part of a student delegation that visited Washington D.C. to visit with state representatives and senators to talk about their experiences in the Space Grant program and the importance of Space Grant in their educational careers and as they get ready to enter the workforce. After earning a bachelors degree in biological engineering, Mario plans to pursue an advanced degree in aerospace with an emphasis on research technology.





**Glenda Alvarenga** is currently a junior at the University of Colorado at Boulder, where she is majoring in aerospace engineering and minoring in computer science. She served as the systems lead for the 2012 HASP team – HELIOS. Glenda is now working on flight software for the ALLSTAR CubeSat mission. Glenda has credited her Space Grant experience as putting her coursework in context, thereby inspiring her to continue to do well in classes. Following graduation, Glenda plans on either pursuing her masters in aerospace or beginning a career within the industry.

**John Naglak** is a junior in engineering at Fort Lewis College. As an FLC Space Grant student he has been on both robotics and balloon payload teams. John explains, *“Space Grant contributes to my education in two significant ways. First, it’s an opportunity to apply my coursework in a way that mimics the rigors and structure of a real contract. Second, projects can be the “dessert” of my academic experience that makes the “vegetables” all the more palatable. Both of these aspects of the Space Grant experience cause me to be a more motivated student, excited to learn well and produce good results.”* Following graduation, John hopes to do process automation consulting for small businesses.



**Carter Allen** is a senior in high school, concurrently enrolled at the Community College of Denver (CCD). In 2013 he will graduate with both a high school diploma and a Associate of Science degree. He became involved with the CCD Space Grant program after hearing about a balloon payload project from his CCD chemistry professor. He began focusing on the electrical systems of the 1st CCD payload and is currently the project manager of the 2nd mission. He entered the projects with neither electrical nor leadership experience and has developed both skills. Carter is planning on earning a bachelors degree in a STEM field.

**Zach Scott** is a sophomore in mechanical engineering at University of Colorado at Boulder (CU). Spring semester 2012, Zach was a student at Trinidad State Junior College (TSJC). While at TSJC, Zach participated on two autonomous robot projects. Currently at CU, Zach is working on the mechanical side of the new PolarCube mission. Zach credits his experiences with Space Grant as giving him the opportunity to apply his knowledge and skills in addition to helping point him in a direction for his career. Zach plans to work in the aerospace industry following graduation.



**Matthew Bird** is a senior in electrical engineering technology at Metropolitan State University of Denver. He first became involved with the MSU Space Grant program on an autonomous robot project leading up to the 2012 Colorado Robot Challenge. He is now part of a team designing a robot for a robotics competition through the Institute of Electrical and Electronics Engineers. Matt started a brown bag lunch activity on the MSU campus where students from different disciplines meet to share their collective knowledge - even hosting an Arduino workshop at the first event. Matt credits hands-on projects as an important aspect of his education. *“I think I absorbed more from these projects than from any other single aspect of my education. I learned how to be disciplined, how to be cross-disciplined, and what it means to take pride in your work. It gave context to my education and showed me the vast distance there is between theory and practice. The lessons I learned were truly innumerable. For instance, I learned how to take an idea, find the the tools and vocabulary to describe it, find the resources to develop it, and find a way to fabricate it. There is hardly a portion of my education that was not enhanced!”* Matt plans to pursue a career in the area of signal integrity following graduation.



**Jaime Corchado** was accepted as a transfer student into the engineering physics undergraduate program at Colorado School of Mines (CSM) where he begins as a sophomore in spring 2013. He first became involved with Colorado Space Grant at the Community College of Aurora. Jaime helped establish the CCA Engineering Club to generate interest in CCA Space Grant projects. His first project was an autonomous robot. *“I value the robotics challenges because they accomplished the task of exposing the team to a real engineering development cycle.”* He then worked on the student team building an experiment for the NASA Johnson Space Center Reduced Gravity Challenge. He focused on software development for the project, but in a small team, also contributed to other aspects of the project. Jaime explains, *“because of Space Grant, I realized I wanted to become a scientist. In this way, Space Grant influenced my decision to continue on in higher education.”* Jaime worked in a CSM faculty lab over summer 2012 and has been at an internship at NASA Kennedy Space Center for the fall semester. He was initially hired as an intern to develop support programs for the Launch Operations Software Developers. After his initial work, his mentor moved him up to program more as a software developer instead of just support. *“The experience has become a dream come true because I have been able to collaborate with some of the nation’s brightest and most motivated groups of people. I’ve been trained alongside NASA engineers.”* Ultimately, Jaime plans to contribute to the development of future technology. He is interested in systems with a high reliance on the computing, physical and mathematical sciences with a promise to benefit humanity. *“Grad school seems like the perfect place to work on these types of questions, so I plan to stay in school for an advanced degree before heading into the workforce.”*



### **Where are they now?**

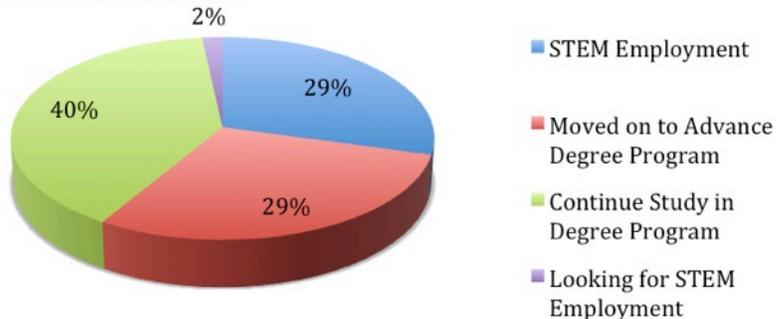
**David Ferguson’s** first experience with COSGC was in the Gateway to Space class at the University of Colorado at Boulder (CU). As a sophomore he joined the RocketSat team as a science specialist. Following his work with RocketSat he moved on to the Hermes CubeSat mission where he did mission operations work. In his final semesters with CU Space Grant, David worked as science specialist for the RockOn! workshop eventually working as project manager for the 3rd year of RockOn!. He explains, *“My experience with the RockOn! project most closely mirrors the aggressive, fast-paced nature of projects at SpaceX.”* Following his graduation from CU in summer 2010 (with a BS in aerospace engineering) David began working at SpaceX (Space Exploration Technologies). At SpaceX David is an Avionics Responsible Engineer in the Flight Computing group. In this role he is responsible for the development, production, testing, and flight operations of the Dragon flight computer system hardware on the Dragon spacecraft. He is also responsible for the continued production and testing of the existing Falcon 9 launch vehicle flight computer hardware. David credits his experience at Space Grant with greatly enhancing his undergraduate experience and preparation for industry. *“Without a doubt Space Grant molded me into the engineer I am today. Without it, I would not have developed the necessary hardware, project management, teamwork, rapid project development, and lean scheduling skills that are truly critical in the aerospace industry. I have great appreciation for everything Space Grant mentors and senior students taught me in my four years with the Space Grant family. Colorado Space Grant does a superb job facilitating real-world projects providing early experiences to prepare young engineers*



*as they work toward their degrees so they can immediately enter the aerospace industry ready to go!”* David concludes by encouraging interested students to consider SpaceX as a possible future. *“SpaceX is always looking for talented, motivated individuals to further grow our team. Do you enjoy a challenging and aggressive R&D work environment similar to a short term Space Grant project? Are you excited about space exploration and interested in fulfilling the SpaceX goals of reusable rocket technology with trips to Mars in this lifetime? Would you consider working for the “Google” of Aerospace? If interested, look no further, have Space Grant staff send me your resume & apply online at <http://www.spacex.com/careers.php>.”*

Pay It Forward!

COSGC students leave the Space Grant program ready to contribute to our nation's future in many ways. In 2011 students moved on to:



Support from our former students who are now successful engineers and scientists is integral to COSGC's success - as is the support from industry partners. Our goal is to support an additional 10 students each year through this fund raising effort. Every monetary gift, no matter the amount, contributes toward this goal and directly effects the life of a student. Most gifts are tax deductible and you can leverage your gift through matching donations from your employer.

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

**Levels of Support**

<b>Balloon/Rocket</b>	\$1 - \$250	includes newsletter and name on Student Support Plaque
<b>CubeSat:</b>	\$251 - \$500	includes items above plus a COSGC coffee mug
<b>Satellite:</b>	\$501 - \$1000	includes items above plus a COSGC t-shirt
<b>Moon:</b>	\$1001 - \$2500	includes items above plus a Space Pen
<b>Beyond:</b>	> \$2500	includes items above plus a special lunch with students in your honor.

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**2013 UPCOMING EVENTS**

**APRIL**

- 6 Colorado Robotics Challenge
- 13 BalloonSat Payloads Launch
- 20 Colorado Undergraduate Space Research Symposium

**JUNE**

- 16-21 RockOn! Workshop
- 21 RockSat C Launch
- 29-30 AFRL SHOT Workshop

**JULY**

- 28 BalloonSat Payloads Launch

**AUGUST**

- 9 RockSat-X Launch

**SEPTEMBER**

- 6-7 COSGC Annual Meeting

**NOVEMBER**

- 10 BalloonSat Payloads Launch



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