

Be Boulder.

In AEROSPACE ENGINEERING SCIENCES



University of Colorado
Boulder

“ Aerospace Engineering Sciences students at CU-Boulder operate within a real hands-on learning environment. This educational culture uniquely aligns with that of the Orbital culture and directly addresses many of our business needs. CU-Boulder alumni are among the top performers in Orbital. Many fall into a performance category in which their performance in all areas of responsibility is rated as excellent and, by a recognizable margin, exceeded the requirements for the job. ”

—ELIZABETH MASHAKAS, SENIOR DIRECTOR, RECRUITING, ORBITAL SCIENCES

“ The Graduate Projects course is a blend of academic research, real-world engineering, and project management. It prepares students for a job in industry better than any other course I have ever come across! After my undergraduate degree, I went into industry with no clue how to scope a project, project a budget, or map a work breakdown structure. I wish I had taken Graduate Projects prior to entering industry. It’s a wonderful learning opportunity. ”

—SIBYLLE WALKER, AEROSPACE ENGINEERING SCIENCES, MS '12, PHD '15

Cover photo: Three CU-Boulder students fly their experimental apparatus on board NASA’s “Weightless Wonder,” where 40 parabolic maneuvers allow them to experience microgravity.

Be innovative. Be relevant. Be a partner.

CU-Boulder's Department of Aerospace Engineering Sciences (AES) is recognized for its exceptional research and educational programs in aerospace engineering, Earth, and space sciences. We offer an ABET-accredited bachelor's degree program, a master's degree program supporting technical specialization or disciplinary breadth, and a doctoral program ranked among the top four in the country by the National Research Council. By integrating theory and practice in our research and educational programs, we solve real-world problems and produce graduates who are broadly educated, interdisciplinary, agile, and professionally prepared.

Industry partnerships play a key role in our success. Our industry sponsors bring their real-world challenges into the classroom, where creative student teams tackle the issues with help from faculty and staff who provide instruction in requirements-driven design and technical support for design, manufacturing and testing. The team-based, hands-on experiences for students prepare them to be immediately effective in the workforce while simultaneously meeting the customer's needs.

On the following pages you will see four recent examples of AES student projects in action. If you would like to join us in this partnership, please contact us to explore how a student project might support both your corporate needs and our educational mission.

Penina Axelrad—Chair, Aerospace Engineering Sciences
University of Colorado Boulder





Scott Palo
Associate Chair for
Undergraduate Studies

The Aerospace Engineering Sciences Department is a leader in engineering education and has embraced experiential learning since the development of Curriculum 2000 nearly 20 years ago.

The senior and graduate projects courses are key examples of the hands-on learning that students experience in our academic programs. In these two courses, we collaborate with our industry partners to develop interesting real-world engineering problems for our students to solve. As a result, our students learn the systems engineering process, develop professional skills, and integrate science and engineering knowledge in a rigorous, structured, requirements-based design environment.



Dan Scheeres
Associate Chair for
Graduate Studies

Sponsorship of a senior or graduate project benefits our students by providing a corporate context for their projects, aligning well with the department's workforce development mission of preparing students for professional careers. Supporting a project also enables sponsors to connect directly with our faculty members and students, thus developing a foundation for future collaborative projects.

We are exceptionally proud of the transformative curriculum that we have developed and the outstanding opportunities it provides our students. Please consider joining our team by sponsoring a future project.

2013 Student Team Awards

NASA RASC-AL Competition

First place-Graduates, and "Best Advanced Concepts," CU-Boulder AES Project Team

NASA eXploration Habitat (X-Hab) Academic Innovation Challenge

One of seven winners, CU-Boulder AES Project Team

AIAA Design Engineering Technical Committee

"Best Paper Award," CU-Boulder AES Hyperion Green Aircraft Project Team

American Astronomical Society

GN&C Conference

"SpaceX Grand Prize," CU-Boulder AES DayStar Project Team

AIAA Region V Student Paper Conference

First and second place, CU-Boulder AES Senior Project Teams. In 2010, 2011 and 2012 CU-Boulder AES teams swept first, second and third place.

AIAA Design, Build, and Fly (DBF)

International Competition

Fifth place, CU-Boulder AES DBF Team

2013 AES Students—National Awards

Seven of the 20 students honored by Aviation Week/Raytheon's newest awards program, Tomorrow's Engineering Leaders: The Twenty20s, are CU-Boulder aerospace engineering students.

Thirty AES students were awarded graduate fellowships from NSF (11), NASA (13), NDSEG (4), DoD (1) and the Ford Foundation (1).

Mike Lotto, an AES BS/MS student, won the Goldwater Scholarship.

Luis Zea, PhD student, won the Orville and Wilbur Wright Graduate Award, AIAA.

Felipe Nievinski, PhD student, won the Institute of Navigation Bradford Parkinson Award.



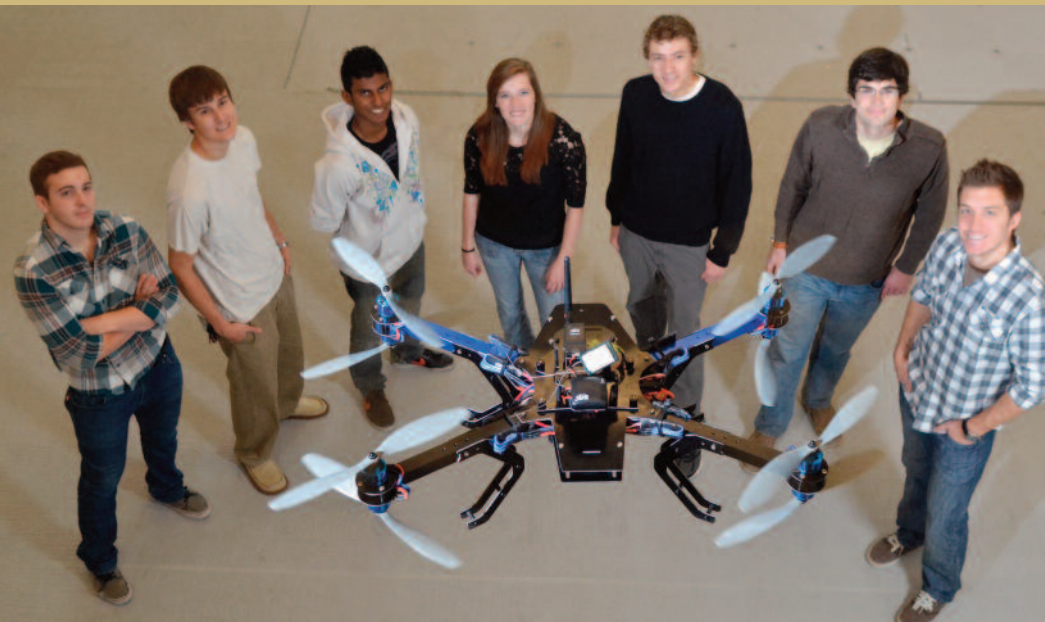
“The ability to apply the aerospace curriculum to a senior design project enables me to develop a systems engineering approach that will prove invaluable when pursuing a job in the industry. As the project manager for TIRESIAS, I have gained leadership experience that will prepare me in all aspects of an aerospace career.”

—RACHAEL COLLINS
AEROSPACE ENGINEERING SCIENCES
BS/MS '15



The Telemetric Interplanetary Regolith Explorer for Seismic Investigation of Asteroid Surface (TIRESIAS) senior design project, sponsored by Ball Aerospace & Technologies Corporation, involves developing a 10-inch diameter probe to be deployed onto the surface of an asteroid by an orbiting satellite. The TIRESIAS team is designing the communications architecture, the

power system, and the internal structure of the probe, all of which will be fully integrated and capable of transmitting collected science and ancillary data to a simulated orbiting spacecraft. This effort is a risk-reduction activity and is relevant to a future Ball Aerospace proposal to the NASA Discovery Program.



The Scout senior project team is developing a sensing and control system that will allow a multi-rotor indoor aerial robot to move through a standard doorway autonomously. The Scout system is designed to interface as an outer loop system with the avionics of a commercial multi-rotor system. Indoor flying

robots can serve a variety of applications such as search and rescue, package delivery, tour guide, air quality monitoring, etc. The ability to travel through doorways is a key capability for movement through buildings and has overlap with other obstacle avoidance tasks.

“Senior Projects is a comprehensive application of the many technical aspects of aerospace engineering learned thus far. Students build team-work skills and design complex engineering systems while keeping the big picture in mind. These projects are the most rewarding conclusion to an already outstanding undergraduate experience.”

—GEOFFREY INGE
AEROSPACE ENGINEERING SCIENCES
BS '14

“ Working as the project manager for the Dream Chaser team has enabled me to grow academically and professionally in ways that are not possible in lectures alone. From management to technical skills, Graduate Projects has equipped me to enter the workforce at a level above the competition.”

—ASHLEY GLEAVES
AEROSPACE ENGINEERING SCIENCES
MS '14



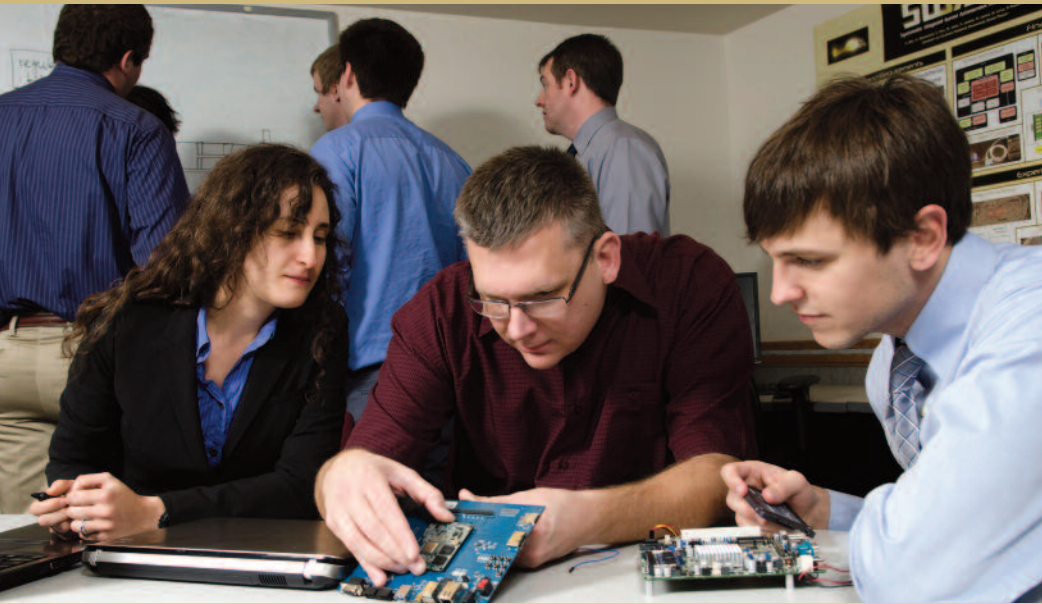
CU-Boulder engineering students are playing a role in the design of the Dream Chaser spacecraft being developed by the Sierra Nevada Corporation (SNC). Beginning in 2009, the graduate project curriculum involved designing the overall crew cabin. More recently, the teams have focused on the cockpit layout.

The fall 2013 Dream Chaser team conducted a variety of design and analysis tasks, including human factors evaluations of simulated cockpit operations and mechanical load testing of the structure. Each of the student team members gained valuable technical and communication skills under the guidance of SNC experts.

Projects

CUSP

SURREY SATELLITE TECHNOLOGY US



The CU-Surrey Payload (CUSP) is a collaboration between students at CU-Boulder and Surrey Satellite Technology US. The CUSP payload will test the effects of the near-earth space environment on low-cost, commercially available microprocessors and

storage, focusing on the Raspberry Pi, Parallax Propeller and a Samsung solid state drive. The payload, which is designed and built by students, will be integrated into the SST-US Orbital Test Bed satellite scheduled for launch in 2015.

“Our graduate projects team is made up of aerospace engineers, electrical engineers, electrical and computer engineers, and computer scientists. My teammates bring decades of work experience to our project, and their advanced studies complement my own expertise. I learn something from them every time we meet.”

—MICHAEL TROWBRIDGE
AEROSPACE ENGINEERING SCIENCES
BS/MS '14

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Aerospace Engineering Sciences

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