



University of Colorado

Center of Excellence for Commercial Space Transportation First Annual Technical Meeting

November 9, 2011

Boulder, CO

David Klaus

Associate Professor, Aerospace Engineering Sciences

Associate Director, BioServe Space Technologies

CU President's Teaching Scholar

CU PI, FAA COE for Commercial Space Transportation



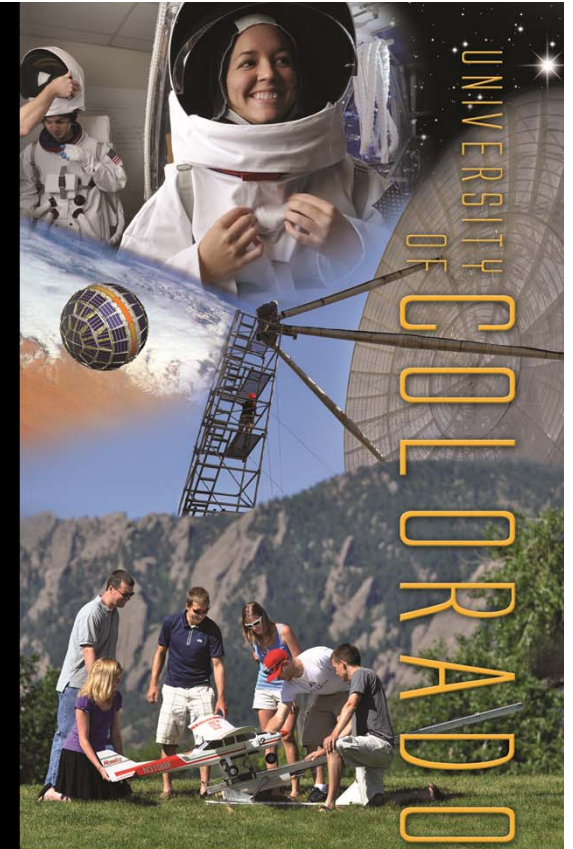
University of Colorado

- CU-Boulder is a Tier 1 research institution that received >\$454 million in sponsored research in FY 2010, ranking 13th nationally and 6th among all public universities
- The university offers 80 majors at the bachelor's level, 70 at the master's level, and 53 at the doctoral level
- CU-Boulder has more than 200 researchers and post-doctoral and doctoral students involved in space research
- CU-Boulder is the only university in the world to have designed, built and launched instruments to every planet in the solar system
- National Labs in the Boulder area include NCAR, NIST, NOAA, NTIA and NREL

College of Engineering and Applied Science
Department of Aerospace Engineering Sciences
at CU-Boulder



COE CST PI's & PhD Students
David Klaus, Christine Fanchiang
George Born, Brad Cheetham
Dan Scheeres, Kohei Fujimoto
Penny Axelrad, Holly Borowski
Tim Fuller-Rowell



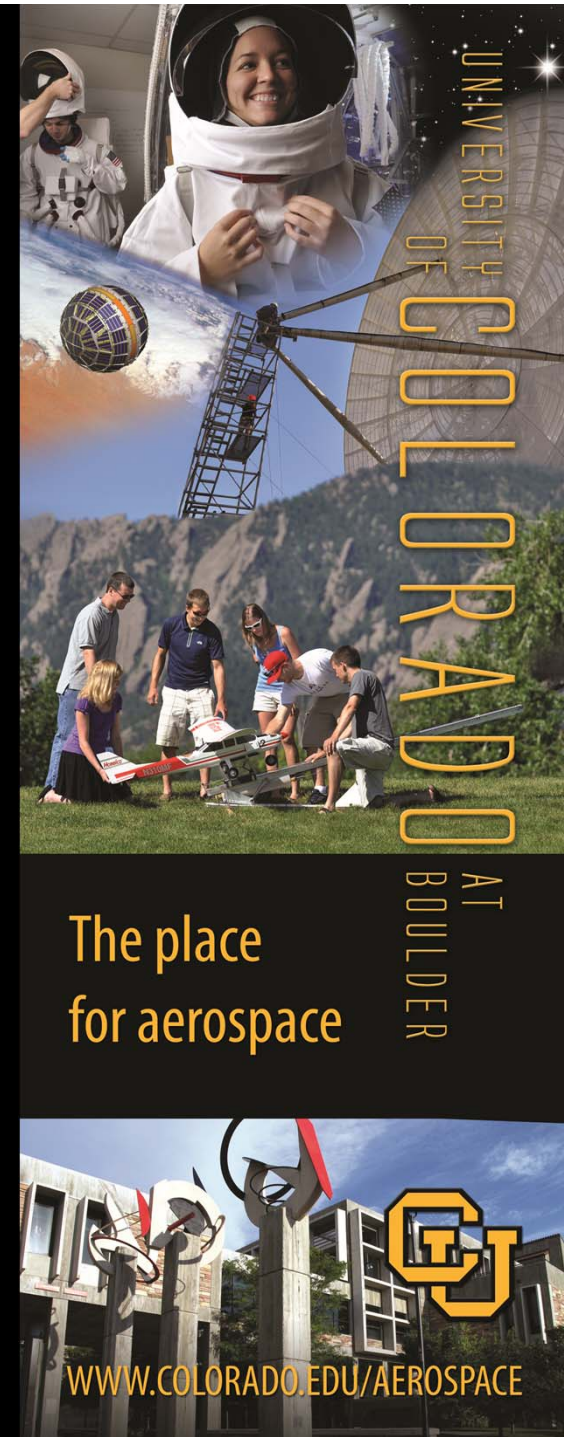
UNIVERSITY OF
COLORADO
AT
BOULDER

The place
for aerospace



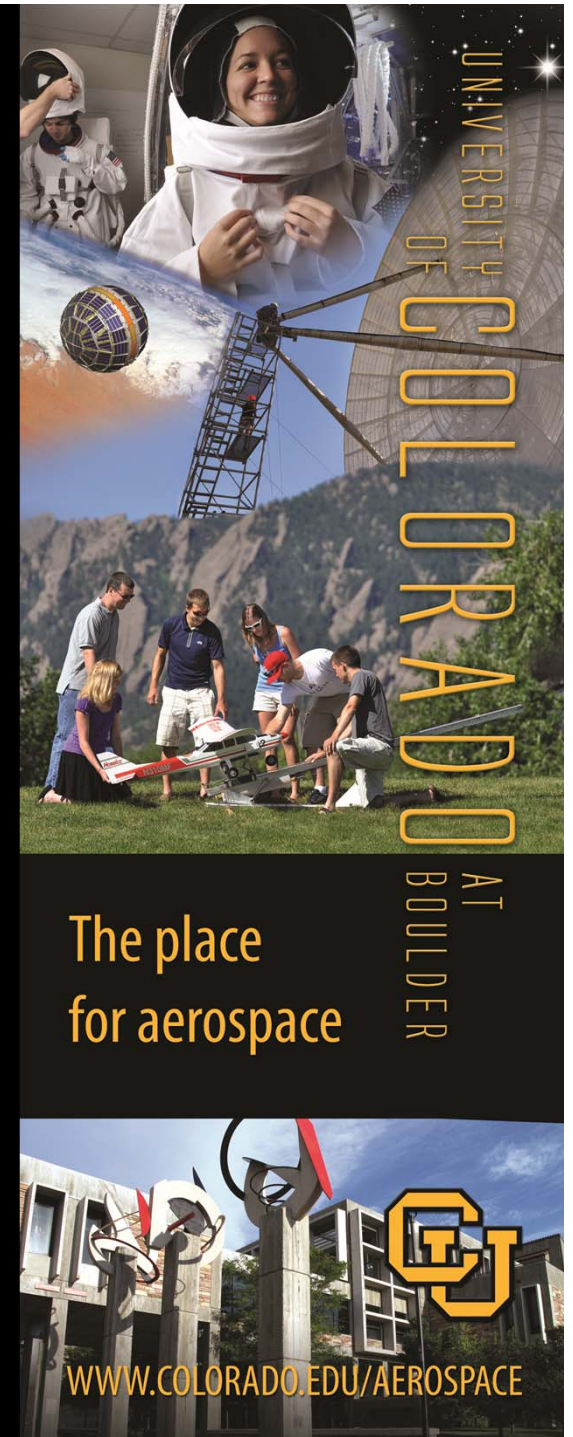
Aerospace Engineering Sciences

- Students
 - ~400 undergraduate students
 - ~250 graduate students
- 3600 Alumni/ 1600 in Colorado
- 30 Tenure-Track Faculty (2.5 budgeted elsewhere)
 - 15 Full Professors
 - 10 Associate Professors
 - 5 Assistant Professors
- \$11.5M in research expenditures (FY10)
- 4.5 Instructors, Senior Instructors, Scholars in Residence
- 3 Research Faculty; numerous Research Associates
- 8.5 Support Staff, not including Research Centers



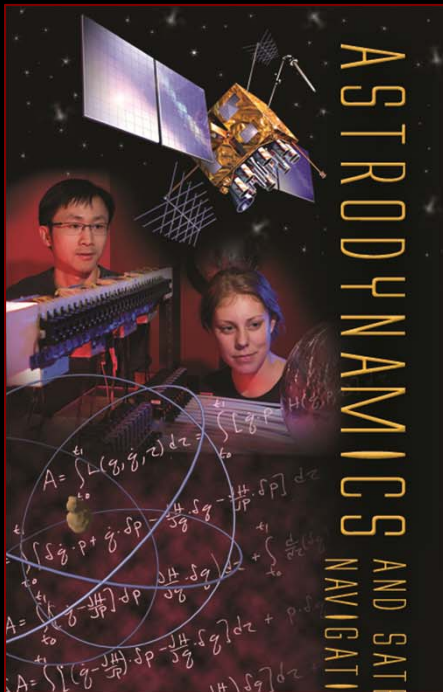
Aerospace Engineering Sciences

- Hands-on experiential learning in team settings
- Design experiences throughout the curriculum
- Ranked among the top 4 aerospace Ph.D. programs by the NRC in 2010
- **Research Centers in the Department**
 - BioServe Space Technologies
 - Center for Aerospace Structures (CAS)
 - Colorado Center for Astrodynamics Research (CCAR)
 - Research and Engineering Center for Unmanned Aerial Vehicles (RECUV)
 - FAA Center of Excellence for Commercial Space Transportation (COE for CST)
- **Grad Program organized around 4 focus areas**



AES Focus Areas for Research & Graduate Study

Astrodynamics & Satellite Navigation



Launching science into orbit

GPS Receivers, Algorithms, & Science
Interplanetary Mission Design
Orbital Mechanics & Control
Earth & Planetary Exploration
Spacecraft Tracking & Navigation



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Bioastronautics



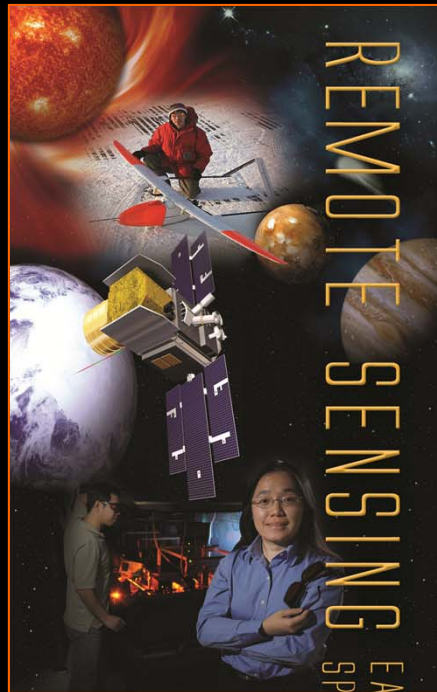
The study and support of life in space

Space Biology & Microgravity Sciences
Spacecraft Life Support Systems
Human Exploration of Space
Space Habitat Systems Engineering



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Remote Sensing, Earth & Space Sciences



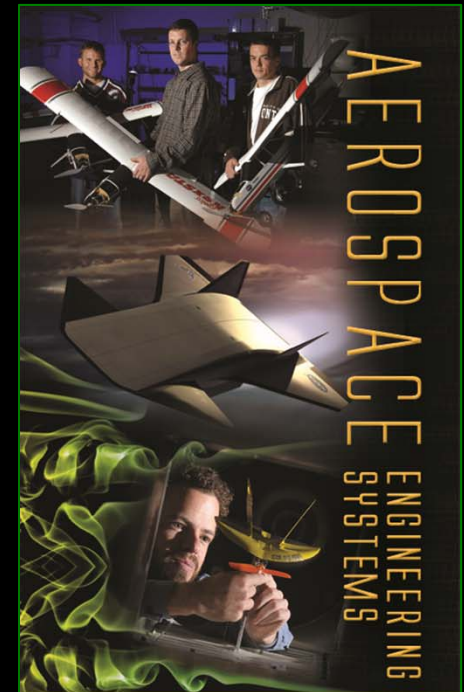
Spanning the spectrum from earth to space

Understanding Space Environments
Designing Instrumentation
Working in Remote Locations
Investigating Climate Variability



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Aerospace Engineering Systems



Complex systems for a better world

Fluid Dynamics
Structures and Controls
Unmanned Vehicle Systems
Devices and Materials
Propulsion



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Examples of Graduate Projects

A two-semester course sequence to introduce MS and PhD students to project management and systems engineering while working a complex aerospace engineering project

Design, build and test a miniature jet engine with the goal of low production costs.

Dream Chaser- NASA HL-20



GOJETT – Graduate Organization Jet Engine Technology Team



Develop tools to select or design systems and sub-systems necessary for the support of human life in a space vehicle. Verify tools in the full-scale Dream Chaser mock-up interior layout.

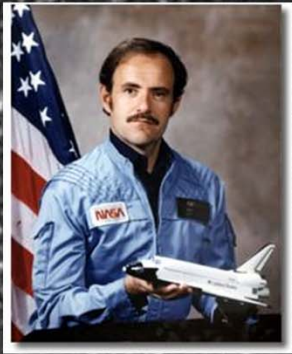


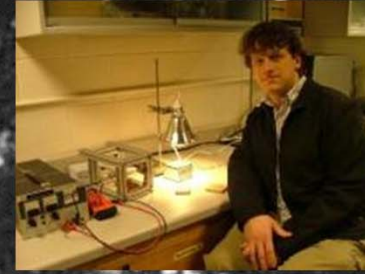
- Support the creation and development of entrepreneurial space companies;
- Commercialize the technologies they create; and
- Develop the workforce to fuel their growth:
 - Venture Design Program
 - Create climate of innovation and entrepreneurship
 - Educate students about entrepreneurship

A 501(c) 3 nonprofit organization formed from a partnership between the University of Colorado and Sierra Nevada Corporation's Space Systems Group



Strongly supported by Lt. Governor O'Brien, Congressman Polis, AFRL





Major Research Initiatives Under CU-Boulder's Strategic Plan "Flagship 2030"

Biotechnology

Aerospace

Renewable
and Sustainable Energy

Geosciences

**2 new faculty lines committed from CU
in support of the FAA COE Award
(1 from the Provost , 1 from the Dean)
in the area of Bioastronautics**

Search process currently underway...

