



Ann and H.J. Smead Aerospace Engineering Sciences



University of Colorado **Boulder**



SMEAD AEROSPACE ENGINEERING SCIENCES

The Ann and H.J. Smead Department of Aerospace Engineering Sciences is a hub for our nation's aerospace education and research efforts. Our students and faculty are advancing the frontiers of aerospace engineering and space science. From designing autonomous systems to expanding humanity's presence into deep space, our students build their technical expertise and creativity to solve tomorrow's challenges.



50+ Faculty | **1,700+ Students**



10 AIAA Fellows | **7 National Academies Members**

INCLUSIVITY AT SMEAD AEROSPACE

Smead Aerospace Engineering Sciences fosters an environment of inclusivity and celebrates the ever-increasing diversity of our student body. Whatever your background, our department will provide you with the support necessary for academic and professional success, while keeping our minds open to how we can further improve our scholastic environment.

#1

Public university
for NASA
research funds

**OVER
\$50 MILLION**

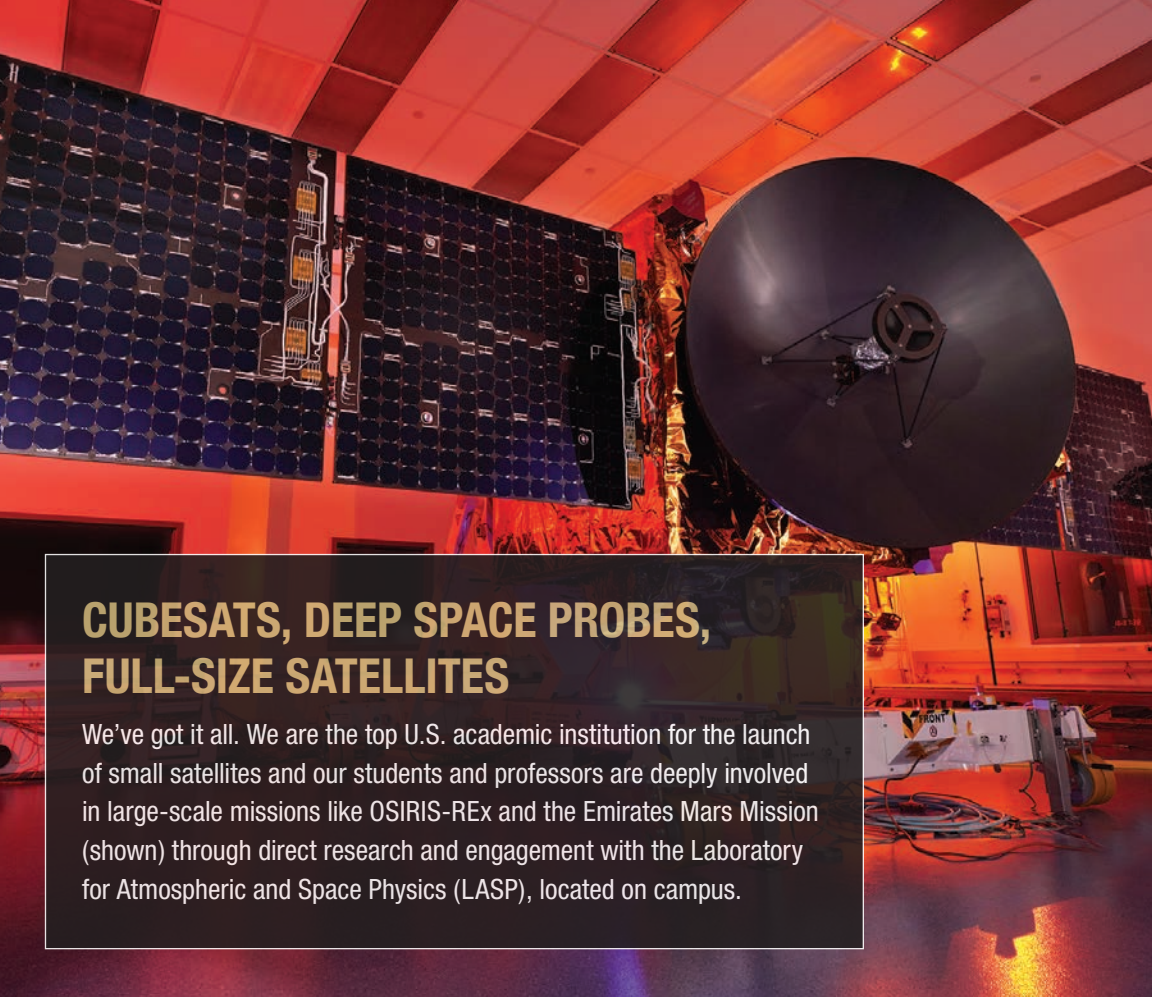
in research awards
in 2021

>95%

of students have job or
research offers within
six months
of graduating

SPACE TO EXPLORE

In 2019, we opened a new 175,000 sq. ft. aerospace building with unique laboratory facilities, collaborative research spaces and immersive educational opportunities.



CUBESATS, DEEP SPACE PROBES, FULL-SIZE SATELLITES

We've got it all. We are the top U.S. academic institution for the launch of small satellites and our students and professors are deeply involved in large-scale missions like OSIRIS-REx and the Emirates Mars Mission (shown) through direct research and engagement with the Laboratory for Atmospheric and Space Physics (LASP), located on campus.



RESEARCH FOCUS AREAS

Our centers and institutes are pushing scientific and engineering boundaries, creating innovative technologies and capabilities, and exploring new frontiers in space and on Earth. Recent projects include:

Astrodynamics & Satellite Navigation Systems (ASN)

Investigating orbital motion of spacecraft, interplanetary mission design, attitude control, and navigation utilizing advanced sensors and technology.

» JANUS Mission

Leading development of twin deep space probes to explore two binary asteroid systems in partnership with industry.

» MAXWELL CubeSat

A nanosatellite project being developed by our students for the U.S. Air Force to demonstrate high-rate communications with NASA's Near-Earth Network.

Autonomous Systems (AUT)

Incorporating interdisciplinary knowledge in robotics, human-robot interaction, artificial intelligence, and uncrewed systems for subterranean, underwater, ground, and aerospace applications.

» Targeted Observation by Radars & UAS of Supercells (TORUS)

We're using uncrewed aircraft systems (UAS) to study severe storms and tornadoes in one of the largest and most ambitious drone-based investigations of meteorological phenomena ever.

» Collaborative Analyst-Machine Perception for Robust Data Fusion (CAMP)

Developing new fusion algorithms and interfaces to allow communication with automated machine learning systems via natural language chat, direct manipulation, and hand-drawn sketches.

Bioastronautics (BIO)

Encompasses biological, behavioral and medical research for safe and efficient exploration of space by humans and biological science in microgravity. Our work is closely aligned with NASA Programs and FAA Commercial Space Transportation goals.

» Space Station Hardware

We design experimental and operational hardware for the International Space Station, like the Space Automated Bioproduct Lab microbe incubator, or new custom refrigerators for the ISS crew galley. Since 2019, we've launched 30 major crew-operated payloads on 14 resupply missions.

» Artificial Gravity as a Countermeasure to Spaceflight Physiological Deconditioning

Investigating human centrifuge options for mitigating bone loss and muscle weakening on long term space missions.

Fluids, Structures and Materials (FSM)

We are pushing the frontiers of composites, multifunctional materials, and hypersonics through advanced atomic level modeling, simulation, and optimization.

» Advanced Computational Center for Entry System Simulation (ACCESS)

A \$15 million NASA institute led by CU Boulder to significantly advance computer simulations to design and ensure safe atmospheric entry systems for space exploration.

» Hypersonic Flight in the Turbulent Stratosphere (HYFLITS)

We're leading a multi-university effort to characterize the stratosphere for hypersonic aircraft.

Remote Sensing, Earth and Space Sciences (RSESS)

Bridging the gap between science and engineering, developing advanced technology and sensors to explore Earth from space, and space from Earth.

» Geospace Data Science

Advancing the science and engineering of forecasting near-Earth orbital environments through numerical space weather prediction systems that assimilate large volumes of remote sensing and in-situ observations.

» Lidar Exploration

Studying advanced spectroscopy principles, developing new lidar technologies, investigating fundamental physical and chemical processes governing the whole atmosphere, and making new discoveries in atmosphere-to-space sciences.



90 PATENT APPLICATIONS
OVER THE LAST TEN YEARS





INDUSTRY PARTNERS

More than 125 companies have partnered with our faculty on research, ranging from startups to large firms such as Ball Aerospace and Lockheed Martin.

UNDERGRADUATE STUDENTS

The University of Colorado Boulder is internationally recognized for its education leadership in aerospace engineering and Earth and space sciences with a world-class, committed faculty and exceptional, engaged students.

We focus education and research programs on both the science and engineering of aerospace, using experiential learning from day one. Combine this with intensive faculty and staff advising, and our graduates are broadly educated, interdisciplinary, agile and ready to hit the ground running in their careers.

Whether your interests lie in joining a business or a federal agency, leading a research laboratory and teaching the next generation, starting your own company, or becoming an astronaut, CU Boulder will help you achieve your aerospace career goals.



CAPSTONE PROJECTS

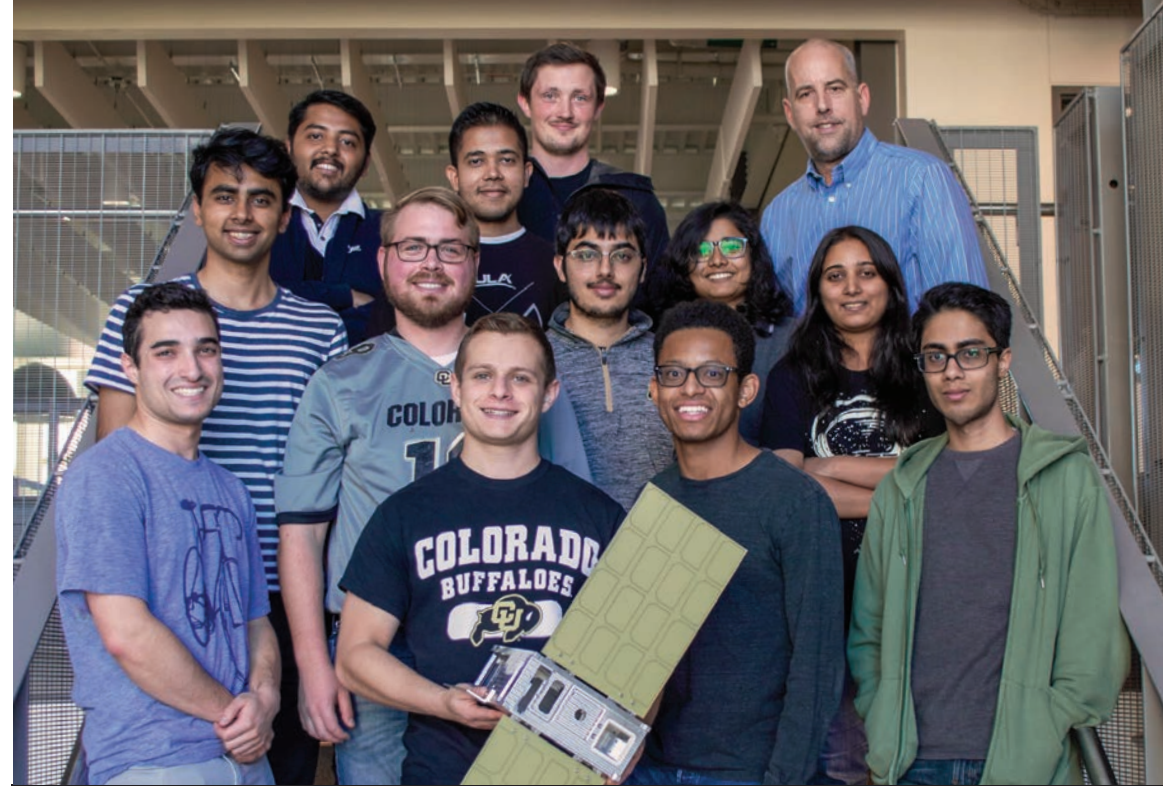
As a part of our hands-on curriculum, we work directly with companies and aerospace industry leaders on projects that can make a real impact and prepare our senior and graduate students for the workforce.

INVOLVEMENT OPPORTUNITIES

As an aerospace student, you will have access to a wide variety of clubs and organizations. From engineering and aerospace-specific groups to organizations centered on hobbies and the outdoors, you have a place at CU Boulder.

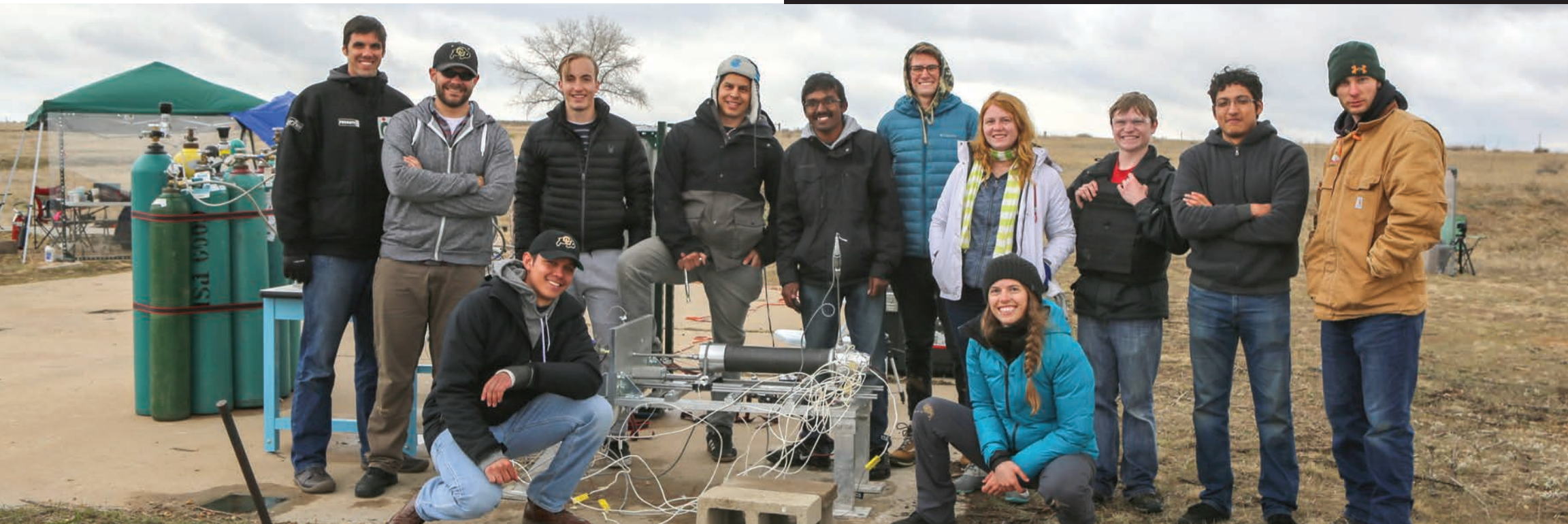
The College of Engineering and Applied Science is also home to eight affinity-based professional engineering societies as well as the Broadening Opportunity through Leadership & Diversity (BOLD) Center.

BOLD cultivates an inclusive, equitable, educational experience and community where historically underserved and underestimated students thrive. BOLD is a people-centered community that encourages, listens and guides students to create positive change in the college and the world.



#1

STATE PER CAPITA FOR AEROSPACE EMPLOYMENT





GRADUATE STUDENTS

Our graduates become leaders and entrepreneurs in aerospace, groundbreaking researchers, technical experts in industry and government labs, and educators and mentors for future generations inspired by flight and space exploration.

Focus areas

- » Astrodynamics and Satellite Navigation Systems
- » Autonomous Systems
- » Bioastronautics
- » Fluids, Structures and Materials
- » Remote Sensing, Earth and Space Sciences

Graduate degrees

- » PhD
- » MS
- » Professional MS – Designed for working professionals
- » BAM – 5-year BS-Accelerated MS

TOP 10 NATIONALLY-RANKED GRADUATE AND UNDERGRADUATE PROGRAMS



STUDENT EXCELLENCE

Student awards are from the most recent five years.

- » 23 NASA Fellows
- » 24 NSF Graduate Research Fellows
- » 10 NDSEG Fellows
- » 10 Draper Fellows
- » 8 Brooke Owens Fellows
- » 13 Aviation Week 20 Twenties Awardees (the most of any university)





THE SMEAD PROGRAM

The Smead Program ensures the department attracts and retains the brightest minds in aerospace. It brings together graduate students, faculty and visiting professors to conduct groundbreaking, interdisciplinary research in an enriched environment.

Smead Scholars

Each year, a small group of aerospace PhD applicants are hand-selected and invited to apply to this prestigious program. Only two individuals are chosen annually for this award, which provides full tuition coverage, a research stipend, programming, and dedicated staff support. Being a Smead Scholar is a journey of pushing through boundaries and building character to become a future leader of the field. Smead Scholars are nationally-recognized for their research and character, with alumni spanning the nation both geographically and across the aerospace sector. Each spring, Scholars convene in Vail, Colorado to share research updates and meet with leaders of the aerospace sector to discuss the most pressing matters facing our community. If you are interested in being considered for this program, learn more at colorado.edu/aerospace/smead.

Faculty Fellows

Chosen for their outstanding research records and mentorship qualities, Smead Faculty Fellows serve for terms of two to four years. The program supports both groundbreaking science and the student Smead Scholars, as Fellows often serve as research advisors.

Visiting Professorship

The Michael M. Byram Distinguished Visiting Professorship welcomes an internationally-renowned researcher for one to two semesters each year to teach classes, host seminars, and collaborate with faculty.



I'm part of a tight-knit community with a real support system. As Smead Scholars, we're encouraged to collaborate and offered opportunities to attend workshops and events to explore different areas. We have true cheerleaders in aerospace.

Shaylah Mutschler
Smead Scholar

University of Colorado Boulder

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colorado.edu/aerospace

The University of Colorado is an equal opportunity/nondiscrimination institution. The information in this brochure was accurate at the time of printing (November 2021).

All information is subject to change without notice.