



Aerospace Engineering Sciences

University of Colorado at Boulder

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*Michael S. Francis, PhD, 1976
Honorary Degree in Science, 2010*

INTERVIEW WITH ALUMNUS MICHAEL S. FRANCIS

Michael S. Francis is a scientist, engineer and entrepreneur. He is known as one of the nation's foremost experts in aerospace science. After receiving his Ph.D. from the University of Colorado, he rose to leadership positions at Lockheed Martin and continues to serve as a program developer and adviser in the areas of autonomy and unmanned systems at United Technology Corporation. Dr. Francis is a founding member of the UCB Department of Aerospace Engineering Sciences' External Advisory Board (EAB). He has guided its strategic planning to poise the department as a national leader in the development of unmanned aircraft systems.

What brought you to UCB as an undergraduate, and what kept you here for the MS and PhD degrees?

Although I grew up in Wisconsin, I spent three years as a boy (grades 4-6) in Denver. I came to love the mountains in Colorado as a whole. When it came time for college, the University of Colorado was a very appealing alternative, especially given that no Wisconsin school offered aerospace engineering. I stayed on for advanced degrees at CU with Air Force encouragement and independent fellowship/ scholarship support. I had a great graduate student committee and an adviser (Don Kennedy) whom I greatly admired.

What are some changes that you see at AES today from when you were a student?

When I was at CU, the curriculum was heavily focused on aeronautics and its constituent subjects.

Bob Culp taught the only space-related course at the time (orbital mechanics). In addition, even the undergraduate curriculum was oriented toward producing PhD graduate students, with little regard for future practicing engineers. Today the curriculum is much more balanced between air and space, and between industry and academic objectives. The space engineering and sciences component today is among the best in the nation. And aeronautics is regaining its stature with a vibrant and creative young faculty, and pathfinder programs in areas such as unmanned air systems. The emphasis on teaching quality is also a major discriminator for today's students, and that attribute is rare in higher education as a whole.

Most of my classmates went on to industry careers, while I pursued a unique career with a PhD in the military. We weren't as close as today's

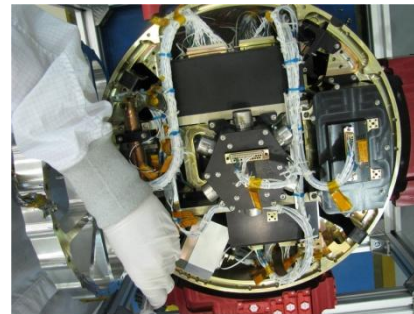
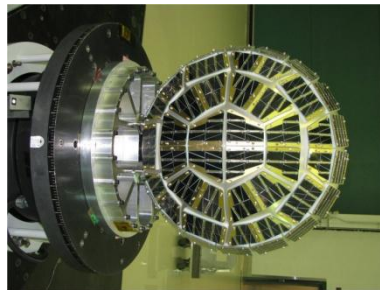
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FAA Center of Excellence

On August 19, 2010 the Federal Aviation Administration announced the formation of a Center of Excellence for Commercial Space Transportation, tasked with researching issues of space launch operations and traffic management, among other space-related matters. CU-Boulder is one of eight universities and other institutions which will collectively make up the center, with David Klaus, an associate professor in the Department of Aerospace Engineering Sciences, serving as the principal investigator for the CU-led portion of the project. Klaus has experience as a former launch controller for NASA's space shuttle program, and he sees great potential for the Center of Excellence (COE) to advance the capabilities of space travel for generations to come. The COE will not be housed in a physical building but its many group members will be in contact and meet regularly. It has already identified more than 20 policy issues that should be addressed with space vehicles and airplanes vying for the sky. See the Boulder Daily Camera story [here](#).



Professor David Klaus



DANDE (Drag and Atmospheric Neutral Density Explorer) sits in the lab facilities of the Discovery Learning Center on the UCB campus, waiting for shipment to Kirtland AFB and the Air Force Research Labs in Albuquerque mid-Fall Semester 2010 for further tests and a possible launch next year. Conceived as a graduate project for AES students in summer 2006, a Space Grant-AES proposal in January 2007 gave birth to the UCB student-designed nanosatellite which, two years later, won the AIAA/AFOSR/AFRL National University Competition against ten other schools. This guaranteed DANDE the chance to be chosen as a secondary payload for a rocket launch. Launch could be as early as 2011 since the nanosatellite's mission (to measure winds and density in the thermosphere to understand better how factors such as solar activity may affect satellite drag) is technologically relevant to today's focus on space debris and space weather.

AES PhD candidate Lee Jasper, current Project Manager for the DANDE nanosatellite, estimates that nearly 100 students from disciplines including AES, ECE, ME, and CS have worked on the project. Since the 2009 competition, the make-up of the student team has switched from graduate to undergraduate students for building and testing.

Excitement is so high that students frequently put in 25-30 hours a week on the project during the school year (40-60 hours a week during the summer). AES senior Kyle Kemble, Integration and Test Lead for DANDE, believes it is the cradle-to-the-grave design aspect of the project that so appeals to students. Both Jasper and Kemble appreciate the mentoring provided by current engineering professors and their "partners" at the Air Force Space Research Labs. Several companies and organizations have been helpful with in-kind gifts and loaning testing facilities. These include LASP, CASA, Ball Aerospace, Lockheed Martin, First RF and Goddard Space Flight Center. Even alumni with over ten years of experience in the field have called up after reading about DANDE and offered their expertise. "With such help, we really feel this is the best product we can deliver," says Kemble.

Michael Francis Interview (continued from page 1)

students, although I have a few friends from that class that I still correspond with. A recent addition to the AES External Advisory Board, Chris Finnoff, is one of the '69 alums with whom I've reconnected.

What future contributions do you hope to make to the field of aerospace technology?

I've been truly fortunate to have a rewarding career that has taken me across the entire spectrum of aerospace, from aeronautics to space, from basic research to systems development and operations, and across military and civil applications. During the last two decades, across military and civil applications. During the last two decades, I've been fortunate to help shape the future of our business in the area of autonomous and unmanned systems—the latter the result of the continuing marriage of information revolution and the industrial age. I hope to continue to help open this frontier—one which will also help me contribute to the preeminent aerospace challenge of our time - that of modern systems integration. I also hope to use my insights and experience to help the next generation of young engineers learn how to meet these challenges. My involvement with the CU Aerospace Engineering Department External Advisory Board, along with other similar activities, affords me that opportunity.

One final note—I came through the department at a difficult and turbulent time in its history. There was internal strife then, along with the unpopular Vietnam War—factors which may have soured many of my classmates on aerospace, and the university in general. I'd like to assure them that this institution has come a long way since those days, and it continues to provide an absolutely first-rate education to the students that enroll in this very popular subject. I encourage them to support the Department and the University in any way they can. I'm proud of my lifelong relationship with this fine institution.

JEFFREY M. FORBES, PROFESSOR AND CHAIR

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