

# **RICHARD D. COLGREN**

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## **(i) PROFESSIONAL PREPARATION:**

University of Washington 1982	Aeronautical & Astronautical Engineering	BS,
University of Southern California 1987	Electrical Engineering	MS,
University of Southern California 1993	Electrical Engr. – Systems, minor Aero. Engr.	PhD,

## **(ii) APPOINTMENTS:**

2003 to Present: Associate Professor, Department of Aerospace Engineering, University of Kansas, Lawrence, KS.  
1984 to 2003: Senior Staff Engineer, Lockheed Martin Aeronautics Company, Palmdale, CA. 2002 to 2003: Adjunct Professor, Embry-Riddle Aeronautical University, Palmdale, CA.  
2000 to 2002: Adjunct Professor, University of Phoenix, Lancaster, CA.  
1998 to Present: Adjunct Professor, Department of Electrical Engineering, University of Southern California, Los Angeles, CA.  
1996 to 1997 and 2002: Associate Professor, Department of Computer Science, Chapman University, Edwards AFB and Palmdale, CA.  
1996: Lecturer, National Test Pilot School, Mojave, CA.  
1995 to 2003: Adjunct Professor, Department of Mathematics and Science, Antelope Valley College, Lancaster, CA.  
1993 to 1996 and 2002: Associate Professor, Department of Electrical Engineering, California State University - Fresno, Edwards AFB, CA.  
1982 to 1984: Flight Control Engineer, Northrop Corporation, Pico Rivera, CA.

## **(iii) PUBLICATIONS:**

### (i) Related Publications

Colgren, Richard, "Applications of Robust Control to Nonlinear Systems" to be published in the AIAA Progress in Aeronautics and Astronautics Series, January 2004.  
Colgren, Richard, Han Park, Forrest Fisher, Timothy Johnson, et. al., "Autonomous Control of Uninhabited Air Vehicles," Proceedings of the 2001 AIAA Guidance, Navigation and Control Conference, Montreal, Canada, 6-9 August 2001.  
Colgren, Richard, and Johnson, Timothy, "Flight Mishap Prevention for UAVs," Proceedings of the 2001 IEEE Aerospace Conference, Big Sky, MT, 7-13 March 2001.  
Pete Schaefer, Colgren, Richard, Abbott, Richard, Park, Han, Fijany, Amir, et. al., "Technologies for Reliable Autonomous Control (TRAC) of UAVs," co-authored with Proceedings of the 19th Digital Avionics Systems Conference (DASC), Philadelphia, PA., 7-13 October 2000.  
Colgren, Richard, Gulati, Sandeep and Koneck, Robert, "Technologies for Reliable Autonomous Control (TRAC)," co-authored with Proceedings of the 1999 IASTED Control and Applications Conference, Banff, CA, pp. 156-161, 25-29 July 1999.

### (ii) Other Publications

Lyshevski, Sergey, Skormin, Victor, and Colgren, Richard, "High Torque Density Integrated Electro-Mechanical Flight Actuators," IEEE Transactions on Aerospace and Electronic Systems, Volume 38, Number 1, pp. 174-182, January 2002.

Colgren, Richard, "Method and System for Elimination and Correction of Angle-of-Attack and Sideslip Angle from Acceleration Measurements," U. S. Patent No. 6,273,370, 14 August 2001.

Colgren, Richard with Eds. Zobrist, George and Leonard, J., V., "Simulation Systems – Chapter 8" Gordon & Breach Science Publishers, Amsterdam,, Netherlands, 2000.

Colgren, Richard and Jonckheere, Edmond, "H Control of a Class of Nonlinear Systems using Describing Functions and Simplicial Algorithms," IEEE Transactions on Automatic Control, Volume 42, Number 5, pp. 707-720, May 1997.

Colgren, Richard, Criss, Christopher and Criss, Russell, "Rocket-Powered Ducted Fan Engine," United States Patent Office, Patent Number 5,063,735, 12 November 1991.

**(iv) SYNERGISTIC ACTIVITIES:**

1. Lead Vehicle Sciences and Systems Engineer, C4ISR and UAV Programs, Lockheed Martin.
2. Lockheed Martin Project Investigator on the DARPA Software Enabled Control (SEC) Technologies for Reliable Autonomous Control (TRAC) program.
3. Project Engineer on the Multivariable Control Theory Contracted and Internal Research and Development (CRAD), leading to the USAF Modern Control System Design Guidelines.
4. Instructor for the Skunk Works and Lockheed Technical Institutes. Developed and implemented training programs used across company sites for the Matlab and Simulink software suites.
5. Past Software Subcommittee Chairman for the Lockheed Corporate Task Force.

**COURSE, CURRICULUM AND TEACHING LABORATORY DEVELOPMENT**

My research on intelligent aerospace vehicles and systems is focused on the development of cutting-edge embedded control technologies to enable the realization of autonomous vehicles capable of conducting safe operations in conjunction with other vehicles, including formation flight. This is required to achieve a high level of mission effectiveness and to accommodate real-world operational issues. The core thrust of my research is on developing the framework for a real-time vehicle management system to obtain self-awareness, external awareness, and perform intelligent decision-making based on that awareness. This research has a major tie into aerospace system applications, including formation flight, collision avoidance, deep space probes, autonomous robots, and UAVs. The use of UAV helicopters at the Lawrence Airport Flight Research Facility is to develop and verify these autonomous control technologies, to identify and verify dynamic vehicle models, and to train students in rigorous flight test procedures.

I have been working with Wayne Olson, Jay Ferrell, and other retired engineers from NASA Dryden and the Air Force Flight Test Center on low cost methods for flight testing. These techniques and methods have direct application to both the development of experimental general aviation aircraft and to Uninhabited Air Vehicle (UAV) flight testing. They use inertial and GPS sensors with minimal modifications to the vehicle. Estimation techniques are used to correct for winds and derive air data parameters. A paper on a portion of this work covering flight testing conducted this winter was presented at the August 2003 AIAA Modeling and Simulation Technologies Conference.

I am currently transitioning the aircraft conceptual design teaching and research area from Jan Roskam, Deane E. Ackers distinguished professor of aerospace engineering at the University of Kansas and world-renowned aircraft designer, who retired at the end of this 2003. With Robert Loschke, retired Technical Fellow from the Lockheed Martin Skunk Works in Palmdale, California, I received the best paper award at the August 2003 AIAA Modeling and Simulation Technologies Conference.

**(v) COLLABORATORS AND OTHER AFFILIATIONS:**

**(a) Collaborators and Co-Editors (or Co-Authors)**

Richard Abbott, Lockheed Martin; Jay Ferrell, Lockheed Martin (Retired); Amir Fijany, JPL; Forrest Fisher, JPL; Timothy Johnson, GE R&D Center; Sergey Lyshevski, Purdue (now RPI); Wayne Olson, EAFB (Retired); Han Park, JPL; Pete Schaefer, Lockheed Martin; Victor Skormin, Purdue; George Zobrist, J. V. Leonard.

**(b) Graduate and Postdoctoral Advisors**

John Hauser, University of Colorado; Petros Ioannou, USC; Edmond Jonckheere, USC; Larry Redekopp, USC; Mike Safonov, USC.

(c) Graduate Students

Mike Frye, University of Texas at San Antonio; Ying Huo, University of California; Joshua Shireman, Grannell University, Subodh Bhandari, Sajjadi Kia Solmaz, Shah Keshmiri, Philipp Lederbogen, Lance Holly and Scott Kowalchuk, University of Kansas. 6 graduate students total