

Current Position

UNIVERSITY OF DETROIT MERCY, Detroit, MI – *Assistant Professor* Aug 2008 – Current
Department of Mechanical Engineering

COURSES TAUGHT

AEV 5020: Modeling and Control of Advanced Electric Vehicles	Fall 2010, Winter 2011, 2012, Summer 2011, 2012
ENGR 3130: Dynamics	Fall 2008, 2009, 2010, 2011, 2012
ENGR 4220/5220: Controls Systems	Summer 2009, 2010, 2011, 2012
ENGR 4440/5440: Vibrations	Winter 2010
ELEE 4700/5700: Controls II	Fall 2008, 2010, 2011, 2012
ELEE 5780: Optimization and Optimal Control	Fall 2009
MENGR 3610: Mechanical Measurements Laboratory	Summer 2009, 2010, 2011, 2012

Academic Preparation

UNIVERSITY OF MICHIGAN, Ann Arbor, MI – *PhD Mechanical Engineering* Aug 2008
Thesis: Modular Approaches to the Control of Discrete-Event Systems
Advisors: Prof. Dawn Tilbury and Prof. Stephane Lafortune

UNIVERSITY OF MICHIGAN, Ann Arbor, MI – *MS Applied Mathematics* Dec 2008

UNIVERSITY OF CALIFORNIA, Berkeley, CA – *MS Mechanical Engineering* Dec 2000
Thesis: Nonlinear Slip-based Brake Control and Accompanying Road Force Observation
Advisor: Prof. J. Karl Hedrick

UNIVERSITY OF SOUTHERN CALIFORNIA, Los Angeles, CA – *BS Mechanical Engineering* May 1998

Select Prior Experience

Ford Motor Company, Dearborn, MI – *Visiting Researcher* Summer 2008, Winter 2010

- Developed course for Ford on the modeling and control of Advanced Electric Vehicles.
- Reviewed processes employed for developing the diagnostic systems for the Ford Escape Hybrid and a demonstration fuel cell electric vehicle.
- Produced a technical report making recommendations on how to improve the development of diagnostic systems at Ford Motor Company. These recommendations are currently being applied.

WILLOW GLEN HIGH SCHOOL, San Jose, CA – *Math and Physics Teacher* Sept 2002 – June 2004

- Full-time teacher responsible for all aspects of class and laboratory instruction in Advanced Placement Calculus AB and BC, Pre-Calculus and Honors Physics.
- Introduced the Calculus BC curriculum to the school and improved students' Advanced Placement scores both years.

LOCKHEED MARTIN CORPORATION, Sunnyvale, CA – *Controls Engineer* Sept 2000 – July 2002

- Designed a satellite thruster control system employing classical and state-space methods. Validated designs through component and system-level simulations.
- Updated a heritage satellite attitude reference algorithm employing my knowledge of stochastic estimation methods.

ALLIEDSIGNAL CORPORATION, Torrance, CA – *Engineering Intern* Summer 1997 and 1998

- Designed and helped conduct acceptance and development testing. Interfaced with various subcontractors and customers.

Brief Summary of Research Activities

UNIVERSITY OF MICHIGAN, Ann Arbor, MI – *Graduate Student Researcher* July 2004 – July 2008

- Determined requirements and developed algorithms for the modular and hierarchical control of discrete-event systems that reduce complexity and improve reconfigurability. Applied results to various physical examples: manufacturing systems, automated vehicles, fluid systems, etc.
- Developed an experimental set-up, hardware and software, for testing control over a network.

UNIVERSITY OF CALIFORNIA, Berkeley, CA – *Graduate Student Researcher* Sept 1998 – July 2000

- Built hardware for a car brake control system in cooperation with other graduate students.
- Designed and implemented a linear road force observer and a nonlinear brake controller.
- Participated in writing the grant proposal that funded this research.

Honors and Awards

- University of Detroit Mercy Engineering Teacher of the Year 2011
- Best Paper in Session, American Control Conference 2008
- ASEE Outstanding Graduate Student Instructor (1 of 5 in college) 2007
- Best Presentation in Session, U of M Graduate Student Symposium 2007
- Nominated for Best Paper, ASEE Annual Conference & Exposition 2006
- University of Michigan Regents' Fellowship (outstanding incoming graduate student) 2004
- USC Senior Mechanical Engineering Award (top graduate) 1998
- USC Trustee Scholar (full tuition award) 1994-1998

Publications

Refereed Journal Papers

R. C. Hill, J. Cury, M. de Queiroz, D. M. Tilbury, and S. Lafortune, "Multiple-Level Hierarchical Interface-Based Supervisory Control," *Automatica*, Vol. 46, No. 7, July 2010, pp. 1152-1164.

R.C. Hill, J. Lockwood, and Y. Li. "Diagnostics Design Process for Developmental Vehicles," *SAE Int. J. Passeng. Cars - Electron. Electr. Syst.* 3:1-9, 2010.

R.C. Hill, D.M. Tilbury, and S. Lafortune. "Modular Supervisory Control with Equivalence-based Abstraction and Covering-Based Conflict Resolution," *Discrete Event Dynamic Systems*, Vol. 20, Issue 1, 2010, pp. 491-498.

R.C. Hill and D.M. Tilbury. "Incremental Hierarchical Construction of Modular Supervisors for Discrete-Event Systems," *International Journal of Control*, Vol. 81, No. 9, September 2008, pp 1364-1381.

Refereed Conference Proceedings

J. Goryca and R.C. Hill. "Formal Synthesis of Supervisory Control Software for Multiple Robot Systems," to appear in the *Proceedings of the American Control Conference*, Washington D.C., June 2013.

A. Niedert, R.C. Hill, and N. Rayess. "Modeling, Control, and Simulation of an Omni-directional Robotic Ground Vehicle," *Proceedings of the 2012 ASME Dynamics Systems and Controls Conference*, Ft. Lauderdale, FL, October 2012.

R.C. Hill. "Development of an Introductory Course on the Modeling and Control of Advanced Electric Vehicles," *Proceedings of the American Control Conference*, Montreal, Canada, June 2012.

- R.C. Hill and K.A. Plantenberg. "A Conceptual Approach to Undergraduate Dynamics Instruction: A Work in Progress," *Proceedings of the North Central Section Meeting of the American Society for Engineering Education*, Ada, OH, March, 2012.
- M. Sartini, A. Paoli, R.C. Hill, and S. Lafortune. "A Methodology for Modular Model Building in Discrete Automation," *Proceedings of the IEEE Conference on Emerging Technologies in Factory Automation*, Bilbao, Spain, Sept 2010.
- R.C. Hill and P. Pena. "International Collaboration in an Undergraduate Controls Systems Course," *Proceedings of the 2010 American Society for Engineering Education Annual Conference & Exposition*, Louisville, KY, June 2010.
- R.C. Hill, J. Lockwood, and Y. Li. "Diagnostics Design Process for Developmental Vehicles," *Society of Automotive Engineers (SAE) World Congress*, April 2010.
- R.C. Hill. "Effective Use of Simulation in the Introductory Controls Curriculum," *Proceedings of the American Society for Engineering Education North Central Section Conference*, Saginaw, MI, April 2009.
- R.C. Hill and D.M. Tilbury. "Incremental Hierarchical Construction of Modular Supervisors for Discrete-Event Systems," *International Journal of Control*. Vol. 81, No. 9, pp 1364-1381, September 2008.
- R.C. Hill, J.E.R. Cury, M.H. Queiroz, and D.M. Tilbury. "Modular Requirements for Multiple-level Hierarchical Interface-based Supervisory Control," *Proceedings of the American Control Conference (ACC'08)*. pp. 483-490, June 2008.
- R.C. Hill, D.M. Tilbury, and S. Lafortune. "Modular Supervisory Control with Equivalence-based Conflict Resolution," *Proceedings of the American Control Conference (ACC'08)*. pp. 491-498, June 2008.
- R.C. Hill, D.M. Tilbury, and S. Lafortune. "Covering-based State-feedback of Partially Observed Discrete-Event Systems," *Proceedings of the International Workshop on Discrete Event Systems (WODES'08)*. pp. 2-8, May 2008.
- R.C. Hill and D.M. Tilbury. "Modular Supervisory Control with Abstraction and Incremental Hierarchical Construction," in *Proceedings of the International Workshop on Discrete Event Systems (WODES)*, July 2006.
- R.C. Hill and D.M. Tilbury. "Introducing Discrete-Event Systems into an Undergraduate Controls Course," in *Proceedings of the American Society for Engineering Education Annual Conference & Exposition*, Chicago, IL, June 2006.
- Michael Uchanski, Massimiliano Gobbi, R.C. Hill, and J.K. Hedrick. "Experimental Results Using Sliding Mode Controller with Non-smooth Adaptation," *International Symposium on Mathematical Theory of Networks and Systems (MTNS)*, 2000.

Book Chapters

- Stephane Lafortune, Richard Hill, and Andrea Paoli, "Fault Diagnosis of Manufacturing Systems using Finite State Automata," in *Formal Methods in Manufacturing*, J. Campos, C. Seatzu, X. Xie , Editors, CRC Press/Taylor and Francis, *to be released 2013*, Chapter 22.

Richard Hill, "Discrete Event Systems," in *The Control Handbook, Control System Fundamentals: Second Edition*, W. Levine, Editor, CRC Press, 2010, Section 5.5, pp. 81-99.

Books

Kirstie Plantenberg and Richard Hill, *Conceptual Dynamics*, SDC Publications, to be released 2013.

Posters Presented

A. Niedert, R.C. Hill, and N. Rayess, "Modeling, Control, and Simulation of an Omni-directional Robotic Ground Vehicle" at the 4th Annual IEEE International Conference on Technologies for Practical Robotic Applications (TePRA), Woburn, Massachusetts, April 23-24, 2012.

R.C. Hill, "Advanced Electric Vehicle Graduate Certificate," at the ONR/NSF-sponsored Workshop on Reforming Electrical Energy Systems Curriculum, Napa, CA, February 4-5, 2011.

Websites

D.M. Tilbury, W. Messner, and R.C. Hill, *Control Tutorial for MATLAB and Simulink*. www.ctms.umich.edu

Articles

R.C. Hill. "Broadening the Control Perspective of ME Undergrads," *ASME Dynamic Systems and Control Division Newsletter*, May 2006.

Seminars

- R.C. Hill and W. Messner. *Using web-based tutorials to learn controls fundamentals with MATLAB and Simulink*. 2012 American Control Conference, Montreal, Canada, June 26, 2012.
- R.C. Hill. *Introduction to Modeling and Control for Advanced Electric Vehicles*. (4 hour short course) Ford Motor Company Research and Advanced Engineering, Dearborn, USA, August 30, 2010 and September 2, 2010.
- R.C. Hill. *Diagnostic System Design for Developmental Vehicles*. Ford Motor Company Research and Advanced Engineering, Dearborn, USA, August 2008.
- R.C. Hill. *History, Culture, and Language: The Americas*. National Science Foundation IREE Grantees Conference, Washington D.C., USA, May 2008.
- R.C. Hill. *Technical and Professional Practice: The Americas*. National Science Foundation IREE Grantees Conference, Washington D.C., USA, May 2008.
- R.C. Hill. *Control System Design from the Discrete to the Continuous*. Ford Motor Company Research and Advanced Engineering, Dearborn, USA, May 2008.
- R.C. Hill. *Modular Approaches to the Control of Discrete-Event Systems*. Federal University of Santa Catarina, Florianópolis, Brazil, April 2007.

Funded Grants

"Supervisory Control of Autonomous Vehicle Fleets," PI, UDMPU Faculty Research Award: \$4,000, funded 2012-2013.

"CAREER Proposal Development Support," PI, University of Detroit Mercy Summer Stipend Award: \$4,260,

funded 2011-2012.

“Fault-Tolerant Discrete Control Logic in Automotive Applications”, Subcontract, PI Stephane Lafortune (University of Michigan), Automotive TRW Endowed Research Award: \$ 35,000 (\$8,000 at UDM), funded 2011-2012.

“Updating MATLAB Controls Tutorial”, PI, Co-PI William Messner (Carnegie Mellon University), MathWorks Academic Support Award for Curriculum Development: \$ 85,298 (\$ 32,217 at UDM), funded 2010-11.

“Supervisory Control of Autonomous Vehicle Fleets”, PI, Co-PI Lazaros Kikas, UDMPU Faculty Research Award: \$ 4,800, funded 2010-11.

“Control Development for a High-Mobility Robotic Vehicle”, PI, UDM Faculty Grant Incentive Program: \$ 5,000, funded 2009-10.

Service and Enrichment

- McNichols Faculty Assembly, College of Engineering and Science Representative, 2009-current
- University IT team, MFA representative, 2011-current
- College of Engineering and Science, Student Affairs Committee member 2010-2011
- Chaired three sessions of the 2012 American Control Conference, June 27 and 28, 2012
- Participated in the meeting of the AACC Technical Committee on Education at the 2012 American Control Conference, Montreal Canada, June 28, 2012
- Featured speaker at the Detroit International Advanced Manufacturing Technology Show at Cobo Center in Detroit, Michigan. Gave talk entitled “Rapid Control System Development for Hybrid Electric Vehicles” on October 4, 2011
- Contributed the white paper, “Fault-Tolerant Discrete Control Logic in Automotive Applications” and participated in the NSF/NIST/USCAR-sponsored Workshop on Cyber-Physical Systems, Troy, MI, March 17-18, 2011
- Presented a poster on the Advanced Electric Vehicle Graduate Certificate and participated in the ONR/NSF-sponsored Workshop on Reforming Electrical Energy Systems Curriculum, Napa, CA, February 4-5, 2011
- Commencement Marshall – 2010, 2011, 2012
- Volunteer for Tech Day 2008, 2009, 2010, 2011 – Supervised Rube Goldberg Competition
- Presented the poster, “Design and Implementation of an Omni-directional Robotic Ground Vehicle” and participated in the Ground Robotics Reliability Center (GRRC) Annual Meeting at the University of Michigan, Ann Arbor, May 18, 2010
- Served on a panel at the University of Michigan, Ann Arbor on “Obtaining an Academic Position,” December 2, 2009
- Gave commencement address for the 2009 Engineering and Science Diploma Ceremony, August 2009
- Taught Saturday course on Mechatronics for the Detroit Area Pre-College Engineering Program, Winter 2009
- Moderated two sessions as part of the National Science Foundation (NSF) International Research and Education in Engineering (IREE) Grantees Conference, May 2008

Masters Theses Advised

Jill Goryca, *Auto-Generation and Real-Time Optimization of Control Software for Multi-Robot Systems*.
Master of Mechanical Engineering, Summer 2012.

Andrew Niedert, *Modeling, Control, and Design of a Teleoperated Omnidirectional Ground Robot*. Master of Mechanical Engineering, Fall 2011 (co-advised with Dr. Nassif Rayess).

Reviewer of Technical Papers

- *Journals*
 - *IEEE Transactions on Automatic Control*
 - *IEEE Transactions on Automation Science and Engineering*
 - *International Journal of Control*
 - *Journal of Discrete Event Dynamic Systems*
- *Conferences*
 - *2013 American Control Conference (ACC'13)*
 - *2012 American Society of Engineering Education (ASEE) North-Central Section Conf*
 - *2010 Society of Automotive Engineers (SAE) World Congress & Exhibition*
 - *2009 IEEE Conference on Decision and Control (CDC'09)*
 - *2009 IEEE Conference on Automation Science and Engineering (CASE'09)*
 - *2009 International Workshop on Principles of Diagnosis (DX'09)*
 - *2009 American Society of Engineering Education (ASEE) North-Central Section Conf*
 - *2009 Society of Automotive Engineers (SAE) World Congress & Exhibition*
 - *2008 International Workshop on Discrete Event Systems (WODES'08)*
 - *2007 Dependable Control of Discrete-event Systems (DCDS'07)*
 - *2007 American Control Conference (ACC'07)*
 - *2006 American Control Conference (ACC'06)*

Affiliations

- *ASEE*
- *ASME*
- *SAE*