

## Curriculum Vitae JESSY W. GRIZZLE

### Business Address

Department of Electrical Engineering and Computer Science  
University of Michigan  
EECS Building  
Ann Arbor, MI 48109-2122

grizzle@eecs.umich.edu  
Fax: (734) 763-8041  
Phone: (734) 763-3598  
[www.eecs.umich.edu/~grizzle/](http://www.eecs.umich.edu/~grizzle/)

### Personal Information

Birthdate: February 8, 1957

### Research Interests

Analysis and feedback control of nonlinear systems; control of bipedal robot locomotion; formal methods for highly dynamics systems; hybrid electric vehicles; automotive powertrain control; nonlinear discrete-time systems.

### Education

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| 1984      | NSF-NATO Postdoctoral Fellowship in Science, Laboratory of Signals and Systems, CNRS, Ecole Supérieure d'Electricité, Paris, France. Subject: "Geometric Methods in Discrete-time Nonlinear Control." Advisor: M. Michel Fliess |
| 1980–1983 | Ph.D. in Electrical Engineering, The University of Texas at Austin, Austin, Texas. Thesis: "The Structure and Optimization of Nonlinear Control Systems Possessing Symmetries." Advisor: Professor Steven I. Marcus             |
| 1979–1980 | M.S. in Engineering, The University of Texas at Austin, Austin, Texas. Thesis: "An Analysis of Centralized and Decentralized Control Strategies for Multiaccess Broadcast Networks." Advisor: Professor Steven I. Marcus        |
| 1975–1979 | B.S. in Electrical Engineering, Oklahoma State University, Stillwater, Oklahoma. Report: "Modeling the Global Carbon Cycle." Advisor: Professor Robert J. Mulholland  |

### Professional Experience

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| 2014         | Elmer G. Gilbert Distinguished University Professor                              |
| 2013         | Visiting Professor, EECS Dept., MIT, January through May                         |
| 2007–present | Jerry W. and Carol L. Levin Professor of Engineering                             |
| 9/94–present | Professor of Electrical Engineering and Computer Science, University of Michigan |
| 9/05–5/06    | Professeur Invité, Université Lyon-I, Claude Bernard, Lyon, France               |
| 5/03         | Professeur Invité, Ecole Centrale, Nantes, France                                |

9/98-2/99	Professeur Invité, Université Louis Pasteur, Strasbourg, France
5/94-6/94	Directeur de Recherche Associé, Laboratoire d'Automatique de Nantes, Ecole Centrale, Nantes, France, Visiting Professor
1/91-3/91	Directeur de Recherche Associé, Laboratoire des Signaux et Systèmes, SU-PELEC, CNRS-ESE, Gif-sur-Yvette, France, Visiting Professor on a Poste Rouge
5/91-7/91	Visiting Professor, Dipartimento di Informatica e Sistemistica, L'Università di Roma, "La Sapienza", Rome, Italy
1990-2001	Director of the Control Systems Laboratory, Department of Electrical Engineering and Computer Science, University of Michigan
1990-1994	Associate Professor of Electrical Engineering and Computer Science, University of Michigan
1987-1990	Assistant Professor of Electrical Engineering and Computer Science, University of Michigan
Summers 1988-2010	Consultant to Ford Mo. Co., Dearborn, MI
Summers 1986-1987	Research Engineer, Ford Motor Co., Dearborn, MI
1985-1987	Assistant Professor, Department of Electrical and Computer Engineering, University of Illinois at Urbana-Champaign
1985-1987	Research Assistant Professor, Coordinated Science Laboratory, University of Illinois

## Honors and Awards

2014	Elmer G. Gilbert Distinguished University Professor
2014	Eta Kappa Nu ECE Professor of the Year (teaching award)
2012	Bode Prize, IEEE Control Systems Society
2012	10 World-Changing Innovators, Popular Mechanics
2010	Fellow of IFAC, the International Federation of Automatic Control
2010	Attwood Award, the highest faculty achievement award conferred by the College of Engineering at the University of Michigan
2007	Endowed Professorship, Jerry W. and Carol L. Levin Professor of Engineering
2007	University of Michigan Distinguished Faculty Achievement Award
2006	Scientific American Top 50 (honors the top 50 outstanding leaders in science and technology over the past year)
2005	Discover Magazine Top 100 Science Stories of 2005 (for Rabbit)
2005	College of Engineering Research Excellence Award

2004	Tau Beta Pi Engineering Professor of the Year, UofM Chapter
2003	Control Systems Technology Award of the IEEE Control Systems Society for <i>the development of fuel-efficient and environmentally friendly automotive powertrains through innovative application of control theory</i> , with J. Cook and J. Sun
2002	George S. Axelby Award (best paper published in the <i>IEEE Transactions on Automatic Control</i> ); with G. Abba and F. Plestan
2001-2003	Ford Innovation Award
1997	Fellow of the IEEE (for Contributions to the Theory and Practice of Non-linear Control)
1993	Henry Russel Award, University of Michigan, given in recognition of distinguished scholarship and conspicuous ability as a teacher
1993	College of Engineering Teaching Award
1992	Vehicular Electronics Paper of the Year: “Individual Cylinder Air-Fuel Ratio Control with a Single EGO Sensor”, with K.L. Dobbins and J.A. Cook, <i>IEEE Vehicular Technology Society</i>
1990	Senior Member of IEEE
1987	National Science Foundation Presidential Young Investigator Award
1984	North Atlantic Treaty Organization (NATO) Postdoctoral Fellowship in Science; research performed at the Laboratory of Signals and Systems, France, January through December
1983	Fulbright Grant (Full, to France), October 1983 to June 1984 (declined)

### Plenary and Keynote Addresses

2014	Distinguished Lecture Series at ETH Zurich, Switzerland, May
2014	Distinguished Lecture at University of Toronto, Canada, April
2014	Plenary Speaker, Texas Systems Day, March
2013	Keynote Address, Maryland Robotics Day, College Park, USA, October
2012	Bode Lecture, IEEE Conference on Decision and Control, USA, December
2012	Keynote Speaker, Osteobiology Society, Minneapolis, USA, October
2012	Plenary Speaker, Climbing and Walking Robots Conference (CLAWAR), Johns Hopkins, USA
2010	Plenary Speaker, IFAC Nonlinear Control Conference (NOLCOS), Bologna, Italy, August
2009	Plenary Speaker, 4èmes Journées Nationales de la Robotique Humanoïde, Nantes, France, May
2007	13th IEEE & IFAC International Conference on Methods and Models in Automation and Robotics, Szczecin, Poland, August

2004	Plenary Speaker, IEEE Conference on Decision and Control, Bahamas, December
2003	Plenary Speaker, Allerton Conference on Control, Communication and Computing, Illinois, October
2003	Keynote Address, American Society of Biomechanics Annual Meeting, Ohio, September
2001	Plenary Speaker, Super Mechano-Systems Symposium, Japan, November

### Professional Activities

2015-present	Awards Nominations Chair, IEEE Control Systems Society
2009-2012	Senior Editor, IEEE Transactions on Automatic Control
2006-2009	Associate Editor at Large, IEEE Transactions on Automatic Control
2003-2005	American Automatic Control Council Award Committee and Chairman of Ragazzini Education Award subcommittee
2002-2005	IEEE Control Systems Field Award Committee
2002-2005	Associate Editor of Automatica
2003	Workshop on the Modeling and Control of Bipedal Robots, IEEE Conf. Dec. & Control, Co-organized with Carlos Canudas-de-Wit
2003-2004	International Program Committee for First IFAC Symposium on <i>Advances in Automotive Control</i> - University of Salerno, Italy, April 19-23, 2004
2001-2006	Program Committee for Conférence Internationale Francophone d'Automatique
2001	Program Committee for 2001-IEEE Conference on Decision and Control
2000-2003	Chair of IEEE Control Systems Society Fellows Solicitation Committee
1999-2003	Vice-Chair of IEEE Control Systems Society Working Group on Automotive Control Systems
1997-2000	Board of Governors for the IEEE Control Systems Society
1995	International Program Committee for IFAC Conference on System Structure and Control
1992	Vice-Chairman for NOLCOS-92, IFAC Symposium on Nonlinear Control Systems Design
1992	Blue ribbon panel for Student Paper Contest, 30th IEEE Conference on Decision and Control
1990-1993	Associate Editor for IEEE Transactions on Automatic Control
1989-1993	Associate Editor for Systems and Control Letters
1989	Publications Chairman for 28th IEEE Conference on Decision and Control
1987	Program Committee for 1987-IEEE Conference on Decision and Control

- 1986 Selected by NSF to NSF Workshop on Future Directions in Control, Santa Clara, California
- 1985 Organizer and one of two main speakers for Pre-Allerton Tutorial Workshop on Nonlinear Systems, Oct. 1

## Foreign Languages

French

Italian

## Doctoral Students Graduated

- 1990 Sun-Tae Chung, "Digital Aspects of Nonlinear Synthesis Problems"
- 1992 Yongkyu Song, "Estimation and Control in Discrete-time Nonlinear Systems"
- 1993 Kenneth Butts, "Issues in the Implementation of Automotive Control Systems"
- 1994 Paul Moraal, "Nonlinear Observer Design: Theory and Applications to Automotive Control"
- 1996 Anna Stefanopoulou, "Modeling and Control of Advanced Technology Engines"
- 1996 Peter Hanish, "Phenomenological Modeling of Reactive Ion Etching for Real-time Feedback Control"
- 1996 Courtney Hanish, "Modeling and Automation of an Electron Cyclotron Resonance Source Etcher Using a Chlorine/Argon Plasma"
- 1996 Manish Chandhok, "Phenomenological Modeling of Plasma Generation for the Real-time Control of RIE Systems"
- 1998 Erich Brandt, "Modeling and Diagnostics of Three-Way Catalysts for Advanced Emissions Control Systems"
- 2000 Craig Garvin, "Radio Frequency Based Sensors for Diagnostics and Control of Plasma-Assisted Micro Manufacturing"
- 2000 Jun-Mo Kang, "Advanced Control for Fuel Economy and Emissions Improvement in Spark Ignition Engines"
- 2000 Hyun-Mog Park, "Real-Time Feedback Control and Fault Detection in Deep-Submicron Plasma Etch"
- 2002 Giovanni (Gian Piero) Fiengo, "Emissions Control for the Spark Ignition Internal Combustion Engine Equipped with Three-Way Catalytic Converter," 2001 [Primary advisor: Luigi Glielmo ; thesis completed at Università degli Studi di Napoli Federico II]
- 2002 Joseph J. Scillieri, "Limitations and Improvements in the Idle Speed Control of a Direct Injection Spark Ignition Engine," 2002 [Primary advisor: James S. Freudenberg]

2003	Eric Westervelt, “Toward a Coherent Framework for the Control of Planar Biped Locomotion”
2004	Chan-Chiao (Joe) Lin, “Modeling and Control Strategy Development for Hybrid Vehicles” [Primary advisor: Huei Peng]
2005	Jun Ho Choi, “Model-based Control and Analysis of Anthropomorphic Walking”
2006	Edward Dean Tate, Jr., “Techniques for Hybrid Electric Vehicle Controller Synthesis”
2007	Benjamin Morris, “Stabilizing Highly Dynamic Locomotion in Planar Bipedal Robots with Dimension Reducing Control”
2008	Ioannis Poulakakis, “Stabilizing Monopedal Robot Running: Reduction-by-Feedback and Compliant Hybrid Zero Dynamics,”
2010	Daniel F. Opila , “Incorporating Drivability Metrics into Optimal Energy Management Strategies for Hybrid Vehicles,” [Co-advisor: Brent Gillespie]
2011	Koushil Sreenath , “Feedback Control of a Bipedal Walker and Runner with Compliance”
2012	Hae Won Park , “Control of a Bipedal Robot Walker on Rough Terrain”
2013	Alireza Ramezani, “Feedback Control Design for MARLO, a 3D-Bipedal Robot”

## Patents

1. Alex Colvin, Richard Soltis, Jeffrey Cook, and Jessy Grizzle, “Control Approach For Use With Dual Mode Oxygen Sensor,” U. S. Patent No. 7197866, April 2007.
2. Giovanni Fiengo, Jeffrey Cook, and Jessy Grizzle, “Control Of Oxygen Storage In A Catalytic Converter,” U. S. Patent No. 6840036, January 2005.
3. Jessy Grizzle and Jing Sun, “Hybrid Operating Mode for DISI Engines,” U. S. Patent No. 6,411,885, June 2002.
4. Jessy Grizzle, Ilya Kolmanovsky and Jing Sun, “Fuel Injection Method for an Internal Combustion Engine,” U. S. Patent No. 6,393,832, May 2002.
5. Ilya Kolmanovsky, Jessy Grizzle, Jing Sun and John Russell, “Coordinated Control of Valve Timing During Mode Transitions of Direct Injection Stratified Charge Engine,” U.S. Patent No. 6,378,484, April 2002.
6. Julia Buckland and Jessy Grizzle, “Engine/Vehicle Speed Control For Direct Injection Spark Ignition Engine Applications,” U.S. Patent No. 6,349,700, February 2002. .
7. Jessy Grizzle and Jing Sun, “Direct Injection Engine System and Method,” U. S. Patent No. 6,336,071, January 2002
8. Jessy Grizzle and Jing Sun, “Hybrid Operating Mode for DISI Engines,” U. S. Patent No. 6,321,714, November, 2001.

9. Julia Buckland and Jessy Grizzle, "Rapid Transient Torque Management in DISI Engines," U. S. Patent No. 6,278,933 , August 2001.
10. Jessy Grizzle and Jing Sun, "Direct Injection Engine System and Method," U. S. Patent No. 6,244,242, June 2001.
11. Jing Sun and Jessy Grizzle, "Direct Injection Engine System," U. S. Patent No. 6,209,526, April 2001.
12. Jessy Grizzle and Jing Sun, "Idle Speed Control," U. S. Patent No. 5,630,394, May 1997.
13. Jessy Grizzle and Jeffrey Cook, "An Engine Controller with Air Meter Compensation," U. S. Patent No. 5,654,501, August 1997.
14. Jeffrey Cook and Jessy Grizzle, "Method and Apparatus for Air-Fuel Ratio and Torque Control for an Internal Combustion Engine," U. S. Patent No. 5,515,828, May 1996.
15. Julian LoRusso, Jeffrey Cook, Pete Szpak and Jessy Grizzle, "System using Time Resolved A/F Sensor to Equalize Cylinder to Cylinder Air/Fuel Ratios with Variable Valve Control," U. S. Patent No. 5,377,654, January 1995.
16. Jeffrey Cook and Jessy Grizzle, "Individual Cylinder Air/Fuel Ratio Control System," U. S. Patent No. 4,962,741, October 1990.

## Books

1. Eric Westervelt, Jessy Grizzle, Christine Chevallereau, Jun Ho Choi, and Benjamin Morris, *Feedback Control of Dynamic Bipedal Robot Locomotion*, CRC Press, Boca Raton, June 2007, 503 pages.

## Journal Publications

2. J. W. Grizzle, K. Hsu, and S. I. Marcus, "A Decentralized Control Strategy for Multiaccess Broadcast Networks," *Large Scale Systems*, Vol. 3, May 1982, pp. 75-88.
3. J. W. Grizzle and S. I. Marcus, "Optimal Control of Systems Possessing Symmetries," *IEEE Trans. on Automatic Control*, Vol. AC-29, No. 11, November 1984, pp. 1037-1040.
4. J. W. Grizzle and S. I. Marcus, "The Structure of Nonlinear Control Systems Possessing Symmetries," *IEEE Trans. on Automatic Control*, Vol. AC-30, No. 3, pp. 248-258, March 1985.
5. J. W. Grizzle, "Distributions Invariantes Commandees pour les Systemes Non Lineaires en Temps Discret," *C. R. Acad. Sc. Paris, t. 300, Serie I*, no. 13, pp. 447-450, 1985.
6. J. W. Grizzle, "Controlled Invariance for Discrete Time Nonlinear Systems with an Application to the Disturbance Decoupling Problem," *IEEE Trans. on Automatic Control*, Vol. AC-30, No. 9, pp. 868-874, September 1985.

7. J. W. Grizzle and H. Nijmeijer, "Zeros at Infinity for Nonlinear Discrete Time Systems," *Math. System Theory*, 19, pp. 79-93, 1986.
8. J. W. Grizzle, "Local Input-Output Decoupling of Discrete Time Nonlinear Systems," *Int. J. of Control*, Vol 43, No. 5, pp. 1517-1530, 1986.
9. B. K. Powell, J. A. Cook and J. W. Grizzle, "Modelling and Analysis of an Inherently Multi-Rate Sampling Fuel Injected Engine Idle Speed Control Loop," *J. of Dym. Syst.*, Vol. 109, pp. 405-410, December 1987.
10. J. W. Grizzle and M. H. Shor, "Sampling, Infinite Zeros and Decoupling of Linear Systems," *Automatica*, Vol. 24, No. 3, pp. 387-396, May 1988.
11. J. W. Grizzle and P. V. Kokotovic, "Feedback Linearization of Sampled- Data Systems," *IEEE Trans. Automatic Control*, Vol. AC-33, No. 9, pp. 857-859, September 1988
12. C. H. Moog and J. W. Grizzle, "Decouplage Non Lineaire vu de l'Algebre Lineaire", *C. R. Acad. Sc. Paris, t. 300*, Serie I, pp. 497-500, September 1988.
13. A. Isidori and J. W. Grizzle, "Fixed Modes and Nonlinear Noninteracting Control with Stability," *IEEE Trans. Automatic Control*, Vol. 33, No. 10, pp. 907-914, October 1988.
14. J. W. Grizzle and A. Isidori, "Block Noninteracting Control with Stability via Static State Feedback", *Mathematics of Control, Signals, and Systems*, Vol. 2, 1989, pp. 315-341.
15. M. D. Di Benedetto, J. W. Grizzle and C. H. Moog, "Rank Invariants of Nonlinear Systems", *SIAM J. Control*, Vol. 27, No. 3, May 1989, pp. 658-672.
16. J. Freudenberg and J. W. Grizzle, "An Observation on the Parametrization of Causal Stable Controllers for Lifted Systems", *Control Theory and Advanced Technology*, Vol. 5, No. 3, September 1989, pp. 367-372.
17. S. T. Chung and J. W. Grizzle, "Sampled-Data Observer Error Linearization", *Automatica*, Vol. 26, No. 6, November, 1990, pp. 997-1007.
18. M. D. Di Benedetto and J. W. Grizzle, "An Intrinsic Notion of Regularity for Output Nulling, Inversion, and Dynamic Extension" *Control Theory and Advanced Technology*, vol. 6, No. 3, September 1990. pp. 357-381.
19. J.W. Grizzle, K. Dobbins and J. Cook, "Individual cylinder air-fuel ratio control with a single EGO sensor", *IEEE Transactions on Vehicular Technology*, Vol. 40, No. 1, February 1991, pp. 280-286.
20. J.W. Grizzle, M.D. Di Benedetto, "Approximation by Regular Input-Output Maps", *IEEE Trans. on Auto. Control*, Vol. AC-37, No. 7, July 1992, pp. 1052-1055.
21. S.T. Chung and J.W. Grizzle, "Nonlinear discrete-time block noninteracting control with internal exponential stability", *Int. J. Control.*, Vol. 55, No. 5, 1992, pp. 1071-1092.
22. J.W. Grizzle, "A Linear Algebraic Framework for the Analysis of Discrete-time Nonlinear Systems," *SIAM J. Control*, Vol. 31, No. 4, July 1993, pp. 1026-1044.



23. L. Benvenuti, M. Di Benedetto and J.W. Grizzle, "Approximate Output Tracking for Nonlinear Non-Minimum Phase Systems with an Application to Flight Control," *Journal of Robust and Non-linear Control*, Vol. 4, 1994, pp. 397-414.
24. M. Di Benedetto and J.W. Grizzle, "Asymptotic and Exact Model Matching for Nonlinear Systems," *IEEE Trans. Auto. Control*, Vol. 39, No. 8, pp. 1539-1550.
25. J.W. Grizzle, M. Di Benedetto and F. Lamnabhi-Lagarigue, "Necessary Conditions for Asymptotic Tracking in Nonlinear Systems," *IEEE Trans. Auto. Control*, Vol. 39, No. 9, September 1994, pp. 1782-1794.
26. Y. Song and J.W. Grizzle, "The Extended Kalman Filter as a Local Asymptotic Observer for Nonlinear Discrete-Time Systems," *Journal of Mathematical Systems, Estimation and Control*, Vol. 5, No. 1, 1995, pp. 59-78.
27. P.E. Moraal and J.W. Grizzle, "Observer Design for Nonlinear Systems with Discrete-time Measurements", *IEEE Trans. Auto. Control*, Vol. 40, No. 3, March 1995, pp. 395-404.
28. P.D. Hanish, J.W. Grizzle, M.D. Giles and F.L. Terry, Jr., "A Model-Based Technique for Real-Time Estimation of Absolute Fluorine Concentration in a CF<sub>4</sub>/Ar Plasma", *Journal American Vacuum Science and Technology*, **B**, Vol. 13, No.3, May 1995, pp. 1802-1807.
29. B.A. Rashap, M. Elta, H. Etemad, J.P. Fournier, J.S. Freudenberg, M.D. Giles, J.W. Grizzle, P.T. Kabamba, P.P. Khargonekar, S. Lafortune, S.M. Meerkov, J.R. Moyne, D. Teneketzis, and F.L. Terry, Jr., "Control of Semiconductor Manufacturing Equipment: Reactive Ion Etching," *IEEE Transactions on Semiconductor Manufacturing*, Vol. 8, No.3, August 1995, pp. 286-297.
30. T.E. Benson, C.K. Hanish, P.D. Hanish, L.I. Kamlet, P. Klimecky, B.A. Rashap, J.S. Freudenberg, J.W. Grizzle, P.P. Khargonekar, F.L. Terry, Jr., and Bryan Barney, "Sensor Systems for Real-Time Feedback Control of Reactive-Ion Etching", *Journal American Vacuum Science and Technology*, **B**, January/February 1996, pp. 483-488.
31. S. Thomas III, H. H. Chen, C. K. Hanish, J. W. Grizzle, and S. W. Pang, "Minimized Response Time of Optical Emission and Mass Spectrometric Signals for Optimized Endpoint Detection," *Journal American Vacuum Science and Technology*, **B**, Jul/Aug 1996, pp. 2531-2536.
32. C. K. Hanish and J.W. Grizzle, "Automated Tuning of an Electron Cyclotron Resonance Cavity to a Microwave Power Source", *Journal American Vacuum Science and Technology*, **A**, 15(5), Sep/Oct 1997, pp. 2717-2727.
33. C. K. Hanish, J.W. Grizzle, H.-H Chen, L. I. Kamlet, S. Thomas III, F. L. Terry, Jr., and S. W. Pang, "Modeling and Algorithm Development for Automated Optical Endpointing of an HBT Emitter Etch," *Journal of Electronic Materials*, Vol. 26, No. 12, 1997, pp. 1401-1408.
34. A.G. Stefanopoulou, J. A. Cook, J. S.Freudenberg, and J. W. Grizzle, "Control-Oriented Model of a Dual Equal Variable Cam Timing Spark Ignition Engine," *ASME Journal of Dynamic Systems, Measurement, and Control*, vol. 120, 1998,pp. 257-266.
35. C. Garvin, B.E. Gilchrist, D.S. Grimard, and J.W. Grizzle, "Measurement and Error Evaluation of Electrical Parameters at Plasma Relevant Frequencies and Impedances,"

- Journal American Vacuum Science and Technology*, **A**, Vol. 16, No. 2 Mar/Apr 1998, pp. 595-606.
36. M. Chandhok and J.W. Grizzle, "Modeling the Pressure Dependence of DC Bias Voltage in Asymmetric, Capacitive RF Sheaths," *IEEE Trans. on Plasma Science*, Vol. 26, No. 2, April 1988, pp. 181-189.
  37. H. M. Park, C. Garvin, D.S. Grimard, and J. W. Grizzle, "Control of Ion Energy in a Capacitively Coupled Reactive Ion Etcher," *Journal of the Electrochemical Society*, Vol. 145, NO. 12 Dec 1998, pp. 4247-4252.
  38. C. Garvin, D. S. Grimard and J. W. Grizzle, "Advances in Broad Band RF Sensing for Real-Time Control of Plasma-Based Semiconductor Processing," *Journal of Vacuum Science and Technology A*, Volume 17, Number 4 Jul/Aug 1999, pp 1377-1383.
  39. C.K. Hanish, J.W. Grizzle and F.L. Terry, Jr., "Estimating and Controlling Atomic Chlorine Concentration via Actinometry," *IEEE Trans. on Semiconductor Manufacturing*, Vol. 12, No. 3, August 1999, pp. 323-331.
  40. A.G. Stefanopoulou, J.A. Cook, J. W. Grizzle and J. S. Freudenberg, "Air-Fuel Ratio and Torque Control using Secondary Throttles," *Journal of Dynamic Systems Measurement and Control*, Vol. 121, No. 4, Dec. 1999, pp. 638-647.
  41. A.G. Stefanopoulou, J. S. Freudenberg, and J. W. Grizzle, "Variable Camshaft Engine Control," *IEEE Transactions on Control Systems Technology*, Vol. 8, No.2, January 2000, pp. 23-34.
  42. C. Garvin and J. W. Grizzle, "A Demonstration of Broadband RF Sensing: Empirical Polysilicon Etch Rate Estimation in a Lam 9400 Etch Tool," *Journal of Vacuum Science and Technology A*, Volume 18, Number 4 Jul/Aug 2000, pp. 1297-1302.
  43. E.P. Brandt, Y. Wang and J.W. Grizzle, "Dynamic Modeling of a Three-Way Catalyst for SI Engine Exhaust Emission Control," *IEEE Trans. on Control Systems Technology*, Vol. 8, No. 5, September 2000, pp. 767-776.
  44. J.W. Grizzle, Gabriel Abba and Franck Plestan, "Asymptotically Stable Walking for Biped Robots: Analysis via Systems with Impulse Effects", *IEEE Trans. Automatic Control*, Vol. 46, No. 1, January 2001, pp. 51-64.
  45. J.W. Grizzle and J.M. Kang, "Discrete-time Control Design with Positive Semi-definite Lyapunov Functions," *Systems and Control Letters*, 43, 2001, pp. 287-292.
  46. Jun-Mo Kang, Ilya Kolmanovsky and J. W. Grizzle, "Dynamic Optimization of Lean Burn Engine Aftertreatment," *ASME J. Dynamic Systems Measurement and Controls*, Volume 123, Number 2, June 2001, pp. 153-160.
  47. H.-M Park, D.S. Grimard, J.W. Grizzle and F. Terry, Jr., "Etch Profile Control of High-Aspect Ratio, Deep Submicron  $\alpha$ -Si Gate Etch," *IEEE Trans. on Semiconductor Manufacturing*; Vol. 14, No. 3, August, 2001, pp. 242-254.
  48. J. W. Grizzle, Julia Buckland, Jing Sun, "Idle Speed Control of a Direct Injection Spark Ignition Stratified Charge Engine," *International Journal of Robust and Nonlinear Control*, Vol. 11, No. 11, September, 2001, pp. 1043-1072.

49. J.W. Grizzle and J.M. Kang, "Discrete-time Control Design with Positive Semi-definite Lyapunov Functions," *Systems and Control Letters*, 43, 2001, pp. 287-292.
50. E.R. Westervelt, J.W. Grizzle, and D.E. Koditschek, "Hybrid Zero Dynamics of Planar Biped Walkers," *IEEE Trans. Automatic Control*, Vol. 48, No. 1, January 2003, pp. 42-56.
51. E.R. Westervelt, J.W. Grizzle, and C. Canudas de Wit, "Switching and PI Control of Walking Motions of Planar Biped Walkers," *IEEE Trans. Automatic Control*, Vol. 46, No. 2, February 2003, pp. 308-312.
52. Pete I. Klimecky, J. W. Grizzle, and Fred L. Terry, Jr., "Compensation For Transient Chamber Wall Condition Using Realtime Plasma Density Feedback Control In An Inductively Coupled Plasma Etcher," *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films*, May 2003, Volume 21, Issue 3, pp. 706-717.
53. H.M Park, D. S. Grimard, and J. W. Grizzle, "Sensor Fault Detection in Etch Based on Broadband RF Signal Observation," *Journal of the Electrochemical Society*, A Vol. 21, No. 3, May/June 2003, pp. 814-824.
54. Franck Plestan, J.W. Grizzle, Eric Westervelt and Gabriel Abba, "Stable Walking of a 7-DOF Biped Robot," *IEEE Trans. Robotics and Automation*, Vol. 19, No. 4, August 2003, pp. 653-668.
55. C. Chevallereau, G. Abba, Y. Aoustin, F. Plestan, E.R. Westervelt, C. Canduas-de-Wit, and J.W. Grizzle, "RABBIT: A Testbed for Advanced Control Theory", *IEEE Control Systems Magazine*, Vol. 23, No. 5, October, 2003, pp. 57-79.
56. Jun-Mo Kang and J.W. Grizzle, "Dynamic Control of a SI Engine with Variable Intake Valve Timing," *International Journal of Robust and Nonlinear Control*, April 2003, pp. 399-420.
57. Chan-Chiao Lin, Huei Peng, J.W. Grizzle and Jun-Mo Kang, "Power Management Strategy for a Parallel Hybrid Electric Truck," *IEEE Transactions on Control Systems Technology*, Vol. 11, No. 6, Nov. 2003 pp. 839-849.
58. E.R. Westervelt, G. Buche, and J.W. Grizzle, "Experimental Validation of a Framework for the Design of Controllers that Induce Stable Walking in Planar Biped," *The International Journal of Robotics Research*, Vol. 24, No. 6, June 2004, pp. 559-582.
59. Chan-Chiao Lin, Huei Peng, J. W. Grizzle, Jason Liu and Matt Busdiecker Control System Development for an Advanced-Technology Medium-Duty Hybrid Electric Truck, *SAE 2003 Transactions Journal of Commercial Vehicles*, September 2004, pp. 105-113.
60. D. Aswani, M. J. van Nieuwstadt, J. A. Cook, and J. W. Grizzle, Control Oriented Modeling of a Diesel Active Lean NOx Catalyst Aftertreatment System, *ASME J. Dyn. Syst. Meas. and Control*, Volume 127, Issue 1, March 2005, pp. 1-184
61. J.W. Grizzle, C.H. Moog, and C. Chevallereau, "Nonlinear Control of Mechanical Systems with an Unactuated Cyclic Variable," *IEEE Transaction on Automatic Control*, Vol. 30, No. 5, May 2005, pp. 559-576.

62. C. Chevallereau, E.R. Westervelt, and J.W. Grizzle, "Asymptotically Stable Running for a Five-Link, Four-Actuator, Planar Bipedal Robot," *International Journal of Robotics Research*, Volume 24, Issue 6, June 2005, pp. 431 - 464.
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