

Curriculum vitae

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NAME: Thomas L. Harman
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EDUCATION:
B.S.E.E. with Honors, University of Maryland, 1965
Ph.D. Rice University, Electrical Engineering, 1972

RELATED EXPERIENCE:

Industrial and Commercial:

1977-Present Consultant
1973-1977 Lockheed Electronics Staff Engineer

Center Director:

2017- Director of Center for Robotics Software

Teaching and University Positions:

2012- Chairperson of Engineering Department
1992-2009 Chairperson of Computer Engineering
1979-Present University of Houston - Clear Lake
Professor of Computer Engineering
1974-2013 Adjunct or Part-Time Professor (Rice)

CONSULTING ACTIVITIES:

Numerous consulting activities include:
(a) design of microprocessor-based systems
(b) electrical and electronic design
(c) interpretation of the National Electrical Code
(d) expert witness in various legal cases

PROFESSIONAL REGISTRATIONS AND ORGANIZATIONS:

Professional Engineer - Texas (Inactive 2014)
Master Electrician - Houston, Texas and other cities
Member of National Electrical Code Panel No. 2,
(National Fire Protection Association)

PROFESSIONAL SOCIETIES:

American Society for Engineering Education
Association for Computing Machinery
Institute of Electrical and Electronics Engineers
National Fire Protection Association

HONORARY SOCIETIES: Eta Kappa Nu, Sigma Xi, Tau Beta Pi, Phi Kappa Phi

OTHER DUTIES:

Chair IEEE Life Member Affinity Group (2012-)
Association for Computing Machinery -Chairman (1984)
IEEE Clear Lake Chapter, various positions including:
Treasurer (1983-84); Chairman (1985-86)
Thesis Advisor for several graduate students each semester (UHCL)

TEACHING AND UNIVERSITY SERVICE:

Memberships

American Society for Engineering Education
IEEE Education Society

Samples of Previous Service

President Elect of the Faculty Senate 2001, President (2002-2003)
Chairman Computer Engineering Program (1992-2009)
International Affairs Committee (1990-Present)
Faculty Development Committee and Piper Teaching Award Committee
Coordinator - Computer System Design Program (1988-89)
Policy and Curriculum Committee - Chairman (1985-86)
Dean Search Committee and Robotics Committee (1984)
Faculty Senate (1982)

Samples of Courses Taught

Advanced Engineering Mathematics with MATLAB, Advanced Microcomputer System Design, Biomedical Engineering, Computer Graphics, Digital Signal Processing, Signals and Linear Systems, MATLAB, Network System Specifications, Windows NT, Robotics, Mobile Robots, Electromagnetic Theory, Quantum Mechanics, Quantum Electronics, Electro-optics, Fourier optics.

CONFERENCES:

NASA Innovations – yearly conference- Session chair.
Joint Applications in Instrumentation Process and Computer Control - various positions including: Co-Chairman 1984, Program Chairman 1993
IEEE Video Conference on Fiber Optics - Moderator 1985
Computer Development Conference - Chairman 1983

EXAMPLE SHORT COURSES AND SEMINARS:

“ROS (Robot Operating System) Seminar for Industrial Partners” – 3 Days, 2018
“Robots in the Operating Room and the Doctor’s Office,” Mexico 2001, NASA 2005
"Microcontroller Applications in Commercial and Industrial Applications," Mexico 1999
“Design and Implementation of a reliable IntraNet with Windows NT,” Mexico 1997
"Applications of Microcontrollers in Systems Design", Sri Lanka 1993
"The Motorola MC68332 Microcontroller", Mexico 1992
"Space applications at NASA-JSC", Japan 1991
"Applications of Microcontrollers", Japan 1991
"The Motorola MC68030," Motorola, Austin 1988
"Electrical Design and the National Electrical Code," Union Carbide 1984
"Master Electrician's Training Course," (various dates)
"The Motorola MC68020," various dates and locations.
"Selection and Applications of Modern Microprocessor Systems,” NASA 1983
"Applications of 16- and 32-bit Microprocessors,” Rice University 1983
"VLSI Microprocessors," Boumerdes, Algeria - June 1982
"Applications of the National Electrical Code," Republic of South Korea (1982)

SAMPLES OF RESEARCH ACTIVITIES:

Robotics research with Baxter research robot – Rethink Robotics- Current.
Development leave for work on laser spectrometers at Rice University 2007.
ISSO (Institute for Space Systems Operations) grants for "Model-based Control of Piezoelectric Ultrasonic Motor for Space Robotics" - 2002, 03, 04, 05, 06, 07, 08.
ISSO (Institute of Space Systems Operation), Rice University, and NASA- 5 year grant-starting 1999 for “Development of quantum-cascade laser based biosensor technology”.
TQM (Total Quality Management) grant for Remote train/robot control 1998
Consultant- Rice university project- Laser Diode environmental monitor, 1996- Present
High Technology Laboratories Award for Robotics Research, 1992
Codirector- High Technology Laboratories (1994-1998)
Grant Award for research in Japan, Japan Society for the Promotion of Science (Spring 1991)
Grant Award - Motorola, Inc., "Applications of Microcontrollers," (1989-1990)
Tunable Laser Diodes with Rice research group (1988-89) - Ongoing work also.
NASA (Johnson Space Center) Contract "Applications of Microprocessors," (1983)
UH/CL Grant for 32-bit microprocessor system (1986-1987)
NSF Grant Award with John Clark (Rice, EE); "A Study of Evoked Volume Conductor Field Potentials from Peripheral Nerve and the Spinal Cord,"(1981-85).
Grant Award - UH/CL "Microcomputer-based Energy Management Systems," (1979-1980)

OTHER HONORS, AWARDS OR GRANTS:

Patent with D. Seitz et. Al. for Tankless Water Heater 10,024,571 July 17, 2018
UHCL Distinguished and Endowed Professor 2005-2007, 2016-2017
Patent with D. Seitz for Tankless Water Heater EP 2769152 A1 2013
Piper teaching award; Nominated in 2011
Development leave for work on laser spectrometers at Rice University 2007
Piper teaching award finalist 2002; Nominated in 2004
President's Distinguished Research Award (UHCL) 2002
Patent with D. Seitz, et. al. for Fluid Heating Control System – US 6,246,831-2001
President's Distinguished Teaching Award (Enron) 1999
Finalist for Piper Teaching Award in 1996; Nominated 2001
"Star" Award at UHCL in 1995
Nominated for the Piper Teaching Award; finalist in 1992
Nominated for Distinguished Research Award (UH/CL) in 1992
Neumann Cultural Enrichment Award - study of the French language, 1987
Technical Educator of the Year 1987 - Clear Lake Council of Technical Societies

OTHER LANGUAGES: French (Mostly reading)

PUBLICATIONS and CONFERENCE PAPERS:

1. "Switching phenomena in Lithium Drifted Silicon p-i-n Diodes," Ph.D. Thesis, Rice University, October 1971.
2. T. L. Harman et al, "Numerical Computation of the External Potential Field of the Isolated Active Purkinge Strand in a Volume Conductor," 1973. SWIEECO Proceedings.
3. T. L. Harman, T. A. Rabson and T. K. Gaylord, "Effects of Intrinsic Region Width in Si(Li) p-i-n Diodes," Solid State Electronics, Vol. 17, pp. 408-411, 1974.
4. T. L. Harman et al, "A Comparison of Two Methods of Determining the Extracellular Potential Field of an Isolated Purkinge Strand in a Volume Conductor," IEEE Transactions, Biomedical Engineering, Vol. BME-22, pp.174-183, May 1975.
5. Minicomputers and Microprocessors, IBM Corporation, Federal Systems Division, Houston, Texas, 1976.
6. J. W. Clark, E. C. Greco and T. L. Harman, "Experience with a Fourier Method for Determining the Extracellular Potential Fields of Excitable Cells with Cylindrical Geometry," Critical Reviews in Bioengineering, CRC Press, Inc., 1978.
7. E. C. Greco, J. W. Clark and T. L. Harman, "Volume-Conductor Fields of the Isolated Axon," Mathematical Biosciences, Vol. 33, pp.235-236, 1977.

8. "Trends in Computer-Based Energy Management Systems," Second Annual Conference on Computer Developments, University of Houston-Clear Lake, December 1980.
9. T. L. Harman, R. Kadri, "The Design of a Microprogrammed Controller Using the AM29116 Bipolar Microprocessor," Fourth Annual Conference on Computer Developments, University of Houston-Clear Lake, November, 1982.
10. T. L. Harman, B. Lawson, "Real-Time Multi-Tasking Operating Systems for 16-bit Microcomputers," Fourth Annual Conference on Computer Developments, University of Houston-Clear Lake, November 1982.
11. "Survey and Applications of VLSI Microprocessors," International Conference on Semiconductors at INELEC, Boumerdes (Algiers), Algeria, June 1982.
12. "Designing with a 16-bit Micro-programmable Processors - the AM 29116," with R. Kadri. Fifth Annual Conference on Computer Developments, University of Houston-1983.
13. T. L. Harman, et al, "Design with the Motorola MC68010," Fifth Annual Conference on Computer Developments, University of Houston-Clear Lake, November 1983.
14. "The Automated Office," with J. Meier. Fifth Annual Conference on Computer Developments, University of Houston-Clear Lake, November, 1983.
15. "Potential Field From an Active Nerve in an Inhomogeneous Anisotropic Conductor: The Forward Problem." With O. B. Wilson, J. W. Clark and N. Ganapathy. IEEE Transactions on Biomedical Engineering, December, 1985.
16. "Potential Field From an Active Nerve in an Inhomogeneous Anisotropic Volume Conductor: The Inverse Problem." With O. B. Wilson, J. W. Clark, N. Ganapathy and S. Cabrera. IEEE Transactions on Biomedical Engineering, December, 1985.
17. Introduction to Robotics Book Review, IEEE EXPERT, May, 1986.
18. "Survey of Robotics Research," Robex 86 (NASA), 1986.
19. "Embedded System Design with Considerations for 32-bit Microcontrollers," with Alan Clapp. AIAA conference, 1991.
20. "Perceptual Linear Prediction and Neural Networks for Speech Analysis," with Sheryl Knotts and James Freeman. International Simulation Technology conference, Houston, Fall 1992.

JAIPCC Conference (2 papers), UH/CL March 26, 1993.

21. "Continuous Emissions Monitoring Techniques for Environmental Compliance and Productivity," with Dianne Wieman
22. "Effects of Tether Stretch Dynamics on a Tethered Satellite Yo-Yo Control Law," with James Dabney, et. al.
23. "Robot control from sequential image planes of a 3D object," with Premkumar, et. al., International Symposium on Optical Instrumentation and Applied Science, San Diego, SPIE Vol. 2018, July 1993.
24. "Analyzer Installations with Long Term Maintenance Considerations," with Dianne Wieman, Instrument Society of America International Conference, Chicago, September 1993.
25. "Creating Complex Timing Functions: Microcontroller Timer Unit or PLD," with Alan Clapp. IEEE MICRO, Vol. 14, No. 2, April 1994, pp. 70-78.
26. "Laser range precision for robot applications," with Premkumar and Nguyen. Optical Society of America Laser Science Conference, Dallas Texas, October 1994.
27. "Robot vision: laser range for depth perception," with Premkumar and Nguyen. Optical Society of America Laser Science Conference, Dallas Texas, October 1994.
28. "Development of an Embedded Control System for Compact Diode Laser Gas Sensor" with George Smayling et. al., Rice Quantum Institute Colloquium, September, 1997.
29. "Embedded Control and Data Acquisition for a Compact Difference-Frequency Laser Spectrometer" Darrin Leleux and I presented a poster describing our research at the Rice Quantum Institute's Summer Research Colloquium.
30. "Dynamic Simulation Software for the Scorbot ER-VII Robot", with A. Izad et. al., Summer Computer Simulation Conference, Reno, Nevada, July 1998.
31. "Applications of MATLAB to the Design and Visualization of Antenna Radiation Patterns", with James Dabney, Innovations '98, March, 1998
32. "Dynamic Simulation Software for the Scorbot ER-VII Robot", with A. Izad et. al., Innovations '98, March, 1998.
33. Contributor to *Comprehensive Dictionary of Electrical Engineering*, CRC Press, 1999.
34. "Process Control for NT Testbed," with D. Gebremichael, et. al., Innovations '99, April 1999 (Abstract and presentation.).

35. "Adaptive filtering applications to real-time laser spectroscopy," D.P. Leleux, T. L. Harman, F.K.Tittel, Optical Society of America Annual Meeting, Providence, RI, October, 2000.
36. "A Systems Approach to Embedded Microprocessor Testing," T. L. Harman, James B. Dabney, and Charles S. Haynes, Innovations 2001, Houston, TX, April 2001.
37. "Applications of Kalman filtering to real-time trace gas concentration measurements," with D.P. Leleux, F.K. Tittel, et. al., Optical Society of America Annual Meeting, Long Beach, CA, October 2001.
38. "Applications of Kalman filtering to real-time trace gas concentration measurements," with D.P. Leleux, F.K. Tittel, et. al., Applied Physics B, November 29, 2001
39. "Digital Signal Processing Application- Image Processing & Recognition," with J.J. Chakkungal, Innovations 2002, May 2002.
40. "Piezoelectric Ultrasonic Motor Modeling: State of the Art and Future Directions" with James Dabney accepted by the International Conference on Signals, Systems, and Information Technology held in Tunisia, March 2003.
41. Dabney, J. B., Ghorbel, F. H., and Harman, T. L., "Issues in piezoelectric ultrasonic motor modeling," Innovations 2003, Houston, Texas, May 2, 2003.
42. "A Personal View of the NEC Code Making Panel 2", *Journal of the International Association of Electrical Inspectors*, July/August 2003.
43. "Atmospheric Formaldehyde Monitoring in the Greater Houston Area in 2002" with Robert F. Curl, Frank K. Tittel, Jinhai Chen, et al., Applied Spectroscopy, Vol. 58, Number 2, 2004.
44. "Go Tankless...and Stay in Hot Water", *Journal of the International Association of Electrical Inspectors*, March/April 2004.
45. "Dynamic Response Modeling of Piezoelectric Ultrasonic Motors", Dabney, J. B., Ghorbel, F. H., and Harman, T. L., Accepted by ASME Congress, November 2005.
46. "Model Based Torque Control of Piezoelectric Ultrasonic Motors", Dabney, J. B., Harman, T.L., Ghorbel, F. H., and Chakkungal, J., International Mechanical Engineering Conference, Chicago, Illinois, November, 2006.
47. "Stable Torque Regulation of Piezoelectric Ultrasonic Motors", Dabney, J. B., Harman, T.L., Ghorbel, F. H, American Society of Civil Engineers, Earth and Space 2008, Long Beach, CA, March, 2008

48. H. Wang, L. Li, G. Song, J. B. Dabney, and T. L. Harman, “Nonlinear fault tolerant control of a space truss structure with MR damper,” *Earth and Space 2010*, Honolulu, Hawaii, March 14 – 17, 2010
49. T. L. Harman, J. B. Dabney, and V. S. Vangala, “What’s new in MATLAB for modeling physical systems with applications to robotics,” *Workshop on Automation and Robotics 2010*, Johnson Space Center, Houston, Texas, November, 2010.
50. T.L. Harman and Lei Wu, “Engaging Students in Science and Engineering Education with Intelligent Robotic Systems Development”, *Innovation 2012*, Johnson Space Center, Houston, TX.
51. M. A. Anthony, T. L. Harman, J. R. Harvey, “Rightsizing Electrical Power Systems in Large Commercial Facilities”, *IEEE Industrial and Commercial Power Systems*, May 2013. (Full paper submitted to IEEE Power Systems Engineering Committee).
52. Thomas L. Harman & James B. Dabney, “Baxter the friendly robot: Applications, architecture, and features”, *2014 Conference: INNOVATION’14 AND AUTOMATION’14*, Johnson Space Center, Houston, TX.
53. Han Wang, Luyu Li, Gangbing Song, James B. Dabney and Thomas L. Harman, “A new approach to deal with sensor errors in structural controls with MR damper”, *Smart Structures and Systems*, Vol. 16, No. 2 (2015)
- 54-57. “Why the Robot Operating System is Vital to your Future in Robotics”
Thomas L. Harman, Ph.D., Carol Fairchild and Luong Nguyen, Ph.D.
- "Creating Robots in Simulation", Carol Fairchild, Thomas L. Harman, Ph.D., and Luong Nguyen, Ph.D.
- “Baxter in robotic research and education at UHCL”, Luong Nguyen, Ph.D., Thomas L. Harman, Ph.D., Carol Fairchild.
- “Series Elastic Actuators Principles and Research Issues”, James B. Dabney and Thomas L. Harman.
- INNOVATION and AUTOMATION 2015 Conference, October 23rd, 2015
Gilruth Center, NASA/JSC
58. “Right Sizing Commercial Electrical Systems”, Michael A. Anthony, Thomas L. Harman & James R. Harvey, *IEEE Industry Applications*, Vol. 22, No.4, 41-46, July/August 2016.

59-60. “ROS Networking for Turtlebot using Ad-hoc Network” Tirumala Sai Krishna, RajaKumar Murali Krishnan, Carol Fairchild, Dr. Thomas Harman,

“The NASA Swarmathon and Kennedy Space Center”, Thomas L. Harman, Ph.D. and Luong Nguyen, Ph.D.

INNOVATION and AUTOMATION 2016, FRIDAY October 28, 2016

61. "Multithreading/Multiprocessing Simulation of the International Space Station Multibody System Using a Divide and Conquer Formulation with Flexible Bodies", Luong Nguyen, T. L. Harman, Elihu Deneke, 19th International Conference on Autonomous Robots and Agents (ICARA 2017) held in Paris France May 18-19, 2017.

62-63 “The UHCL Center for Robotics Software”, Thomas L. Harman, Ph.D., Carol Fairchild, Luong Nguyen, Ph.D. (UHCL)

“Cartesian Space Velocity Control for Baxter with A 3DConnexion Space Mouse Pro device”, Nabil Farhat, Luong Nguyen Ph.D., Thomas L. Harman, Carol Fairchild.

INNOVATION and AUTOMATION 2017, SATURDAY October 28, 2017

TEXTBOOKS:

1. *The Motorola MC68020 and MC68030 Microprocessors*,
T.L. Harman, Prentice-Hall, 1989.
2. *Microprocessori, 68020/68030*, Italian language version of textbook published in English as *The Motorola MC68020 and MC68030 Microprocessors*, Prentice Hall International, 1990.
3. *The Motorola MC68332 Microcontroller*,
T. L. Harman, Prentice-Hall, 1991.
4. *The Motorola MC68000 Microprocessor Family*
Harman and Hein, Prentice-Hall, 2nd edition 1996.
(A Dutch version of the first edition has been published.)
5. *Simulink Student Edition User's Guide*, Prentice Hall Publishers, 1997.
(With James Dabney)

6. *Mastering Simulink 2*, Prentice Hall, 1998
(With James Dabney)
7. *Advanced Engineering Mathematics with MATLAB*, Brooks/Cole, 2000.
(With Dabney and Richert) - 2nd Edition - 2000
8. *Mastering Simulink 4*, Prentice Hall, 2001, 2003 (With James Dabney)
9. *Guide to the National Electrical Code – 2011*, Prentice-Hall, 2011 (Eleventh Edition -
Published every three years).
10. *ROS Robotics By Example 2nd Edition*, Carol Fairchild and Dr. Thomas L. Harman, Packt
Publishing, ISBN 139781788479592, November 2017.