

Kelvin T. Erickson
Curators' Distinguished Teaching Professor
Department of Electrical & Computer Engineering
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PROFESSIONAL DATA

DEGREES:

Ph.D.E.E. Iowa State University, 1983
M.S.E.E. University of Missouri-Rolla, 1979
B.S.E.E. University of Missouri-Rolla, 1978 (now known as Missouri University of Science and Technology)

ACADEMIC EXPERIENCE:

2003 – 2014 Chairman, Department of Electrical & Computer Engineering
2002 – 2003 Interim Chairman, Electrical & Computer Engineering
2019 – Present Curators' Distinguished Teaching Professor
2000 - Present Professor, Electrical & Computer Engineering
2000 - 2002 Assistant Chairman, Undergraduate Studies Electrical & Computer Engineering

1992 - 2000 Associate Professor, Electrical & Computer Engineering
1992 - 1996 Assistant Chairman, Laboratory Development, Electrical Engineering, University of Missouri-Rolla (now Missouri S&T)

1986 - 1992 Assistant Professor, Electrical Engineering, University of Missouri-Rolla
1981 - 1982 Graduate Teaching Assistant, Iowa State University (while on leave from Fisher Controls International, Inc.)
1978 - 1979 Graduate Research Assistant, Cloud Physics Research Center, University of Missouri-Rolla

INDUSTRIAL EXPERIENCE:

1997 Consultant, Magnum Technologies, Inc., Fairview Heights, IL. (Sabbatical)
1979 - 1986 Senior Design Engineer, Fisher Controls International, Inc., (During this period I took a 20-month leave of absence to obtain my Ph.D. degree.)

RESEARCH GRANTS AND ACTIVITIES:

Sep 2017 – June 2020 "Development of Steel Continuous Annealing Line Simulation," \$10,000, Association for Iron and Steel Technology Foundation.
Jan 2009 – March 2009 "Rhobi Saw PLC and HMI Programming," \$1,260, Global Brass and Copper.
Jan 2007 – Dec. 2008 "Substation Relay Simulation with PLC," \$18,330, Ameren.
May 2006 – Dec. 2006 "Show Me the Road to Hydrogen, Task 5: Nondestructive Evaluation (NDE)," \$35,520, University Transportation Center (UTC) (Co-principal Investigator with Reza Zoughi).
Oct 2002 – Nov. 2004 "Pipelines as Networked Communications Links," U.S. Dept. of Energy, \$237,447, (Co-principal Investigator with Shari Dunn-Norman, Ann Miller, E. Keith Stanek and C. H. Wu.)
Aug 2001 - Aug 2003 "Capacity Building: Institutional Development Proposal in Trustworthy Computer Systems," National Science Foundation, \$200,000, (Co-investigator with Ann Miller, S. R. Subramanya and Bruce McMillin).

- April 2001 – Jan 2003 “Reliability of Pressure Signals in Offshore Pipeline Leak Detection,” Dept. of the Interior, \$125,039, (Co-principal Investigator with Keith Stanek, Ann Miller, and Shari Dunn-Norman).
- Sept. 1999 - Dec 2000 "Survey of SCADA System Technology and Reliability in the Oil and Gas Industry," Dept. of the Interior, \$109,550 (Co-principal Investigator with Keith Stanek, Ann Miller, and Shari Dunn-Norman).
- Sept. 1999 – May 2000 “Excitation System Estimation for Power System Stability Studies: On-line Data Collection and Analysis,” Union Electric, \$21,000 (Co-principal Investigator with Mariesa Crow).
- Apr. 1996 - Aug. 1997 “Excitation System Nonlinear Parameter Estimation for Power System Stability Studies: Feasibility Study,” Union Electric, \$20,693 (Co-principal Investigator with Mariesa Crow).
- Apr. 1996 - Aug. 1997 “Accurate Measurement of Low-Frequency Power-System Oscillations,” Union Electric, \$22,909 (Co-principal Investigator with Thomas Herrick and David Cunningham).
- June 1996 - Aug. 1996 “New Measurement Techniques for Chicken Houses,” Novus International, \$5,000 (Co-principal Investigator with Thomas Herrick).
- Jan. 1995 - May 1996 “Excitation System Model Parameter Estimation for Power System Stability Studies: Feasibility Study,” Union Electric, \$15,000 (Co-principal Investigator with Mariesa Crow).
- May 1991 - Jan. 1992 “Eliminating Steam Sensitivity of HF Meter in Uranium Oxide Reactor Offgas,” ABB-Combustion Engineering, \$3,593.
- Jan. 1990 - Feb. 1990 “Enhanced Data Acquisition and Analysis for Uranium Oxide Reactor System,” Combustion Engineering, \$9,712, (Co-principal Investigator with S. Vittal Rao and Neil L. Book).
- Apr. 1989 - Dec. 1989 “Automatic Control of Uranium Oxide Reactor System: Phase II,” Combustion Engineering, \$66,624, (Co-principal Investigator with S. Vittal Rao and Neil L. Book).
- Oct. 1988 - Mar. 1989 “Automatic Control of Uranium Oxide Reactor System: Phase I - Sensor Selection and Installation,” Combustion Engineering, \$63,145, (Co-principal Investigator with S. Vittal Rao and Neil L. Book).
- Oct. 1988 - Sept. 1989 “Adaptive Control of a Glass Bead Furnace,” Flex-O-Lite Corporation, \$71,882 (Co-principal Investigator with S. Vittal Rao and Gary G. Leininger).
- June 1987 - June 1989 “Development of a Multivariable Forward Modeling Controller,” Weldon Spring Endowment Fund, \$15,161 (Principal Investigator).
- Jan. 1987 - May 1987 Research appointment at UMR Rock Mechanics and Explosives Research Center.

OTHER GRANTS/GIFTS:

- Aug. 2018 – May 2019 “Robot Arm for the Factory Automation Laboratory,” ArcelorMittal, \$24,590.
- Jan 2018 – Feb 2018 “Safety Relay and Safety PLC for EE 5345 Laboratory Exercise,” Mark Hoffman, Automation & Control Concepts, \$2,000
- Aug. 2017 – May 2018 “Additional Upgrades to PLC Processors for the Factory Automation Laboratory,” ArcelorMittal, \$19,940.
- Sept 2016 – Sept 2017 “Development of a Color Intensity PID Control Laboratory Exercise,” Robbie Gordon and ExxonMobil, \$9,250

- Aug. 2016 – Jan 2017 “Upgrade to PLC Processors for the Factory Automation Laboratory,” ArcelorMittal, \$19,940.
- Aug. 2015 – Jan 2016 “Delta Robot for the Factory Automation Laboratory,” ArcelorMittal, \$21,500.
- Oct. 2014 – Aug 2016 “Controls Laboratory Equipment,” Missouri S&T, \$70,000 and gifts, \$92,250 for a total of \$162,250 (Co-principal Investigator with Jagannathan Sarangapani).
- Aug. 2013 – Jan. 2014 “SMC HAS-202 Production Station for the Factory Automation Laboratory,” ArcelorMittal, \$17,500.
- Aug. 2012 – Jan. 2014 “Student Trip, Reheat Furnace Design Project, and Student Lounge Furnishings” ArcelorMittal, \$11,000.
- Aug. 2011- Jan. 2012 “Heat Exchanger Process for the Factory Automation Laboratory,” ArcelorMittal, \$11,000.
- Sept. 1997 - Aug. 2000 “Desktop Manufacturing and Classical Control System Design Laboratory,” National Science Foundation, \$31,210 (Co-principal Investigator with Levent Acar and Ashok Tikku).
- Sept. 1996 - Aug. 1999 “Rapid Prototype Printed Circuit Board Work Cell to Support Design Across the Curriculum,” National Science Foundation, \$45,000 (Co-principal Investigator with Kurt Kosbar and Randy Moss).
- Jan. 1991 - Sep. 1993 “Control System Design and Automation Laboratory,” National Science Foundation, \$55,049 (Co-principal Investigator with S. Vittal Rao).

BOOK PUBLICATIONS:

Erickson, K. T., *Programmable Logic Controllers: An Emphasis on Design and Application*, 3rd Ed, Dogwood Valley Press, 2016.

Erickson, K. T., *Allen-Bradley Programmable Logic Controllers: An Emphasis on Design and Application*, Dogwood Valley Press, 2013.

Erickson, K. T., *Programmable Logic Controllers: An Emphasis on Design and Application*, 2nd Ed, Dogwood Valley Press, 2011.

Erickson, K. T., *Programmable Logic Controllers: An Emphasis on Design and Application*, Dogwood Valley Press, 2005.

Erickson, K. T. and Hedrick, J. L., *Plantwide Process Control*, Wiley, 1999.

BOOK CHAPTERS:

Erickson, K. T., “Programmable Logic Controllers,” *Process/Industrial Instruments and Controls Handbook*, 6th Ed., Chapter 4, Mc-Graw-Hill, tentatively 2019.

Erickson, K. T., “Discrete Control,” *A Guide to the Automation Body of Knowledge*, 3rd Ed., Chapter 4, Nicholas P. Sands and Ian Verhappen (Eds.), International Society of Automation, Research Triangle Park, NC, 2018, pp. 57-78.

Erickson, K. T., “Programmable Logic Controllers: The Hardware,” *A Guide to the Automation Body of Knowledge*, 3rd Ed., Chapter 13, Nicholas P. Sands and Ian Verhappen (Eds.), International Society of Automation, Research Triangle Park, NC, 2018, pp. 225-232.

Erickson, K. T, Stanek, E. Keith, Cetinkaya, E., Dunn-Norman, S., and Miller, A., "Reliability of SCADA Systems in Offshore Oil and Gas Platforms," *Stability and Control of Dynamical Systems with Applications*, Chapter 20, Birkhauser, Boston, MA, 2003, pp. 395-404.

JOURNAL PUBLICATIONS:

Bhaskar, Rajeev, Crow, M. L., Ludwig, E. M., Erickson, K. T., and Shah, K. S. "Nonlinear Parameter Estimation of Excitation Systems," *IEEE Transactions on Power Systems*, vol. 15, no. 4, Nov. 2000, pp. 1225-1231.

Ludwig, E. M., Crow, M. L., Erickson, K. T., and Shah, K. "A Feasibility Study of On-line Excitation System Parameter Estimation," *IEEE Transactions on Power Systems*, Aug. 1998, pp. 910-916.

Ngo, K. T. and Erickson, K. T., "Stability of Discrete-Time Matrix Polynomials," *IEEE Transactions on Automatic Control*, April 1997, pp. 538-542.

Erickson, K. T., "Programmable Logic Controllers," *IEEE Potentials*, Feb/March 1996, pp 14-17.

Erickson, K.T. and Otto, R. E., "Development of a Multivariable Forward Modeling Controller," *Ind. Eng. Chem. Research*, March 1991, pp. 482-490.

Erickson, K.T. and Otto, R.E., "Development of a Multivariable Forward Modeling Controller," *Model Based Process Control*, T. J. McAvoy, Y. Arkun, E. Zafiriou, eds., Oxford, Pergaman Press, 1989.

Erickson, K.T., "A Limitation to the Use of a Constructive Approach in the Stability Analysis of Fixed-Point Digital Controllers," *IEEE Transactions on Automatic Control*, September 1987, pp. 842-845; Correction, August 1988, p.796.

Erickson, K.T. and Michel, A.N., "Stability Analysis of Fixed-Point Digital Filters Using Computer Generated Lyapunov Functions - Part I: Direct Form and Coupled Form Filters," *IEEE Transactions on Circuits and Systems*, February 1985, pp. 113-132.

Erickson, K.T. and Michel, A.N., "Stability Analysis of Fixed-Point Digital Filters Using Computer Generated Lyapunov Functions - Part II: Wave Digital Filters and Lattice Digital Filter," *IEEE Transactions on Circuits and Systems*, February 1985, pp. 132-142.

OTHER PUBLICATIONS:

Erickson, K. T, C. J. Forjan, D. Rosner, D, P. Weakley, C. Eichholz, and M. Beyene, "Steel Continuous Annealing Line Simulation", AISTech 2020 – The Iron & Steel Technology Conference, Webinar, Sep. 17, 2020.

Erickson, K. T., "Programmable Logic Controllers: What Every Controls Curriculum Needs to Cover", 2019 ASEE Annual Conference, Tampa, FL, June 15 – 19, 2019.

Gupta, K., A. McClanahan, K. Erickson and R. Zoughi, "Show Me the Road to Hydrogen, Task 5: Nondestructive Evaluation (NDE)", Final Report, University Transportation Center (UTC), p. 45, December 2006.

Ramalingam, A., A. Miller, K. T. Erickson, "SCADA System Vulnerability Analysis," Proceedings of the Working Together: R&D Partnerships in Homeland Security Conference, Boston, MA, April 27-28, 2005.

Dunn-Norman, S., K. T. Erickson, E. Keith Stanek, and Ann Miller, "Reliability of Pressure Signals in Offshore Pipeline Leak Detection," final report to Department of the Interior, MMS TA&R Program, Feb. 4, 2005, under <http://www.mms.gov/tarprojects/398.htm>.

Miller, A. and K. T. Erickson, "Multi-Layer Vulnerability Assessment of a SCADA Network", International Workshop on **R**esearch and **E**ducation in **C**ontrol and **S**ignal Processing, REDISCOVER 2004, Cavtat, Croatia, June 2004.

Miller, A. and K. T. Erickson, "Network Vulnerability Assessment: A Multi-Layer Approach to Adaptivity," NATO Symposium on Adaptive Defence in Unclassified Networks, Toulouse, France, April 19 -20, 2004, pp. 13-1 to 13-9.

Erickson, K. T., A. Miller, E. K. Stanek, C. H. Wu, and S. Dunn-Norman, "Pipelines as Communication Network Links," Proceedings of the Natural Gas Technologies II Conference, Phoenix, AZ, Feb. 8-11, 2004.

Erickson, K. T., "Factory Automation: A Controls Course for Every University," Proceedings of the 2001 American Control Conference, June 25-27, 2001, Arlington, VA, pp. 1167-1172.

Dunn-Norman, S., K. T. Erickson, E. K. Cetinkaya, E. K. Stanek, and A. Miller, "SCADA System Trends in Deepwater Developments," Rio Oil & Gas Expo and Conference, October 18, 2000, paper IBP24800.

Erickson, Kelvin T., Ann Miller, E. Keith Stanek, and Shari Dunn-Norman, "Survey of SCADA System Technology and Reliability in the Offshore Oil and Gas Industry," final report to Department of the Interior, MMS TA&R Program, Oct. 1, 2000, under <http://www.mms.gov/tarprojects/356.htm>.

Bhaskar, R., Crow, M. L., Erickson, K., and Shah, K., "Excitation System Nonlinear Parameter Estimation for Power System Stability Studies: Feasibility Study," presented at the 30th North American Power Symposium, Cleveland, OH, October 1998.

Ludwig, E., Crow, M., Erickson, K., and Shah, K., "A Feasibility Study of On-line Excitation System Parameter Estimation," *Proceedings of the 20th International Conference on Power Industry Computer Applications*, Columbus, OH, May 11-16, 1997, pp. 324-330.

Wilmes, E. J. and Erickson, K. T., "Two Methods of Adaptive Controlled Channel Resource Allocation Using Reinforcement Learning and Supervised Learning Techniques," *Smart Engineering System Design: Neural Networks, Fuzzy Logic and Evolutionary Programming*, C. H. Dagli, M. Akay, C. L. Phillip Chen, B. R. Fernandez, J. Ghosh, eds., ASME Press, 1996.

Erickson, K. T., "Innovative Experiments for Undergraduate Factory Automation," *Proceedings of the 13th Triennial World Congress*, International Federation of Automatic Control, San Francisco, CA, June 30-July 5, 1996, vol. G, pp. 99-104.

Wilmes, E. J. and Erickson, K. T., "Two Methods of Neural Network Controlled Dynamic Channel Allocation for Mobile Radio Systems," *Proc. of IEEE Vehicular Technology Conference 1996*, Atlanta, GA, April 28-May 1, 1996.

Stelljes, T. A. and Erickson, K. T., "Modeling the Quality of Steel Production with an Adaptive Logic Network," *Intelligent Engineering Systems Through Artificial Neural Networks, Volume 5: Fuzzy Logic and Evolutionary Programming*, C.H. Dagli, M. Akay, C.L. Phillip Chen, B.R. Fernandez, J. Ghosh, eds., ASME Press, 1995, pp. 943-948.

Schieffer, J. D. and Erickson, K. T., "Vibration Control in a Cantilever Beam Using a Neurocontroller," *Intelligent Engineering Systems Through Artificial Neural Networks, Volume 5: Fuzzy Logic and Evolutionary Programming*, C.H. Dagli, M. Akay, C.L. Phillip Chen, B.R. Fernandez, J. Ghosh, eds., ASME Press, 1995, pp. 593-598.

Ngo, K. T. and Erickson, K.T., "Stability of a Model Predictive Controller with Soft Constraints," *1993 AIChE Annual Meeting*, St. Louis, MO, November 7-12, 1993, paper 150b4.

Erickson, K. T., "Experiments for an Undergraduate Automation Laboratory," *Proceedings of the 1993 American Control Conference*, June 1993, pp. 2032-2035.

Feher, J. D. and Erickson, K. T., "Solving the Model Predictive Control Problem With Soft Constraints," *Proceedings of the 1993 American Control Conference*, June 1993, pp. 377-378.

Feher, J. D. and Erickson, K. T., "Model Predictive Control with Soft Constraints," *1992 AIChE Annual*, Miami Beach, FL, November 1-2, 1992, paper 123h.

Mollenhoff, M.S. and Erickson, K.T., "A Comparison of ARMA and Unit Pulse Response Identification of Step Response Models," *Proceedings of the 1992 American Control Conference*, June 1992, pp. 1443-1444.

Raney, A.D. and Erickson, K.T., "Stability Analysis of a Multivariable Model-Based Predictive Controller," *Proceedings of the 1990 American Control Conference*, May 1990, pp. 2696-2697.

Raney, A.D. and Erickson, K.T., "Stability Analysis of a Multivariable Model-Based Predictive Controller," *Proceedings of the 27th Allerton Conference on Communication, Control and Computing*, September 1989, pp. 243-252.

Mollenhoff, M.S. and Erickson, K.T., "A Comparison of ARMA and Impulse Identification Based on Resultant Step Response Models," *Proceedings of the 27th Allerton Conference on Communication, Control and Computing*, September 1989, pp. 233-242.

Erickson, K.T., "A Limitation to the Use of a Constructive Approach in the Stability Analysis of Fixed-Point Digital Controllers," *Proceedings of the American Control Conference*, June 1987, pp. 1908-1913.

Erickson, K.T., "Stability Analysis of Fixed-Point Digital Controllers Using Computer Generated Lyapunov Functions," *Proceedings of the American Control Conference*, June 1985, pp. 1612-1617.

Erickson, K.T. and Michel, A.N., "Stability Analysis of Fixed-Point Digital Filters Using Computer Generated Lyapunov Functions: Wave and Lattice Filters," *Proceedings of the*

22nd Allerton Conference on Communication, Control and Computing, October 1984, pp. 431-440.

Erickson, K.T. and Michel, A.N., "Lyapunov Stability Analysis of Fixed-Point Digital Filters: A Constructive Approach," *Proceedings of the IEEE International Symposium on Circuits and Systems*, May 1984, pp. 589-592.

Erickson, K.T., "Stability Analysis of Fixed-Point Digital Controllers Using a Constructive Algorithm," *Proceedings of the Monsanto Process Control Symposium*, April 1984.

Erickson, K.T. and Michel, A.N., "Stability Analysis of Fixed-Point Digital Filters Using Computer Generated Lyapunov Functions," *Proceedings of the 21st Allerton Conference on Communication, Control, and Computing*, October 1983, pp. 983-992.

Erickson, K.T., "Stability Analysis of Fixed-Point Digital Filters Using a Constructive Algorithm," Ph.D. Dissertation, Iowa State University, 1983.

Erickson, K.T., "Microcomputer Control and Data Acquisition for a Continuous Flow Diffusion Chamber," M.S. Thesis, University of Missouri- Rolla, 1979.

CONFERENCE PRESENTATIONS:

"Distance Lab for Automation Engineering," Process Control and Safety Symposium, Houston, TX, Nov. 12, 2015.

"New Chairs Workshop," ECEDHA (Electrical and Computer Engineering Dept Heads Association) 2015 Conference, Hilton Head, South Carolina, Mar 21, 2015

"Introduction to PLC Programming," Process Control and Safety Symposium, Houston, TX, Oct. 9, 2014.

"Introduction to HMI Programming," Process Control and Safety Symposium, Houston, TX, Oct. 9, 2014.

"New Chairs Workshop," ECEDHA (Electrical and Computer Engineering Dept Heads Association) 2014 Conference, Napa, California, Mar 21, 2014

"New Chairs Workshop," ECEDHA 2013 Conference, Austin, TX, Mar 22, 2013

"The Engineering Gap – Is Production Meeting Demand?" ISA Expo and Conference, Houston, TX, Oct. 17, 2006.

"Innovative Experiments for Undergraduate Factory Automation," University of Iceland, April 17, 2000.

INVITED PRESENTATIONS:

"Innovative Experiments for Undergraduate Factory Automation," University of Iceland, April 17, 2000.

"Process Control," presented to Mech. Eng. 381 (Mechanical and Aerospace Control) class, University of Missouri-Rolla, April 20, 1993.

“Expert Systems in Control,” Control Systems Seminar, University of Missouri-Rolla, March 1989.

“A Model-Based Predictive Controller for Industrial Process Control,” Control Systems Seminar, University of Missouri-Rolla, November 1987.

COURSE NOTES PUBLISHED:

Erickson, K. T., *PLC Motion Control*, 2015-present. Notes for EE 5345.

Erickson, K. T., *Programmable Logic Controllers*, 1994-present. Notes for EE 3340 and EE 5340.

Erickson, K. T., *Design Techniques for Programmable Logic Controller Systems*, Short course notes, 1994-present.

COURSES TAUGHT:

Arch Eng 3805	Building Electrical and Lighting Systems (co-instructor with Stuart Baur)
Comp Eng 2210	Introduction to Digital Logic
Elec Eng 262	Linear Systems II (now known as EE 3410 Digital Signal Processing)
Elec Eng 3320	Linear Control Systems
Elec Eng 3340	Basic Programmable Logic Controllers
Elec Eng 335	Expert Systems with Application to Engineering Problems (no longer in catalog)
Elec Eng 4380	Practicum in Automation Engineering
Elec Eng 5300	Digital Control
Elec Eng 5340	Advanced PLC (Programmable Logic Controllers)
Elec Eng 5345	PLC Motion Control
Elec Eng 5350	Plantwide Process Control (co-listed as Chem Eng 5190)
Elec Eng 5360	System Simulation and Identification

NEW DEGREE PROGRAM DEVELOPED:

Minor in Automation Engineering – first graduate Spring 2016

Undergraduate Certificate in Automation Engineering – first graduate Spring 2019

NEW COURSES DEVELOPED:

EE 4380, “Practicum in Automation Engineering.” – First taught Spring 2015

EE 5345, “PLC Motion Control” – First taught Spring 2014

EE 5340, “Advanced PLC (Programmable Logic Controllers).” – First taught Spring 2000

EE 5350/ChE 5190, “Plantwide Process Control.” – First taught Spring 1994

EE 3340, “Controllers for Factory Automation.” – First taught Spring 1991

EE 335, “Expert Systems with Application to Engineering Problems.” – First taught Spring 1989. No longer in catalog.

SHORT COURSES:

“Programmable Logic Controllers,” (1994-Present) have taught 3-day version a total of 39 times; 1 day version total of 6 times. Total number of participants: 666. Regularly taught to Missouri S&T students prior to the Fall and Spring semesters. For some years, the demand has been high enough so that two 3-day sessions are offered the week before the semester starts. I started teaching this course for non-ECE undergraduates, but it is also the prerequisite for graduate students wanting the graduate-level PLC courses, as they cannot take the undergraduate prerequisite.

“Programmable Logic Controllers,” June 20-30, 2016, a 2-day short course developed for Missouri Smelting Technology, Jackson, TN. Taught 4 times with 2 – 3 participants each session. The company could only afford to have that many technicians in training at once. The course included a half-day session at the plant, training the technicians on the PLC systems in the plant – how to access and troubleshoot.

“Introduction to Programmable Logic Controllers,” developed 2010, revised in 2014 and 2018, online course for General Motors Technical Education Program. Course in 9 online modules with an online quiz to assess mastery of material.

“Programmable Logic Controllers I,” (2004-2005) a 15-hour short course developed for Briggs & Stratton to train their technicians. Taught 3 times. Total number of participants: about 35.

“Expert Systems,” May 27 - 31, 1991, Federal University of Para, Belem, Para, Brazil.

“Self-Tuning Control,” June 3 - 7, 1991, Federal University of Para, Belem, Para, Brazil.

STUDENT EVALUATIONS (Previous 4 years):

Note: Scores are on a 0.0 to 4.0 scale, with 4.0 being the highest rating

Course Title	Course Number	Date	Number of Students	Avg. CET Score	% Resp.	% Effort
Controllers/Factory Auto	EE 3340 1A	Sp 2017	35	3.68	54	100
Controllers/Factory Auto	EE 3340 1DIS	Sp 2017	1	unknown	0	100
Controllers/Factory Auto	EE 3340 1MSU	Sp 2017	9	3.67	33	100
Controllers/Factory Auto	EE 3340 3E	Sp 2017	1	unknown	0	100
Controllers/Factory Auto	EE 3340 3DIS	Sp 2017	1	unknown	0	100
PLC Motion Control	EE 5345 1A	Sp 2017	17	3.82	65	100
PLC Motion Control	EE 5345 3A	Sp 2017	5	4.00	20	100
Plantwide Process Control	ChE 5190 1A	Sp 2017	13	3.75	62	100
Plantwide Process Control	ChE 5190 1DIS	Sp 2017	1	3.00	100	100
Plantwide Process Control	EE 5350 1A	Sp 2017	9	4.00	67	100
Plantwide Process Control	EE 5350 1DIS	Sp 2017	3	3.00	67	100
Practicum in Automation Engineering	EE 4380 3A	Su 2017	5	no eval	n/a	100
Controllers/Factory Auto	EE 3340 1A	Fa 2017	40	3.91	55	100
Controllers/Factory Auto	EE 3340 1DIS	Fa 2017	2	4.00	50	100
Controllers/Factory Auto	EE 3340 1MSU	Fa 2017	2	unknown	0	100
Controllers/Factory Auto	EE 3340 3DIS	Fa 2017	2	4.00	50	100
Controllers/Factory Auto	EE 3340 3MSU	Fa 2017	2	unknown	0	100
Practicum in Automation	EE 4380 3A	Fa 2017	1	unknown	0	100

Engineering						
Advanced PLC	EE 5340 1A	Fa 2017	27	3.80	56	100
Advanced PLC	EE 5340 1DIS	Fa 2017	3	4.00	33	100
Advanced PLC	EE 5340 1MSU	Fa 2017	1	unknown	0	100
Advanced PLC	EE 5340 3A	Fa 2017	13	3.67	46	100
Advanced PLC	EE 5340 3D	Fa 2017	1	unknown	0	100
Advanced PLC	EE 5340 3DIS	Fa 2017	3	unknown	0	100
Advanced PLC	EE 5340 3MSU	Fa 2017	1	unknown	0	100
Basic PLC	EE 3340 1A	Sp 2018	45	3.82	73	100
Basic PLC	EE 3340 1DIS	Sp 2018	1	unknown	0	100
Basic PLC	EE 3340 1MSU	Sp 2018	11	3.33	64	100
PLC Motion Control	EE 5345 1A	Sp 2018	19	3.91	58	100
PLC Motion Control	EE 5345 1DIS	Sp 2018	2	3.00	50	100
PLC Motion Control	EE 5345 1MSU	Sp 2018	2	4.00	50	100
PLC Motion Control	EE 5345 3A	Sp 2018	9	4.00	56	100
Plantwide Process Control	ChE 5190 1A	Sp 2018	15	3.86	47	100
Plantwide Process Control	EE 5350 1A	Sp 2018	12	3.60	83	100
Plantwide Process Control	EE 5350 1DIS	Sp 2018	2	4.00	100	100
Plantwide Process Control	EE 5350 1MSU	Sp 2018	1	4.00	100	100
Basic PLC	EE 3340 1A	Fa 2018	55	3.70	60	100
Basic PLC	EE 3340 1MSU	Fa 2018	3	4.00	33	100
Practicum in Automation Engineering	EE 4380 3A	Fa 2018	1	unknown	0	100
Advanced PLC	EE 5340 1A	Fa 2018	23	3.80	43	100
Advanced PLC	EE 5340 1DIS	Fa 2018	2	unknown	0	100
Advanced PLC	EE 5340 1MSU	Fa 2018	5	4.00	60	100
Advanced PLC	EE 5340 3A	Fa 2018	8	3.50	50	100
Basic PLC	EE 3340 1A	Sp 2019	67	3.86	66	100
Basic PLC	EE 3340 1DIS	Sp 2019	1	unknown	0	100
Basic PLC	EE 3340 1MSU	Sp 2019	9	3.75	44	100
PLC Motion Control	EE 5345 1A	Sp 2019	23	4.00	48	100
PLC Motion Control	EE 5345 1DIS	Sp 2019	3	4.00	67	100
PLC Motion Control	EE 5345 1MSU	Sp 2019	4	unknown	0	100
PLC Motion Control	EE 5345 3B	Sp 2019	6	4.00	50	100
Plantwide Process Control	ChE 5190 1A	Sp 2019	23	3.54	57	100
Plantwide Process Control	ChE 5190 1DIS	Sp 2019	2	4.00	100	100
Plantwide Process Control	EE 5350 1A	Sp 2019	19	3.90	53	100
Plantwide Process Control	EE 5350 1DIS	Sp 2019	2	4.00	100	100
Practicum in Automation Engineering	EE 4380 3A	Sp 2019	1	unknown	0	100
Practicum in Automation Engineering	EE 4380 3A	Su 2019	5	unknown	0	100
Basic PLC	EE 3340 1A	Fa 2019	54	3.74	70	100
Basic PLC	EE 3340 1DIS	Fa 2019	4	4.00	50	100
Basic PLC	EE 3340 1MSU	Fa 2019	10	3.38	80	100
Practicum in Automation Engineering	EE 4380 3A	Fa 2019	1	unknown	0	100
Process Control Safety, Security and Alarms	ChE 5001 101	Fa 2019	4	3.00	50	100
Process Control Safety, Security and Alarms	EE 5001 103	Fa 2019	12	4.00	25	100

Advanced PLC	EE 5340 1A	Fa 2019	40	4.00	43	100
Advanced PLC	EE 5340 1MSU	Fa 2019	5	3.75	80	100
Basic PLC	EE 3340 1A	Sp 2020	53	3.84	47	100
Basic PLC	EE 3340 1DIA	Sp 2020	4	3.50	50	100
Basic PLC	EE 3340 1MSU	Sp 2020	12	4.00	33	100
Basic PLC (lab)	EE 3340 315	Sp 2020	3	4.00	33	100
PLC Motion Control	EE 5345 1A	Sp 2020	31	4.00	45	100
PLC Motion Control	EE 5345 1DIA	Sp 2020	5	4.00	20	100
PLC Motion Control	EE 5345 1MSU	Sp 2020	3	unknown	0	100
PLC Motion Control (lab)	EE 5345 303	Sp 2020	6	4.00	50	100
PLC Motion Control (lab)	EE 5345 308	Sp 2020	3	unknown	0	100
PLC Motion Control (lab)	EE 5345 309	Sp 2020	4	4.00	25	100
Plantwide Process Control	ChE 5190 1A	Sp 2020	21	3.75	38	100
Plantwide Process Control (Dis)	ChE 5190 102	Sp 2020	2	2.50	100	100
Plantwide Process Control	EE 5350 1A	Sp 2020	17	3.62	47	100
Plantwide Process Control (Dis)	EE 5350 102	Sp 2020	3	unknown	0	100
Practicum in Automation Engineering	EE 4380 3A	Su 2020	5	unknown	0	100
Basic PLC	EE 3340 1A	Fa 2020	35	2.43	20	100
Basic PLC	EE 3340 1DIS	Fa 2020	3	4.00	33	100
Basic PLC	EE 3340 1MSA	Fa 2020	10	4.00	20	100
Practicum in Automation Engineering	EE 4380 3A	Fa 2020	2	4.00	100	100
Process Control Safety, Security and Alarms	ChE 5001 105	Fa 2020	9	3.50	22	100
Process Control Safety, Security and Alarms	EE 5001 101	Fa 2020	4	3.50	100	100
Process Control Safety, Security and Alarms (Dis.)	ChE 5001 106 EE 5001 102	Fa 2020	4	4.00	50	100
Advanced PLC	EE 5340 1A	Fa 2020	35	4.00	46	100
Advanced PLC	EE 5340 1DIS	Fa 2020	5	3.50	40	100
Advanced PLC	EE 5340 1MSU	Fa 2020	5	unknown	0	100

COURSE SOFTWARE DEVELOPMENT:

Computer programs developed for use by the students in department courses.

<i>Name</i>	<i>First Version</i>	<i>Description</i>
PIDTune	1991	PID controller tuning demonstrator. Updated for Windows operating system in 1998. Still actively used in EE 3340 and EE 5350/ChE 5190.
UMRCD	1999	Continuous and discrete controller design: root locus, Bode frequency response, polar frequency response, and time response. DOS-based UMRCCD and UMRDCD combined and extensively modified to use the Windows interface.
FMCDLL	1996	Model predictive controller algorithm. Dynamic linked library for use with Vissim simulation package. Still actively used in EE 5350/ChE 5190.
UMRCCD	1990	Continuous controller design: root locus, Bode frequency response, polar frequency response, time response (DOS)

UMRDCD	1990	Discrete controller design: root locus, Bode frequency response, polar frequency response, time response (DOS)
RLOC	1988	Root locus plotter for continuous systems (DOS)
PFE	1988	Partial fraction expansion of a transfer function (DOS)
DEQ	1988	Discrete equivalent of a continuous-time transfer function (DOS)
DSPACE	1988	Discrete state-space controller design (DOS)
SSPACE	1988	Continuous state-space controller design (DOS)
PIDTUNE	1987	PID tuner/demonstrator (DOS)

Ph.D. DISSERTATIONS GUIDED:

Kangombe Joseph Makasa, "Computational Approaches for Voltage Stability Monitoring and Control in Power Systems," 2015.

James D. Feher, "Model Predictive Control with Soft Constraints," 1993.

Khanh T. Ngo, "Stability of Discrete-Time Matrix Polynomials and Applications to a Model Predictive Controller," 1993.

M.S. THESES GUIDED:

Uday Guntupalli, "Technical Modeling and Control System Development of Hybrid Energy System Using coal, nuclear, wind and diesel," 2013. (co-advised with Joseph Smith)

Richard Hardison, "Automatic PLC Recovery from Compromised Communications Path," 2010.

Curtis Parrott, "Real-Time Configuration of PLC Communication Paths," 2009.

Arunesh Ramalingam, "SCADA System Vulnerability Analysis Using Command Data Packet Manipulation Attacks," 2004 (co-advised with Ann Miller).

Heather Rutenkroger, "Security of Web-based Access to PLCs," 2003.

Egemen Cetinkaya, "Reliability Analysis of SCADA Systems Used in the Offshore Oil and Gas Industry," 2001.

Mohammed Aslam Sherule, "Nonlinear Forward Modeling Controller," 1999.

James E. Lyon, "Iterative Extended Kalman Filter Estimation of Monod Model States and Parameters with Limited Measurement Data," 1996.

Edward J. Wilmes, "Neural Network Control of Dynamic Channel Allocation for Mobile Radio Systems," 1995.

James D. Schieffer, "Vibration Control in a Cantilever Beam Using a Neuro Controller," 1995.

Randall J. Krohn, "A Fuzzy-Logic Predictor for Medical Thermometry," 1995.

Giridhar Tatavarti, "Process Control User Interface Development in X-Windows," 1995.

Rajesh Shinde, "Multivariable Identification and Control of a Uranium Dioxide Chemical Process," 1993.

Timothy A. Stelljes, "Modeling the Quality of Steel Production With an Adaptive Logic Network," 1993.

Hosam A. Aleem, "A Method For the Stability Analysis of a Multivariable Model Predictive Controller," 1992.

Ching-Yu Tyan, "Stability Analysis of a Multivariable Model-Based Predictive Controller with Mismatch Between Model and Process," 1991.

Mark S. Moellenhoff, "Multivariable Identification of a Uranium Dioxide Chemical Process," 1990.

Wesley T. Tremper, "Multivariable Identification of a Glass Bead Furnace," 1990.

James D. Feher, "Control of a Glass Bead Furnace," 1990.

Anthony D. Raney, "Stability Analysis of a Multivariable Model-Based Predictive Controller," 1990.

CURRENT GRADUATE STUDENTS:

SENIOR DESIGN PROJECTS ADVISED

Nucor Furnace Lance Controls Upgrade (SP2020, FS2020)
ArcelorMittal Continuous Annealing Line Simulation (SP2020, FP2020)
Wieland Rimmer Controls Upgrade (FS2019, SP2020)
3D Plastic Recycler (FS2019, SP2020)
Gerdau Caster Remote I/O Panel Upgrade (FS2018, SP2019)
Gerdau Cooling Bed Remote I/O Panel Upgrade (FS2018, SP2019)
Gerdau Nonferrous Processing System Delay Tracking System (FS2018, SP2019)
Solar-Powered Irrigation System (SP2018, FS2018)
ArcelorMittal Continuous Annealing Line Simulation (FS2017, SP2018)
SWOL Memory Muscle Maker (FS2017, SP2018)
Goodyear Material Cooling System PLC Control (SP2017, FS2017)
Olin Brass Integration of Backup Power Generator into PLC Control (SP2017)
Gerdau Steel Cooling Bed Hydraulic System Upgrade (FS2015, SP2016)
Honeywell High-Pressure Valve Testing Station (FS2015, SP2016)
Gates Rubber Press Automation Upgrade (SP2016)
Gerdau Steel Pit Crane Control System Replacement (SP2015, FS2015)
Olin Brass Loma Tester Control System Upgrade (SP2015, FS2015)
Olin Brass Loopco Saw Control System Upgrade (SP2015, FS2015)
Home Automation System (SP2014, FS2014)
Gerdau Steel Allow Weighing System (SP2013)
Ash Grove Cement Remote Monitoring Station (FS2012, SP2013)
Goodyear Tire Levitator (FS2012, SP2013)
Gerdau Bander System HMI Addition (SP2012)
Goodyear Vision Inspection System (FS2011, SP2012)
BBQ Grill Temperature Control (SP2011, FS2011)

Gerdau Steel Shipping Area PLC Control (FS2010, SP2011)
Power Plant Alarm Annunciator web-based interface (SP2010, FS2010)
The Mix (FS2009, SP2010)
Northstar Battery Terminal Seal Robot program (FS2009, SP2010)
Power Plant Boiler #5 Operator Interface Improvements (SP2009, FS2009)
Power Plant SCADA Web Page Development (SP2009, FS2009)
Anheuser-Busch HMI for Event Queue (SP2009, FS2009)
Human-Powered Vehicle Simulator (Sp2009, FS2009)
Gerdau-Ameristeel Baghouse Control (FS2008, SP2009)
Rhobi Saw PLC and HMI Programming (FS2008)
Anheuser-Busch Producer/Consumer Feasibility (SP2008, FS2008)
Shower Temperature Control (SP2008, FS2008)
MSE Environmental Chamber Control (FS2007, SP2008)
MSE Oven Control (FS2007, SP2008)
Power Plant Baghouse Sequencer (FS2007)
Jacksonville Washer Project (SP2007, FS2007)
Anheuser-Busch PLC Health Monitoring (SP2007, FS2007)
Olin Energy Conservation (FS2006, SP2007)
UMR Power Plant Wood Chip System Upgrade (FS2006, SP2007, FS2007)
Civil Engr. Flow Lab Controls Lab Upgrade (WS2006, FS2006)
Manchester Packaging Blend Control (FS2005, WS2006)
Automated Drink Mixer (FS2005, WS2006)
Chevron SCADA System (WS2006)
UMR Power Plant Boiler #5 SCADA (WS2005, FS2005)
Cantex Wireless Data Acquisition for Extruders (WS2004, FS2004)
Olin Annealing Furnace Controls Upgrade (WS2004, WS2003)
Olin LOMA Tube Tester PLC Upgrade (FS2002, FS2004)
Chem. Eng. Unit Ops Lab control Upgrade (FS2002, WS2003)
Power Plant Coal Handler Improvements (WS2002, FS2002)
Aquarium Salinity Control (WS2002, FS2002)
PLC HVAC Retrofit (FS2001, WS2002)
Olin Brass Tube Saw PLC Upgrade (FS2001, WS2002)
Olin Brass Tubemill PLC Retrofit (FS2002, WS2002)
Annunciator Panel – PLC Retrofit (FS2001)
UMR Power Plant PLC Network (WS2001, FS2001)
Briggs & Stratton Engine Tracking (FS2000, WS2001)
UMR Power Plant Switchgear Upgrade (FS2000, WS2001)
Alcoa Heat Treat #12 Plate Tracking (FS2000, WS2001)
UMR Power Plant Water Softener Control Upgrade (WS2000, FS2000)
Alcoa Foils Rewind Tension Measurement (WS2000, FS2000)
Alcoa Foils Cooling Tower MCC Upgrade (WS2000, FS2000)
Power Plant Wood Chip Handler Upgrade (FS1999, WS2000)
Alcoa Heat Treat #12 Upgrade (FS1999, WS2000)
Briggs & Stratton Parts Tracking (WS1999, FS1999)
Power Plant Coal Handler Upgrade (WS1999, FS1999)
Automated Pizza Maker (WS1999, FS 1999)
Formula SAE Engine Controller (WS1991, SP1992)

UNDERGRADUATE RESEARCH/HONORS PROJECTS:

Aaron Burke, “Remote Input/Module Communication Delay Investigation” SP2020

Travis McGuire, “Industrial Control System Cybersecurity Investigation” 2017-18

Ryan Harris, "ControlLogix with AS-i I/O Modules ," 2006.

Kenneth D. Kangas, "Control Strategies for a Heating and Ventilation System," 1991-1992.

Zak Dolan, "Batch Control with Sequential Function Charts," 1992.

Chadwick M. Naeger, "Development of a Process Control Experiment for the Honeywell TDC 3000," 1991.

Christopher D. McDaniel, "Development of Factory Automation Experiments for the Allen-Bradley PLC-5/12," 1990.

Mark S. Moellenhoff, "Comparison of ARMA and Impulse Model Identification," 1988.

HONORS AND AWARDS:

International Society of Automation Fellow, 2019
Governor's Award for Excellence in Education, 2019
Curators' Distinguished Teaching Professorship, 2019
S&T Faculty Teaching Award, 2016
UMR Faculty Excellence Award, 1989 - 90, 1990 - 91, 1991-92
S&T/UMR Outstanding Teacher Award 1987 - 88, 1988 - 89, 1990-91, 1994-95, 1998-99,
1999-2000, 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2007-2008,
2008-2009, 2014-15, 2016-17, 2017-18
IEEE Region 5 Outstanding Engineering Educator Award, 2015
Dean of Engineering Teaching Excellence Award 2003-04
Outstanding Educator Award, IEEE St. Louis Section, May 12, 2000
Buick Spirit Award, 1995
National Science Foundation Graduate Fellowship
Eta Kappa Nu
Tau Beta Pi
Outstanding Senior in EE, UMR, 1978
Eagle Scout

PROFESSIONAL AFFILIATIONS/ACTIVITIES:

International Society of Automation (ISA), fellow
IEEE, senior member
ISA Education Division, Director-Elect, 2010-12, Director, 2012-15, 2016-present, Asst
Director, 2015-2016
Panelist, 2019 ISA Process Control and Safety Conference, Nov. 2019
Panelist, 2015 ISA Process Control and Safety Conference, Nov. 2015
Panelist, 2008 ISA Expo Conference, Oct. 2008
Session Organizer, 2019 ISA Process Control and Safety Conference, Nov. 2019
Session Organizer, 2018 ISA Process Control and Safety Conference, Oct. 2018
Session Organizer, 2017 ISA Process Control and Safety Conference, Nov. 2017
Session Organizer, 2016 ISA Process Control and Safety Conference, Nov. 2016
Session Organizer, Process Control and Safety Symposium, Oct. 2014
Session Organizer, 2007 ISA Expo Conference, Oct. 2007
Session Organizer and Co-Chair, 1996 International Federation of Automatic Control
Conference, July 1996.
Session Organizer and Co-Chair, 1993 American Control Conference, June 1993

Session Co-Chair, 1990 American Control Conference, May 1990.
Technical Program Committee, 31st Midwest Symposium on Circuits and Systems
Acting Controls Area Coordinator 1990-1991.
Controls Area Coordinator 1991-1996, 1998 – 2000, 2016-.
Member of EE Department Undergraduate Committee, 1988-1991
Member of EE Department M.S. Comprehensive and Ph.D. Qualifying Committee 1990-1992.
Member of EE Department Graduate Review Committee, 1990-1991.
Member of EE Department Internal Review Committee, April-May 1990.
Solicited and received equipment donations of more than \$300,000 from Anheuser-
Busch/InBev, ArcelorMittal, Automation & Control Concepts, Barry-Wehmiller, Burns &
McDonnell, CPM Beta Raven, Honeywell, Intelligrated, McEnery Automation, Moore
Products, Nucor, Rockwell Automation, Siemens, and Texas Instruments for
undergraduate laboratory equipment.

OTHER ACTIVITIES:

First Baptist Church, Bourbon, Missouri: Sunday School Superintendent, 2007-present;
Sunday School teacher, 2002-present; Chair, Board of Trustees, 2007-2008, 2013-15,
2017-18; Member Board of Trustees, 2006-2008, 2009-11, 2016-18, 2019-2021.
Moderator, 8/2018-2/2019, 7/2020-present
Sons of the American Revolution – President of the Ozark Patriots Chapter, 2019-2021;
Vice-President, 2018.
Volunteer Elementary School Teacher - Math Enrichment for Third and Fourth Grades at
Mark Twain Elementary School, Rolla, 1989-1996.
Unit Commissioner for Boy Scout Troop 81 and Cub Scout Pack 81. (1994-1996)
Cub Scout Pack 81: Former Cubmaster (2 years) and Webelos Den Leader (1 year).
Judge at the district Vo-Tech Electronics Competition, March 1987.
Parkview Baptist Church: Sunday School Teacher, Jan. 1987-2000; Treasurer, August 1986-
2000.
Math Team Coach - Mark Twain Elementary Fourth Grade team for the regional Missouri
Council of Teachers of Mathematics Math Contest, 1988-1991. During these years, 7 out
of a total of 9 of the team members (3 each year) have advanced to the State level, and
one placed 8th in the State of Missouri

PERSONAL DATA

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August 9, 1957
Ridgeway, Pennsylvania

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Rolla, MO 65401
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