

Edward J. Coyle

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Professional Experience:

Sept 2006 – June 2007	Kenan Trust Visiting Professor for Distinguished Teaching, Princeton University
August 2003 – present	Co-Director of the Center for Wireless Systems and Applications in the College of Engineering, Purdue University
August 2002 – present	Co-Founder and Director of the EPICS Entrepreneurship Initiative within the Burton Morgan Center in Purdue's Discovery Park
May 2001– present	Founder, Director of the Center for Technology Roadmapping
April 2000 – July 2004	Assistant Vice Provost for Research in Computing and Communications, Purdue University; 1/4-time appointment
Sept. 1999 – Sept. 2002	Co-Founder and Co-Director of the National Engineering Projects in Community Service (EPICS) Program.
Jan. 1999 – Dec. 2000	Director, Motorola-Purdue Alliance
Aug. 1995 – Sept. 2002	Co-Founder, Co-Director of the Center for Engineering Projects in Community Service (EPICS) at Purdue University
Aug. 1994 – present	Professor, School of Electrical and Computer Engineering, Purdue University
Aug. 1990 – Aug. 1991	Visiting Professor, Department of Electrical Engineering, University of Delaware
Aug. 1986 – Aug. 1994	Associate Professor, School of Electrical Engineering, Purdue University
Aug. 1982 – Aug. 1986	Assistant Professor, School of Electrical Engineering, Purdue University

Education:

PhD 1982	Princeton University, Electrical Engineering and Computer Science
MSE 1980	Princeton University, Electrical Engineering and Computer Science
MA 1980	Princeton University, Electrical Engineering and Computer Science
BEE 1977	University of Delaware, Electrical Engineering

Honors and Awards:

From the National Academy of Engineering:

2005 Bernard M Gordon Prize for Innovation in Engineering and Technology Education; with L.H. Jamieson and W.C. Oakes. Citation: "For innovations in the education of tomorrow's engineering leaders by developing and disseminating the Engineering Projects in Community Service (EPICS)." The Gordon Prize consists of a gold medallion and a \$500,000 cash award that has been used to create an endowment for the EPICS Program.

From the Institute of Electrical and Electronics Engineers:

IEEE Fellow: For contributions to the theory of nonlinear signal processing, 1998
ASSP Society's 1986 Best Paper Award for Authors under age 30 for "Median Filtering by Threshold Decomposition," by J. P. Fitch, E. J. Coyle and N.C. Gallagher, vol. ASSP-32, pp. 1183-1188, Dec. 1984

Myril B. Reed Best Paper Award from the 32nd Midwest Symposium on Circuits and Systems for "Minimum Mean Absolute Error Stack Filtering with Syntactic Constraints," by M.Gabbouj and E.J. Coyle, Urbana, IL, Aug. 1989.

Delaware Bay Section Scholastic Achievement Award, 1978

From the American Society for Engineering Education:

1997 Chester F. Carlson Award for Innovation in Engineering Education, with L.H. Jamieson

From the State of Indiana:

First Annual Governor's Award for Outstanding Volunteerism, presented to the EPICS Program, January 2003

Awards from Industry:

Finalist, 2000 Boeing Outstanding Educator Award Competition, with L.H. Jamieson and W.C. Oakes

Recognition of Excellence for the EPICS Program from Microsoft Research, with L.H. Jamieson and W.C. Oakes, 2002

Scott Paper Company Leadership Award, 1975-77

From the ECE Department Heads Association (ECEDHA):

Innovative Program Award for the creation of the EPICS Program, with L.H. Jamieson. March 13, 2006

From Purdue University:

Schools of Engineering Faculty Award for Engagement/Service; Citation: "For his outstanding work in fostering multidisciplinary learning and creating partnerships to support research, policy, and planning." March 2005.

Schools of Engineering Team Excellence Award, with L.H. Jamieson, W.C. Oakes, and P. Brown; Citation: "For the creation, institutionalization, and dissemination of the EPICS Program." March 2003.

2002 Focus Award, presented to the EPICS Program for outstanding contributions to the furthering of Purdue's commitment to disability accessibility & diversity

Class of 1922 Award for Outstanding Innovation in Helping Students Learn, University-wide Award, with L.H. Jamieson, 1997

Ruth and Joel Spira Outstanding Teacher Award, School of Electrical and Computer Engineering, with L.H. Jamieson, 1997

From Princeton University:

Wallace Memorial Fellowship in Engineering, 1980, 1981

From the University of Delaware:

Distinguished Engineering Alumnus of the University of Delaware, 1998

College of Engineering Freshman Scholarship, 1974

John B. Lynch Scholarship, 1974, 1975

From the Community of Greater Lafayette, IN:

Together Everyone Achieves More (TEAM) Award presented in July 1998 to the EPICS Program by the Wabash Center in recognition of the contributions of EPICS teams to furthering the mission of the Center

Selected Current (2007) Activities

Working with faculty and administrators at Princeton University to create a VIP/EPICS Program at Princeton University

Organizing the Third Annual National 2007 Idea-to-Product (I2P) Entrepreneurship Competition for EPICS and Social Entrepreneurship, April 1-2, 2007. Entrepreneurship teams from EPICS sites and Social Entrepreneurship programs around the U.S. will participate the competition

Motorola Labs' Applications Research Group has joined the e-Stadium VIP Project at Purdue

Professional Society Activities:

Member:

IEEE Communications Society, 1980-present

IEEE Signal Processing Society, 1982-present

Association for Computing Machinery, 1985-present

American Society for Engineering Education, 1997-present

Technical Committee on Digital Signal Processing
of the IEEE Circuits and Systems Society, 1989-1999

Board of Governors of IEEE Circuits and Systems Society, 1992-1995

Advisory Committee of IEEE Winter Workshop on Nonlinear Digital Signal Processing, Tampere, Finland, Jan. 17-20, 1993

Organizing Committee, ITCOM 2001, SPIE International Symposium

Associate Editor:

IEEE Transactions on Circuits and Systems, 6/89-6/91

Program Committee Member:

1991 International Symposium on Circuits and Systems

1992 International Symposium on Circuits and Systems

1994 International Symposium on Circuits and Systems

Infocom 1993

1995 IEEE Workshop on Nonlinear Signal Processing

1994 Midwest Symposium on Circuits and Systems

1997 International Symposium on Circuits and Systems

Eurasip 2000 - European Signal Processing Conference

2003 International Conference on Image Processing

2007 Workshop on Nonlinear Signal and Image Processing

Chair:

Technical Committee on Digital Signal Processing of the IEEE Circuits and Systems Society, 1991-1993
1997 IEEE/EURASIP Workshop on Nonlinear Signal and Image Processing, Grand Hotel, Mackinac Island, Michigan, Sept. 7-11, 1997

Ph.D. Thesis Supervision Completed:

1. J. Patrick Fitch, "Analysis and Implementation of Median-Type Filters," July 1984. Supervised jointly with N. C. Gallagher.
2. Peter D. Wendt, "Ranked-Order Type Operators in Adaptive Quantization and Digital Signal Processing," August 1985. Supervised jointly with N. C. Gallagher.
3. Steven L. Beuerman, "Quasi-Birth-Death Processes and Their Use in the Modeling and Analysis of Computer Networks," August 1986.
4. R. Lee Hamilton, "Modeling and Analysis of Multi-hop and Priority Random Access Computer Networks," Sept. 1986.
5. Jean-Hsang Lin, "Optimal Nonlinear Filtering under the Mean Absolute Error Criterion," May 1989.
6. Ji Zhang, "The Performance Analysis of Computer Communication Networks," August 1989.
7. Moncef Gabbouj, "Estimation and Structural Based Approach for the Design of Optimal Stack Filters," December 1989.
8. G. Rama Murthy, "Transient and Equilibrium Analysis of Computer Networks: Finite Memory and Matrix Geometric Recursions," December 1989.
9. Pao-Ta (Paul) Yu, "Design of Stack Filters with Specified Invariant Signals and Associative Memory Behavior," December 1989.
10. Liang-Chien Lin, "Theory of and Parallel Algorithms for Stack Filters," December 1990. Supervised jointly with George B. Adams.
11. Sherry X. Wei, "Architecture and Buffer Management Policies in Fast Packet Switching" May 1992.
12. Jisang Yoo, "Stack Filters: Design Algorithms and Applications," May 1993.
13. Kwun-Nan (Kevin) Lin, "Surface and 3D Triangular Meshes from Planar Cross Sections," May 1997.
14. Qiwei Xiao, "Modeling of Long-term Dependent VBR Video Sources and Implementation of Web-Based Network Management," August 1997.
15. Ilya Shmulevich, "Properties and Applications of Monotone Boolean Functions and Stack Filters," August 1997.
16. Jianping Xu, "Performance Analysis of Interfaces between Networks and a Recursive Solution to Two-Dimensional QBD Processes," December 1998.
17. Jr-Jen Huang, "The Use of Human Visual System Models in the Design of Optimal Stack Filters," May 1999.
18. Po-Hao Chang, "Performance Analysis of a Hybrid WDMA/CDMA All-Optical Network," May 2000.
19. Seema Bandyopadhyay, "Energy Efficiency and Spatiotemporal Sampling in Wireless Sensor Networks," May 2004.
20. Qingjiang Tian, "Distributed Data Collection, Detection, and Estimation in Sensor Networks," August 2006.

M.S. Thesis Supervision Completed:

1. M. Gabbouj, "Optimal Stack Filter Examples and Positive Boolean Functions," Dec. 1986.
2. A. Hydrie, "Interactive Video Delivery over ATM (Asynchronous Transfer Mode) Networks," May 1996.
3. H. Abdur-Rahman, "Netscope: Network Status Monitoring and Prediction using WBEM," May 2000.
4. A.C. Ault, "Evaluation of Received Signal Strength for Localization in Sensor Networks," December 2005.

M.S. Students Currently Being Supervised:

1. None at this time.

Ph.D. Students Currently Being Supervised:

1. Xuan Zhong, Sampling and Reconstruction in Ad-hoc Networks; Expected completion date: August 2007
2. Murat Senel, Synchronization in Sensor Networks; Expected completion date: Dec 2007
3. Pablo Navarrete, Sensor Networks; Expected completion date: Dec 2007
4. Vibhav Kapnadak, Sensor Networks; Expected completion date; May 2008.

Courses Developed at Purdue University:

1. EE-647: "Computer Communication Networks," Spring 1983
2. EE-643: "Stochastic Processes in Information Systems," Spring 1985
3. EE-640X: "Nonlinear Digital Signal Processing," Fall 1985
4. EE-290, 390, 490: "Sophomore, Junior, and Senior Participation in EPICS: Engineering Projects in Community Service," Fall 1995, with Leah Jamieson.
5. ECE-495T,U,V: "Sophomore, Junior, Senior, and Graduate Student Participation in Vertically Integrated Projects in Electrical and Computer Engineering," with J.P. Allebach.

Courses Developed at Princeton University:

1. EGR-250, 350, 450: "Sophomore, Junior, and Senior Participation in EPICS: Engineering Projects in Community Service," Fall 2006.

Laboratory Facilities Developed for Courses:

1. The *EPICS Software (1995)* and *EPICS Hardware Prototyping Facilities (1997)*, in support of the EPICS Program at Purdue, with P. Davies, H.G. Dietz, J.L. Gray, L.H. Jamieson, J.D. Jones, K.T. Kornegay, C.-M. Ong.
2. The *EPICS Entrepreneurship Initiative's Laboratory Facilities (2005)* supporting commercial development of products developed by EPICS teams under the EPICS Entrepreneurship Initiative.
3. Laboratory facilities for the *Vertically Integrated Projects Program (2005)*.

Short-Courses and Industry Workshops Organized:

1. “*Strategic and Technology Roadmapping*,” Developed and taught to 40 industry-based attendees for the Japan Advanced Institute for Science and Technology (JAIST), 1/9/2004-1/24-2004, Tokyo Japan. Also counts as the course module for industry workshops on technology roadmapping proposed for the e-Enterprise Center grant “Science and Technology Policy and Planning (STePP).”

External Committee Activities:

1. Dean’s Advisory Council, Colorado State University, 2000-2004.
2. Chester F. Carlson Award Committee, *American Society for Engineering Education*, 2005, three-year term.

University-wide Committee Activities:

1. Priorities Committee (Princeton Univ's Budget Priorities Committee) 1980, 1981
2. Superior Students Committee, 1985 – 1988
3. Visual Arts Committee, 1996 – 1998
4. University Senate, 2001 – 2003
5. Member of Ad-Hoc Strategic Planning Committee for Purdue University, 2001-2
6. Member of the Entrepreneurship Certificate Task Force: responsible for creation of a University-wide program in entrepreneurship learning Certificate, 2004-2006
7. Faculty Affiliate of the Burton D. Morgan Center, 2004-present.

Research Book Contributions and Books Published:

1. PhD Thesis: “Markov Chain Models of Asynchronous Random Multiple Access Networks,” Thesis Advisor: Prof. Bede Liu, Fellow of the IEEE and Member of the NAE, August 1982.
2. E.J. Coyle, “The Theory and VLSI Implementation of Stack Filters,” Chapter appearing in *VLSI Signal Processing, II*, IEEE Press, edited by S. Y. Kung, R. E. Owen, and J. G. Nash, pp. 141-151, 1986. (text for Conference Presentation [21])
3. J. Zhang and E.J. Coyle, “Transient Analysis of the M(t)/M(t)/1 Queue,” Chapter 36 in “*Numerical Solutions of Markov Chains*,” pp. 655-658, edited by W.J. Stewart, Marcel Dekker, Inc., New York, 1990. (reprint of Conference Paper [44]).
4. E.J. Coyle, J.-H. Lin, and M. Gabbouj, “Optimal Stack Filtering and the Estimation and Structural Approaches to Image Processing,” Chapter appearing in *Digital Image Processing*, edited by Rama Chellappa, pp. 230-259, IEEE Computer Society Press, 1992. (reprint of Serial Journal Article [13])
5. E.J. Coyle and G.B. Adams III, Co-editors of the Proceedings of the 1997 *IEEE/EURASIP Workshop on Nonlinear Signal and Image Processing*, Mackinac Island, MI, Sept. 7-10, 1997, available on-line at <http://www.ecn.purdue.edu/NSIP/>.
6. E.J. Coyle and L.H. Jamieson, “EPICS: Service Learning by Design,” appeared in *Projects that Matter: Concepts and Models for Service-Learning in Engineering*, E. Tsang, editor, American Association for Higher Education (AAHE), 2000, pp. 59-74
7. L.H. Jamieson, W.C. Oakes, and E.J. Coyle, “EPICS: Serving the Community through Engineering Design Projects,” chapter in *Learning to Serve: Promoting Civil Society Through Service Learning*, Norwell, MA: Kluwer Academic Publishers, 2001.

8. P.M. Buzzanell, E.J. Coyle, L.H. Jamieson, and W.C. Oakes, "Engineering Difference," appeared in "Case Studies for Organizational Communication: Understanding Communication Processes," edited by J. Keyton and P. Shockley-Zalabak; Los Angeles, CA, Roxbury, 2004, pp157-167.

Serial Journal Regular Articles:

1. E. J. Coyle and B. Liu, "A Matrix Representation of CSMA/CD Networks," *IEEE Transactions on Communications*, vol. COM-33, no. 1, pp. 53-64, Jan. 1985.
2. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "Root Properties and Convergence Rates of Median Filters," *IEEE Trans. on Acoustics Speech and Signal Processing*, vol. ASSP-33, no. 1, pp. 230-240, Feb. 1985.
3. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "Median Filtering by Threshold Decomposition," *IEEE Trans. on Acoustics Speech and Signal Processing*, vol. ASSP-32, no. 6, pp. 1183-1188, Dec. 1984. Best Paper Award for Authors under Age 30, ASSP Society, 1986.
4. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "Threshold Decomposition of Multi Dimensional Ranked Order Operations," *IEEE Trans. on Circuits and Systems*, vol. CAS-32, no. 5, pp. 445-451, May 1985.
5. P. D. Wendt, E. J. Coyle, and N. C. Gallagher, "Some Convergence Properties of Median Filters," *IEEE Trans. on Circuits and Systems*, vol. CAS-33, no. 3, pp. 276-286, March 1986.
6. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "The Analog Median Filter," *IEEE Trans. on Circuits and Systems*, vol. CAS-33, no. 3, pp. 94-103, Jan. 1986.
7. P. D. Wendt, E. J. Coyle, and N. C. Gallagher, "Stack Filters," *IEEE Trans. on Acoustics, Speech, and Signal Processing*, vol. ASSP-34, no. 4, pp. 898-911, August 1986.
8. E. J. Coyle, "Rank-Order Operators and the Mean Absolute Error Criterion," *IEEE Trans. on Acoustics, Speech, and Signal Processing*, vol. ASSP-36, no. 1, pp. 63-76, Jan. 1988.
9. S. L. Beuerman and E. J. Coyle, "The Delay Characteristics of CSMA/CD Networks," *IEEE Transactions on Communications*, vol. COM-36, no. 5, pp. 553-563, May 1988.
10. E. J. Coyle and J.-H. Lin, "Stack Filters and the Mean Absolute Error Criterion," *IEEE Trans. on Acoustics, Speech, and Signal Processing*, vol. ASSP-36, no. 8, pp. 1244-1254, August 1988.
11. S. L. Beuerman and E. J. Coyle, "State Space Expansions and the Limiting Behavior of Quasi-Birth-Death Processes," *Advances in Applied Probability*, vol. 21, no. 2, pp. 284-314, June 1989.
12. J. Zhang and E. J. Coyle, "Transient Analysis of Quasi-Birth-and-Death Processes," *Communications in Statistics: Stochastic Models*, vol. 5, no. 3, pp. 459-496, July-August 1989.
13. E. J. Coyle, J.-H. Lin, and M. Gabbouj, "Optimal Stack Filtering and the Estimation and Structural Approaches to Image Processing," *IEEE Trans. on Acoustics, Speech and Signal Processing*, vol. ASSP-37, no. 12, pp. 2037-2066, December 1989.
14. J.-H. Lin, T. M. Sellke and E. J. Coyle, "Adaptive Stack Filtering under the Mean Absolute Error Criterion," *IEEE Transactions on Acoustics, Speech, and Signal Processing*, vol. ASSP-38, no. 6, pp. 938-954, June 1990.

15. J.-H. Lin and E. J. Coyle, "Minimum Mean Absolute Error Estimation over the Class of Generalized Stack Filters," *IEEE Trans. on Acoustics, Speech, and Signal Processing*, vol. ASSP-38, no. 4, pp. 663-678, April 1990.
16. M. Gabbouj and E. J. Coyle, "Minimum Mean Absolute Error Stack Filtering with Structural Constraints and Goals," *IEEE Trans. on Acoustics, Speech and Signal Processing*, vol. ASSP-38, no. 6, pp. 955-968, June 1990.
17. P.-T. Yu and E. J. Coyle, "Convergence Behavior and N-Roots of Stack Filters," *IEEE Trans. on Acoustics, Speech and Signal Processing*, vol. ASSP-38, no. 9, pp. 1529-1544, September 1990.
18. M. Gabbouj and E.J. Coyle, "On the LP Problem which Finds a MMAE Stack Filter," *IEEE Trans. on Acoustics, Speech and Signal Processing*, vol. ASSP-39, no. 11, pp. 2419-2424, November 1991.
19. M. Gabbouj, E.J. Coyle, and N.C. Gallagher, "An Overview of Median and Stack Filtering," *Circuits, Systems, and Signal Processing*, vol. 11, no. 1, pp. 7-45, January 1992.
20. M. Gabbouj, P.-T. Yu, and E.J. Coyle, "Convergence Behavior and Root Signal Sets of Stack Filters," *Circuits, Systems, and Signal Processing*, vol. 11, no. 1, pp. 171-193, January 1992.
21. J. Zhang and E.J. Coyle, "The Transient Solution of Time-Dependent M/M/1 Queues," *IEEE Trans. on Information Theory*, vol. IT-37, no. 6, pp. 1690-1695, November 1991.
22. G. R. Murthy, M. Kim, and E. J. Coyle, "Equilibrium Analysis of Skip-Free Markov Chains: Nonlinear Matrix Equations," *Communications in Statistics: Stochastic Models*, vol. 7, no. 4, pp. 547-572, 1991.
23. P.-T. Yu and E. J. Coyle, "The Classification and Associative Memory Capability of Stack Filters," *IEEE Trans. on Signal Processing*, vol. 40, pp. 2483-2497, Oct. 1992.
24. P.-T. Yu and E.J. Coyle, "On the Existence and Design of the Best Stack Filter Based Associative Memory," *IEEE Trans. on Circuits and Systems II: Analog and Digital Signal Processing*, vol. 39, no. 3, pp. 171-184, March 1992.
25. J. Yoo, C.A. Bouman, E.J. Delp, and E.J. Coyle, "The Nonlinear Prefiltering and Difference of Estimates Approach to Edge Detection: Applications of Stack Filters," *CVGIP: Graphical Models and Image Processing*, vol. 55, no. 2, pp. 140-159, March 1993.
26. L.C. Lin, G.B. Adams III, and E.J. Coyle, "Stack Filter Lattices," *Signal Processing*, vol. 38, no. 3, pp. 277-297, August 1994.
27. G.B. Adams III, E.J. Coyle, L.C. Lin, L. Lucke, and K.K. Parhi, "Input Compression and Efficient VLSI Architectures for Rank Order and Stack Filters," *Signal Processing*, vol. 38, no. 3, pp. 441-453, August 1994.
28. C. Bajaj, E.J. Coyle, and K.-N. Lin, "Arbitrary Topology Shape Reconstruction from Planar Cross Sections," *CVGIP: Graphical Models and Image Processing*, vol. 58, no. 6, Nov. 1996.
29. J. Yoo, E.J. Coyle, and C.A. Bouman, "Dual Stack Filters and the Modified Difference of Estimates Approach to Edge Detection," *IEEE Trans. on Image Processing*, vol. 6, no. 12, Dec. 1997.
30. E.J. Coyle, L.H. Jamieson, and L.S. Sommers, "EPICS: A Model for Integrating Service-Learning into the Engineering Curriculum," *Michigan Journal of Community Service Learning*, Vol. 4, pp. 81-89, Fall 1997.

31. E.J. Coyle and L.H. Jamieson, "EPICS: Service-Learning by Design," chapter in the monograph, *Projects that Matter: Concepts for Service-Learning in Engineering*, American Association for Higher Education, ISBN 1-56377-019-9, Fall 1998.
32. J. Yoo, K.L. Fong, J.-J. Huang, E.J. Coyle, and G.B. Adams, "Fast Algorithms for Designing Stack Filters," *IEEE Transactions on Image Processing*, Vol. 8, No. 10, pp. 1014-1028, August 1999.
33. I. Shmulevich, O. Yli Harja, E.J. Coyle, D. Povel, K. Lemstrom, "Perceptual Issues in Music Pattern Recognition -- Complexity of Rhythm and Key Finding," *Computers and the Humanities*, Vol. 35, No. 4, Kluwer Academic Publishers, pp. 23-35, 2001.
34. S. Bandyopadhyay and E.J. Coyle, "Minimizing Communication Costs in Hierarchically-clustered Networks of Wireless Sensors," *Computer Networks*, Vol. 44, Issue 1, pp. 1-16, January 2004.
35. E.J. Coyle, L.H. Jamieson, and W.C. Oakes, "EPICS: Engineering Projects in Community Service," *International Journal of Engineering Education*, Vol. 21, No. 1, pp. 139-150, January 2005.
36. S. Bandyopadhyay and E.J. Coyle, "Spatio-Temporal Sampling Rates and Energy Efficiency in Wireless Sensor Networks," *IEEE/ACM Transactions on Networking*, Vol. 13, No. 6, pp. 1339-1352, December 2005.
37. E.J. Coyle, L.H. Jamieson, and W.C. Oakes, "Integrating Engineering Education and Community Service: Themes for the Future of Engineering Education," *Journal of Engineering Education*, Vol. 95, No. 1, pp. 7-12, January 2006 (invited paper).
38. Q.-J. Tian, S. Bandyopadhyay, and E.J. Coyle, "Designing Directional Antennas to Maximize Spatio-temporal Sampling Rates in Multi-hop Clustered Sensor Networks," *Journal of Internet Technology*, Vol. 8 No. 1, Jan 2007 (invited paper).
39. Q.-J. Tian and E.J. Coyle, "A MAC-Layer Retransmission Algorithm Designed for the Physical Layer Characteristics of Clustered Sensor Networks," *IEEE Transactions on Wireless Communications*, to appear.
40. S. Bandyopadhyay and E.J. Coyle, "Stochastic Properties of Mobility Models in Mobile Ad-Hoc Networks," *IEEE Transactions on Mobile Computing*, to appear.
41. Q.-J. Tian and E.J. Coyle, "Optimal Distributed Detection in Clustered Wireless Sensor Networks: The Weighted Median," *IEEE Transactions on Signal Processing*, to appear.

Pending Journal Publications:

1. X. Zhong and E.J. Coyle, "The Design and Implementation of a Testbed for Heterogeneous Wireless Networks and Services," manuscript in preparation.
2. P. Navarette Micheleni and E.J. Coyle, "On the Convergence Rates of Multigrid Algorithms for In-Network Solution of PDEs," manuscript in preparation.

Conference Proceedings and Presentations:

1. E. J. Coyle and P. Warter, "A System for Electronic Type," *Proceedings of the 1979 IEEE Delaware Bay Microcomputer Conference*, Newark, DE, pp. 79-84, March 1979.
2. E. J. Coyle and B. Liu, "Calculation of the Stability Characteristics and Buffer Requirements of CSMA/CD Networks," *Proceedings of the 1982 International Conference on Communications*, Philadelphia, PA, pp. 7F.1.1-7F.1.5, June 1982.

4. E. J. Coyle and B. Liu, "A Matrix Representation of CSMA/CD Networks - the Simplest Case," *Proceedings of the 1983 International Conference on Communications*, Boston, MA, pp. C.5.1.1-C.5.1.4, June 1983.
5. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "Root Properties and Convergence Rates of Median Filters," *Proceedings of the Twenty-First Allerton Conference on Communication, Control, and Computing*, pp. 1024-1033, Monticello, IL, Oct., 1983.
6. E. J. Coyle and A. A. Lazar, "Optimal Flow Control in a CSMA/CD Environment," *Proceedings of the Twenty-First Allerton Conference on Communication, Control, and Computing*, pp. 170-179, Monticello, IL, Oct. 1983.
7. E. C. Bronson, E. J. Coyle, and L. J. Siegel, "Modeling of English Speech for the Design of a Distributed Speech Understanding System," *Proceedings of the 1984 Conference on Acoustics, Speech, and Signal Processing*, pp. 42.6.1-42.6.4, San Diego, CA, March 1984.
8. P. D. Wendt, E. J. Coyle, and N. C. Gallagher, "A Limit on the Number of Passes to a Root for Median Filters," *Proceedings of the 1984 Princeton Conference on Info. Science and Systems*, pp. 378-381, Princeton, NJ, March 1984.
9. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "Median Filtering by Threshold Decomposition," *Proceedings of the 1984 Princeton Conference on Information Science and Systems*, pp. 382-386, Princeton, NJ, March 1984.
10. J. P. Fitch, E. J. Coyle, and N. C. Gallagher, "The Analog Median Filter," *Proceedings of the Twenty-Second Allerton Conference on Communication, Control, and Computing*, pp. 182-191, Monticello, IL, Oct. 1984.
11. S. L. Beuerman and E. J. Coyle, "The Distribution of Delay and Caudal Characteristic Curve of CSMA/CD Networks," *Proceedings of the Twenty-Second Allerton Conference on Communication, Control, and Computing*, pp. 395-404, Monticello, IL, Oct. 1984.
12. P. D. Wendt, E. J. Coyle, and N. C. Gallagher, "Stack Filters: Their Definition and Some Initial Properties," *Proceedings of the 1985 Hopkins Conference on Information Science and Systems*, pp. 378-383, Baltimore, MD, March 1985.
13. S. L. Beuerman, E. J. Coyle, "The Tail of the Waiting Time Distribution of a CSMA/CD Network," *Proceedings of the 1985 IEEE Global Communications Conference*, New Orleans, LA, Dec. 1985.
14. R. L. Hamilton, E. J. Coyle, "Analysis of a Priority CSMA/CD Network," *Proceedings of the 1985 IEEE Global Communications Conference*, pp. 5.5.1-5.5.6, New Orleans, LA, Dec. 1985.
15. N. C. Gallagher, E. J. Coyle, and S. Naqvi, "An Application of Median Filters to Digital Television," *Proceedings of the 1986 Int. Conf. on Acoustics Speech, and Signal Processing*, pp. 2451-2454, Tokyo, Japan, April 1986.
16. E. J. Coyle, "On the Optimality of Rank-Order Operations," *Proceedings of the 1986 Int. Conf. on Acoustics, Speech, and Signal Processing*, pp. 2539-2542, Tokyo, Japan, April 1986.
17. J. P. Allebach, D. W. Sweeney, J. P. Fitch, N. C. Gallagher, and E. J. Coyle, "Optical Implementation of Median Filters," presented at the *1985 Annual Meeting of the Optical Society of America*, Washington, DC, October 14-18, 1985.
18. R. L. Hamilton and E. J. Coyle, "A Two-Hop Packet Radio Network with Product-Form Solution," *Proc. of the 1986 Conf. on Information Science and Systems*, pp. 871-876, Princeton, NJ, March 19-21.

19. S. L. Beuerman and E. J. Coyle, "Closed Form Recursive for the Stationary Probability Vector of a Quasi-Birth-Death Process with a Guard State," *Proc. of the 1986 Conf. on Information Science and Systems*, pp. 460-464, Princeton, NJ, March 19-21, 1986.
20. E. J. Coyle, "On the Optimality of Multi-Level Rank Order Operations," *Proc. of the 1986 Conf. on Information Science and Systems*, pp. 705-710, Princeton, NJ, March 19-21, 1986.
21. E. J. Coyle and S. L. Beuerman, "Recursive and Matrix Geometric Solutions in CSMA/CD Networks and Quasi-Birth-Death Processes," presented at the *1986 Operations Research Conference*, Miami, FL, Oct. 27-29, 1986.
22. E. J. Coyle, "The Theory and VLSI Implementation of Stack Filters," presented at the *1986 IEEE Workshop on VLSI Signal Processing*, Los Angeles, CA, Nov., 1986; *VLSI Signal Processing, II*, IEEE Press, ed. S.-Y. Kung, R.E. Owen, and J.G. Nash, pp. 141-151, New York, NY, 1986.
23. E. J. Coyle, "Choosing the Stack Filter that Minimizes the Mean Absolute Error Criterion," *Proceedings of the Twenty-fourth Allerton Conference on Communication, Control, and Computing*, pp. 373-382, Monticello, IL, Oct. 1-3, 1986.
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 68. J.-J. Huang and E.J. Coyle, “Perceptually Optimal Restoration of Images with Stack Filters,” *Proceedings of the 1997 IEEE/EURASIP Workshop on Nonlinear Signal and Image Processing*, Mackinac Island, MI, Sept. 7-10, 1997.
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 76. E.J. Coyle, “Stack Filter Design Algorithms and Models of the Human Visual System,” Invited Plenary Talk at the *1998 IEEE/EURASIP Workshop on Nonlinear Model Based Image Analysis*, Springer-Verlag, Glasgow Scotland, July 1-3, 1998.
 77. I. Shmulevich and E.J. Coyle, “On the Structure of Idempotent Monotone Boolean Functions,” *Proceedings of the 1998 IEEE/EURASIP Workshop on Nonlinear Model Based Image Analysis*, Springer-Verlag, Glasgow Scotland, July 1-3, 1998.

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79. W.C. Oakes, E.J. Coyle and L.H. Jamieson, "EPICS: A Model of Service-Learning in an Engineering Curriculum," *2000 ASEE Annual Conference and Exposition: Engineering Education beyond the Millennium*, St. Louis, MO, June 18-21, 2000.
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84. L.H. Jamieson, W.C. Oakes, and E.J. Coyle, "EPICS: Documenting Service Learning to Meet EC-2000," *2001 Frontiers in Education Conference*, Reno NV, Oct. 10-13, 2001.
85. J. M. Duckles and E.J. Coyle, "The Purdue Center for Technology Roadmapping: A Resource for Research and Education in Technology Roadmapping," *Proceedings of the IEEE International Engineering Management Conference*, St. Johns College, Cambridge, UK; August 18-20, 2002.
86. C. Rosenberg and E.J. Coyle, "Secure Networking and Satellite/Wireless Communications for e-Fleet Support," *Proceedings of the American Society of Naval Engineers Symposium on State of the Art Fleet Support*, Bloomington, IN, May 14-16, 2002.
87. E.J. Coyle and J.M. Duckles, "The Purdue Center for Technology Roadmapping: A Resource for Research and Education in Technology Roadmapping," *Proceedings of the International Conference on Advances in Infrastructure for e-Business, e-Science, e-Education, and e-Medicine on the Internet (SSGRR 2002)*, L'Aquila, Italy; July 28 – August 4, 2002.
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89. S. Bandyopadhyay and E.J. Coyle, "An Energy Efficient Hierarchical Clustering Algorithm for Wireless Sensor Networks," *Proceedings of the 22nd Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM 2003)*, San Francisco, CA, March 30 – April 3, 2003.

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91. E.J. Coyle, L.H. Jamieson, and W.C. Oakes, "Creation and Evaluation of the National EPICS Program," *Proceedings of the Joint Meeting of the 6'th World Federation of Engineering Organizations and the 2'nd ASEE International Colloquium on Engineering Education*, Nashville, TN, June 20 – 25, 2003 (invited paper).
92. S. Bandyopadhyay and E.J. Coyle, "Spatio-Temporal Sampling Rates for Wireless Sensor Networks," *IEEE Vehicular Technology Conference: Symposium on Wireless Ad-hoc, Sensor and Wearable Networks*, Orlando, FL, October 4 – 9, 2003.
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94. Q. Tian, S. Bandyopadhyay, and E.J. Coyle, "Performance of 802.11 DCF in Clustered Ad Hoc Sensor Networks," *Proceedings of the 2004 International Conference on Computing, Communications and Control Technologies (CCCT 2004)*, Austin, TX, August 14-17, 2004.
95. A. Ault, X. Zhong, and E.J. Coyle, "K-Nearest-Neighbor Analysis of Received Signal Strength Distance Estimation Across Environments," *Proceedings of the First Workshop on Wireless Network Measurements (WinMee 2005)*, Trentino, Italy, April 3, 2005.
96. R.J. Glotzbach, E.J. Coyle, N.S. Bingham, "e-Stadium: Wireless Football Infotainment Applications," *Proceedings of the ACM SIGGRAPH 2005 Annual Conference and Exposition*, Los Angeles, CA, July 31 – Aug 4, 2005.
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98. Q.-J. Tian and E.J. Coyle, "A MAC-Layer Retransmission Algorithm Designed for the Physical-Layer Characteristics of Clustered Sensor Network," *Proceedings of the Third International Workshop on Measurement, Modeling, and Performance Analysis of Wireless Sensor Networks – SenMetrics 2005*, San Diego, CA, July 21, 2005.
99. X. Zhong and E.J. Coyle, "Nonhomogeneous Poisson Sampling and Reconstruction in Clustered Sensor Networks," *Proceedings of the Seventh IASTED International Conference on Signal and Image Processing*, Honolulu, HI, August 15-17, 2005.
100. Q.-J. Tian and E.J. Coyle, "Optimal Distributed Detection in Clustered Wireless Sensor Networks: The Weighted Median," *25th Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM 2006)*, Barcelona, Spain, April 2006.
101. Q.-J. Tian, S. Bandyopadhyay, and E.J. Coyle, "Effect of Directional Antennas on Spatiotemporal Sampling in Clustered Ad Hoc Sensor Networks," *2006 IEEE Wireless Communications and Networking Conference*, Las Vegas, NV, April 3-6, 2006.
102. X. Zhong, H.-H. Chan, T.-J. Rogers, C. Rosenberg, and E.J. Coyle, "The Development and eStadium Testbeds for the Research and Development of Wireless Services for Large-scale Sports Venues," *2nd International IEEE/Create-Net Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities, Barcelona, Spain, March 1-3, 2006*.

103. E.J. Coyle, N.I. Clement, and J. Garton Krueger, "Creating an Innovation Continuum in the Engineering Curriculum: EPICS and the EPICS Entrepreneurship Initiative," *Proceedings of the 2006 ASEE Annual Conference and Exposition*, Chicago, IL, June 18-21, 2006.
104. E.J. Coyle, J.P. Allebach, and J. Garton Krueger, "The Vertically-Integrated Projects (VIP) Program in ECE at Purdue: Fully Integrating Undergraduate Education and Graduate Research," *Proceedings of the 2006 ASEE Annual Conference and Exposition*, Chicago, IL, June 18-21, 2006.
105. Q.-J. Tian and E.J. Coyle, "Optimal Distributed Estimation in Clustered Sensor Networks," *Proceedings of the 2006 Int. Conf. on Acoustics Speech, and Signal Processing*, Toulouse, France, May 15-19, 2006.
106. S. Bandyopadhyay, E.J. Coyle, and T. Falck, "Stochastic Properties of Mobility Models in Mobile Ad Hoc Networks," *2006 Conference on Information Science and Systems*, Princeton, NJ, March 22-24, 2006.
107. R. Khosla, X. Zhong, G. Khanna, S. Bagchi, E.J. Coyle, "Reliable Push-Pull based Data Dissemination for Low Energy Sensor Networks," submitted to the *International Conference on Dependable Systems and Networks (DSN 2006)*, Philadelphia, PA, June 25-28, 2006.
108. N.I. Clement, E.J. Coyle, and R.J. Steuterman, "A Partnership between Purdue's Office of Technology Commercialization and the EPICS Entrepreneurship Initiative: Providing Sustainable Income to Area Non-Profits through the Commercialization of EPICS Products," *2006 Association of University Technology Managers (AUTM) Annual Meeting*, Orlando, FL, Mar 2-4, 2006.
109. C. Hoffmann, E. Swain, Y. Xu, T. Downar, L. Tsoukalas, P. Top, M. Senel, M. Bell, E. Coyle, B. Loop, O. Wasynczuk, and S. Meliopoulos, "DDDAS For Autonomic Interconnected Systems: The National Energy Infrastructure," *International Conference on Computational Science (ICCS 2006)*, Reading UK, May 28-31, 2006.
110. X. Zhong, H.-H. Chan, T.-J. Rogers, C. Rosenberg, and E.J. Coyle, "eStadium – The Living Lab," *Proceedings of Infocom 2006*, Barcelona, Spain, April 23-28, 2006.
111. P. Navarrete and E.J. Coyle, "Intergrid Operators for Optimal Convergence of Multigrid Algorithms," *2006 SIAM Conference on Analysis of Partial Differential Equations*, Boston, MA, July 10-12, 2006.
112. X. Zhong and E.J. Coyle, "eStadium: A Wireless "Living Lab" for Safety and Infotainment Applications," *ChinaCom 2006*, Beijing, China, Oct 25-27, 2006.
113. N. Clement and E.J. Coyle, "A University-Community Collaboration that Creates an Innovative Model for Social Entrepreneurship," *Proceedings of the 2007 Conference of the United States Association for Small Business and Entrepreneurship*, Orlando, FL, Jan 11-14, 2007.
114. R. Khosla, G. Khanna, X. Zhong, S. Bagchi, and E.J. Coyle, "Comparison of SPIN-based Push-Pull Protocols," *Proceedings of the IEEE Wireless Communications and Networking Conference 2007*, Hong Kong, China, March 11-15, 2007. (to appear)
115. X. Zhong, R. Khosla, G. Khanna, S. Bagchi, and E.J. Coyle, "Data-Centric Routing in Sensor Networks: Single-hop Broadcast or Multi-hop Unicast?" *Proceedings of the 2007 IEEE 65'th Vehicular Technology Conference*, Dublin, Ireland, April 22-25, 2007. (to appear)

- 116.P. Navarrete and E.J. Coyle, "The Effect of Intergrid Operators on Multigrid Convergence," *Computational Imaging Conference* within the *IS&T/SPIE Symposium on Electronic Imaging*, San Jose, CA, Jan 28-Feb 1, 2007. (to appear)

Recent Invited Presentations (Last five years only):

1. "The Purdue Center for Technology Roadmapping," Innovation Roadmapping Workshop, La Jolla, CA, April 2002.
2. "Technology Roadmapping: An Overview of Research," Distinguished Lecture Series, Naval Surface Warfare Center – Crane Division, Crane, IN, July 25, 2002.
3. "Entrepreneurship Activities at Purdue," Technology Symposium and Fellows Program, National Network for Technology Entrepreneurship and Commercialization (N2TEC), University of Southern California, Feb 20-22, 2003.
4. "The Engineering Projects in Community Service Program," Bernard M. Gordon Prize Lecture, the National Academy of Engineering, Washington DC, October 9, 2005.
5. "The EPICS Entrepreneurship Initiative," the NCIIA Idea-to-Venture Workshop at the Illinois Institute of Technology, Chicago IL, October 29, 2005.
6. "Research in Wireless Communications and Networking," Conference on Wireless Technologies, Indiana Innovation Network, Ball State University, Nov 9, 2005.
7. "Wireless Sensor Networks," CS Department, UCLA, January 12, 2006.
8. Session Chair, Wireless Networks I, ChinaCom 2006.
9. "The Vertically-Integrated Projects Program: Fully Integrating Undergraduate Education and Research," presented at the TKE-Sponsored National Symposium on Engineering Education, Tsinghua University, Beijing, China, Oct 30, 2006. This symposium was attended by approximately 150 faculty, academic administrators, and company representatives from around China.
10. "The Vertically-Integrated Projects Program: Fully Integrating Undergraduate Education and Research," Presented at five universities in Taiwan: National Chung Cheng University, Nan Kai Institute of Technology, National Chi Nan University, National I-Lan University, and National Dong Hwa University. Invited guest of the Ministry of Education, Taiwan.

Consulting Activities:

Information Science and Systems, Delco Electronics, General Dynamics, Texas Instruments, Los Alamos National Lab, Motorola, NSWC/Crane, International Technology Strategy Partners, Storage Network Industry Association, Raytheon.

Start-Up Companies:

VP for Technology of SenMetrics, Inc.: Develop products supporting the application of research in sensors and sensor networks to improve the productivity of farms.

Diversity Workshops

1. Multicultural Diversity Forum, Schools of Engineering, 2-day workshop, March 1998
2. Gender Diversity Forum, Schools of Engineering, 2-day workshop, March 5-6, 2000
3. Continuing the Journey Forum, Schools of Engineering, 1-day workshop, March 6, 2001

Patents, Servicemarks, and Trademarks:

1. U.S. Patent #4,868,773: (with J. P. Fitch, N. C. Gallagher, R. G. Harber, and S. C. Bass), "Filtering by Threshold Decomposition," 1990. Assignee: Purdue University
2. E.J. Coyle and L.H. Jamieson, *Servicemarks for the Engineering Projects in Community Service (EPICS) Program*, registered with the US Patent and Trademark Office on January 25, 2000; Certificate No. 2,310,451

Service within the School of Electrical and Computer Engineering:

1. PEEII - Faculty Representative for GTE, 9/83 - 9/84.
2. PEEII - Faculty Representative for TRW, 9/87 - 9/90.
3. PEEII - Faculty Representative for Northern Telecom, 9/90 - 9/92.
4. HKN Faculty Advisor, 1983-1986.
5. Technical Program Organizer for Spring 1989 PEEII Workshop.
6. Faculty Advisor for ECE Graduate Student Association, 8/92-8/98.
7. Faculty Advisor for ECE Student Advisory Committee, 10/96-12/97.
8. Member of the Qualifying Examination Committee, 2002-2004.
9. Chair of the Qualifying Examination Committee, 2004-2006.

Service to Purdue University and the State of Indiana:

1. Member of the Working Group for the 21st Century Fund for Science and Technology, Spring 2000 – Spring 2003; This working group organized a lobbying effort for the successful (state) legislative renewal of the *21st Century Research and Technology Fund*.
2. Co-organizer (Lead organizers: John Schneider and Jeff Gunsher) of Purdue's Information Technology Workshops, October 4, 2000 and October 24, 2001. The purpose of the workshops was to make Purdue's capabilities in Information Technology Research better known throughout the state of Indiana. This effort resulted in a web site that provides access to Purdue's IT researchers and the presentations from the workshop. Please see: <http://www.ecn.purdue.edu/ITresearch/>
3. Member of the organizing committee for the Research at Indiana display booth at Supercomputing 2000, 11/4/00-11/10/00, Dallas, TX.

Representation of Purdue University at Media Events:

1. Represented Purdue at and made a 15 minute speech as part of the public ceremony marking the launch of the \$2.5M Knowledge Projection research project involving Purdue, IU, NSWC/Crane and EG&G. This event was televised and was attended by members of the IN Congressional delegation.