

Randal T. Abler

**Associate Director of the Arbutus Center
and the Vertically-Integrated Projects Program,
Principal Research Engineer**

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EARNED DEGREES

PhD, Georgia Institute of Technology,
School of Electrical and Computer Engineering, 2000

MSEE, Georgia Institute of Technology, School of Electrical Engineering, 1992

BEE, Georgia Institute of Technology, School of Electrical Engineering, 1986

EMPLOYMENT

2008 - present Georgia Institute of Technology,
Associate Director of the Arbutus Center and Vertically-Integrated Projects Program

2000 - 2008 Georgia Institute of Technology, Assistant Professor,
School of Electrical and Computer Engineering, Georgia Tech Savannah Campus

1997 - 2000 Georgia Institute of Technology, Research Engineer II

1987 - 1997 Georgia Institute of Technology, Research Engineer I

1986, 1987 Graduate Internship, Lockheed Georgia Antenna Lab

AWARDS AND HONORS

Georgia Tech “Class of 1934 Outstanding Innovative Use of Education Technology Award”
and \$7,500 honorarium (April 2005)

Adjunct Faculty, Skidaway Institute of Oceanography, Nov. 2005 - 2010

TEACHING

PhD Students Graduated

Lane Thame (ECE), PhD defended Spring 2012, “Globalizing Internet Security with a Distributed Firewall and Active Response Architecture”. Research & Development - Software Development Engineer, Tripwire, beginning spring 2013.

Ana Goulart (ECE), PhD defended Spring 2005, “Signaling Architectures for the Interaction of the Session Initiation Protocol and Quality of Service for Internet Multimedia Applications”,

Assistant Professor of Engineering Technology and Industrial Distribution at Texas A&M University beginning fall 2006.

Sita Krishnakumar (ECE), PhD defended May 2008, “Intelligent Actor Mobility in Wireless Sensor and Actor Networks”, graduated Aug, 2008. Senior Manager – Product with Entrayn Education Technologies, Chennai, India, beginning April 2013.

PhD Students Currently Supervised

Paul Garver (co-advised with Ed Coyle), “Theory and Implementation of Distributed Cognitive Radio Systems,” Expected completion: August 2017.

Other Teaching Activities

Educational Innovation:

A three year, five million dollar award from the Helmsley Trust was made to Ed Coyle (PI) and Randal Abler (co-PI) on 1/1/2015. Using the funds from Helmsley, GT created and funded a 20 university consortium, creating subawards from GT to those universities to fund both dissemination and evaluation work. Each of the sites was visited by either Dr. Coyle or Dr. Abler, and the VIP concept explained in depth, as well as funding and other program mechanisms initiated. Dr. Abler has served as the program manager for all funded sites, handling contract negotiation, budget allocations, awards of supplemental budgets, and managing reporting expectations from the PI's, and re-allocating funds on a 6-month basis as required by Helmsley.

Dr. Abler has developed the teaching techniques and infrastructure for project teams to effectively use peer learning to develop long-term strategies for information technology (IT) systems, including public web servers, databases, and other IT services. These skills include hands-on responsibilities in areas ranging from system installation, to network security aspects, to development verses production software practices. Through the Vertically-Integrated Projects (VIP) program, this knowledge becomes embedded in a team's experience and is enhanced with appropriate mentoring.

Dr. Abler continues to run the Intelligent Digital Communications VIP team, which completed a 2 year, approximately \$300k project with Bit-Systems Inc, and has received additional funding from Harris Corporation. The team combines research in spectrum usage, telecommunication theory, signal processing, digital communications, embedded systems, and sensor nets to create and undergraduate through PhD research experience in high emitter-density environments.

SCHOLARLY ACCOMPLISHMENTS

Book Contributions:

- 1) E.J. Coyle, J.V. Krogmeier, R.T. Abler, A. Johnson, S. Marshall and B.E. Gilchrist, “The Vertically-Integrated Projects (VIP) Program: Leveraging Faculty Research Interests to Transform Undergraduate STEM Education,” Chapter in *Transforming Institutions: Undergraduate STEM Education for the 21st Century*, edited by G.C. Weaver, W.D. Burgess, A.L. Childress, and L. Slakey; Purdue University Press, West Lafayette, IN 2016; pp. 223-234.

- 2) R.T. Abler, E.J. Coyle, A. Kiopa, and J. Melkers, "Team-based Software/System Development in a Vertically-Integrated, Project-Based Course," Chapter in *Advanced Information Technology in Education*, edited by Khine Soe Thaug, Springer, New York, 2012, pp. 286-294.

Refereed Journal Publications

- 1) M.B. Woods, C.O Alford, R.M Pitts, P.R. Bingham, R.T. Abler, and S.R. Wachtel, "Digital Emulation Technology Laboratory: A facility for real-time KEW simulation and testing", *Transactions of the Society for Computer Simulation*, vol. 10, no. 2, pp 72-102, June 1993.
- 2) J. Copeland, R. Abler, and K. Bernhardt, "IP flow identification for IP traffic carried over switched networks", *Computer Networks and ISDN Systems*, 2096 (1998).
- 3) S.H. Jeong, M. Choi, R. Abler, H. Owen, J.A. Copeland and J. Sokol, "QoS Support for Real-Time Applications Using the Integration of RSVP/IntServ and DiffServ", *IFIP-TC6IEU Networking 2000*, May 2000.
- 4) S.-E. Jeon, R.T. Abler, J.A. Copeland and Y. Pan, "Path Selection with Class Distribution Information in the Integrated Network", *IEEE Communications Letters*, vol 6, no. 2, February 2002.
- 5) R. Abler, H. Owen and G. Riley, "University Methodology for Internetworking Principles and Design Projects", *IEEE Transactions on Education*, vol. 46, no. 2, pp. 218-225, May 2003.
- 6) S.-E. Jeon and R. Abler, "Formulation and Optimization of the connection Preemption Problem", *Computer Communications*, vol. 27, no. 3, pp. 253-261, Feb 2004.
- 7) A. Goulart and R. Abler, "On Overlapping Resource Management and Call Setup Signaling: a New Signaling Approach for Internet Multimedia Applications", *Computer Communications*, vol. 28, no. 8, pp. 851-863, May 2005.
- 8) R. Abler and I. Wells, "Distributed Engineering Education: Evolution of the Telecollaboration Station for Individualized Distance Learning", *IEEE Transactions on Education*, vol. 48, no. 3, pp. 490-496, Aug 2005.
- 9) R. T. Abler, D. Contis, J. Grizzard and H. Owen, "Georgia Tech 'Hands On' Network Security Laboratory", *IEEE Transactions on Education*, vol. 49, no. 1, pp. 82-87, Feb 2006.

Refereed Conference Proceedings

- 1) C.O. Alford, R.T. Abler, W.S. Tan and A.H. Register, "Hardware-in-the-loop testing of KEW processors", *Proceedings of the 1990 Summer SCS Missile Simulation Conference*, pp. 938-943 (July 16-18, 1990).
- 2) S. Wang, H. Zheng, R. Abler, and J.A. Copeland, "High-quality videoconferencing over an ATM network", *Conf on Implementation Management, and Provisioning of Videoconferencing*, pp 65-78, May 1998.
- 3) R. Abler and G. Wells, "Supporting H.323 video and voice in an enterprise network", *1st Conference on Network Administration*, Proceedings, pp 23-30 April 1999.
- 4) M. Arpaci, R. Abler and J.A. Copeland, "Improving the marking probability of RED", *Proceedings of the Applied Telecommunication Symposium (ATS'00)*, pp 55-60, April 2000.

- 5) S.-E. Jeon, R. Abler and A. Goulart, "The Optimal Connection Preemption Algorithm in a Multi-Class Network", *Proceedings of the IEEE ICC2002 Conference*, New York, May 2002.
- 6) N. Athanasiades, R. Abler, J. Levine, H. Owen and G. Riley, "Intrusion Detection Testing and Benchmarking Methodologies", *IEEE Information Assurance Workshop*, pp. 63-72, Darmstadt, Germany, March 2003.
- 7) A. Goulart and R. Abler, "Session Initiation Protocol (SIP) and Quality of Service (QoS) Interaction for Internet Multimedia Applications" (awarded "best paper of session"), *CCCT 2003*, pt. 2, vol. 2, pp 393-398, Orlando, FL, August 2003.
- 8) R. Abler and I. G. Wells, "Issues and Architecture for a Distributed Education Campus", *LASTED KSCE 2004*, U.S. V.I., November 2004.
- 9) A. Goulart and R. Abler, "On the interaction of SIP and admission control: an inter-domain call authorization model for Internet multimedia applications", *IEEE International Workshop on IP Operations and Management (IEEE IPOM 2005)*, October 2005.
- 10) J. L. Thames, R. Abler, and A. Saad, "Hybrid Intelligent Systems for Network Security", *44th ACM Southeast Conference*, Orlando, FL, March 2006.
- 11) R. Abler and I. G. Wells, "Work in Progress: Rapid and Inexpensive Archiving of Classroom Lectures", *2006 Frontiers in Education Conference*, San Diego, CA, October 2006.
- 12) J. L. Thames and R. Abler, "Implementing Distributed Internet Security using a Firewall Collaboration Framework", *IEEE Southeast Conference 2007*, Richmond, VA, March 2007.
- 13) S. Krishnakumar and R. Abler, "Intelligent Actor Mobility in Wireless Sensor and Actor Networks", *First IFIP International Conference on Wireless Sensor and Actor Networks (WSAN 2007)*, Albacete, Spain, September 2007
- 14) J. L. Thames, R. Abler, and D. Keeling, "A Distributed Active Response Architecture for Preventing SSH Dictionary Attacks", *IEEE SoutheastCon 2008*, Huntsville, AL, March 2008.
- 15) J. L. Thames, R. Abler, and D. Keeling, "A Distributed Firewall and Active Response Architecture Providing Preemptive Protection", *ACMSE 2008*, Auburn, AL, March 2008.
- 16) J. L. Thames, R. Abler, and E. Moore, "Mentoring Undergraduate Students Preparing for Graduate Study in Engineering – A CREATE Case Study", *2008 Frontiers in Education*, Saratoga Springs, NY, October 2008.
- 17) R. Abler, J. Jackson, and S. Brennan, "High Definition Video Support for Natural Interaction through Distance Learning", *2008 Frontiers in Education*, Saratoga Springs, NY, October 2008.
- 18) J. L. Thames and R. Abler, "Using the Open Source Software Model as a Tool for Teaching Engineers the Skills Needed in the Global Workplace", *2008 Frontiers in Education*, Saratoga Springs, NY, October 2008
- 19) J. Lane Thames, Randal Abler, David Keeling, *Bit Vector Algorithms Enabling High-Speed and Memory-Efficient Firewall Blacklisting*, Proceedings of the ACM Southeast Conference (ACMSE 2009), March 2009.
- 20) R. Abler, J.V. Krogmeier, A. Ault, J. Melkers, T. Clegg, E.J. Coyle, "Enabling and Evaluating Collaboration of Distributed Teams with High-Definition Collaboration Systems," *ASEE Annual Conference and Exposition*, Louisville, KY, June 20-23, 2010.

- 21) J. Lane Thames, Randal Abler, Dirk Schaefer, *Parametric Optimization of Artificial Neural Networks for Signal Approximation Applications*, Proceedings of the ACM Southeast Conference (ACMSE 2011), March 2011.
- 22) R. Abler, E.J. Coyle, A. Kiopa, J. Melkers, "Team-based Software/System Development in a Vertically-Integrated Project-Based Course," *Annual ASEE/IEEE Frontiers in Education Conference*, Rapid City, SD, Oct. 12-15, 2011
- 23) R. Abler, E.J. Coyle, R.A. DeMillo, E. Ivey, M. Hunter, "Team-based Software/System Development in the Vertically-Integrated Projects (VIP) Program," 2011 International Conference on Computers and Advanced Technology in Education (ICCATE 2011), Beijing, China, Nov 3-4, 2011.
- 24) J. Melkers, A Kiopa, R.T. Abler, E.J. Coyle, J.M. Ernst, J.V. Krogmeier, A. Johnson, "The Social Web of Engineering Education: Knowledge Exchange in Integrated Project Teams," Proceeding of the 2012 ASEE Annual Conference and Exposition, San Antonio, TX, June 10-13, 2012.
- 25) E.J. Coyle, R.T. Abler, J. Melkers, and J. Howard, "Learning the Realities of the Research Process: Vertically-Integrated Project Teams," presented at the *Atlanta Conference on Science and Innovation Policy*, Atlanta, GA, Sept. 26-28, 2013.
- 26) J. Melkers, A. Kiopa, R.T. Abler, and E.J. Coyle, "Teaching and Catalyzing Innovation in Vertically-Integrated Projects (VIP) Program," abstract + poster, *2nd Annual STEM Education Research Expo*, Georgia Tech, March 5, 2014.
- 27) P.W. Garver, R.T. Abler, E.J. Coyle, and J. Narayan, "Comparisons of High Performance Software Radios with Size, Weight, Area and Power Constraints," *Ninth ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation & Characterization (WiNTECH 2014)*, Maui HI, Sept. 7, 2014.
- 28) E.J. Coyle, J.V. Krogmeier, R.T. Abler, A. Johnson, S. Marshall and B.E. Gilchrist, "The Vertically-Integrated Projects (VIP) Program – Leveraging Faculty Research Interests to Transform Undergraduate STEM Education," Presented at the *Transforming Institutions: 21st Century Undergraduate STEM Education Conference*, Indianapolis IN, Oct. 23-24, 2014.
- 29) Phanish, Deepa, Paul Garver, Ghaith Matalkah, Tal Landes, Fu Shen, Jesse Dumond, Randal Abler et al. "A wireless sensor network for monitoring the structural health of a football stadium." In *Internet of Things (WF-IoT), 2015 IEEE 2nd World Forum on*, pp. 471-477. IEEE, 2015.
- 30) P. Garver, R. Abler, E.J. Coyle, "Theory and Development of Cross-Layer Techniques for Localization in Environments with Extreme Emitter Densities," *Proceedings of the 2015 Military Communications Conference (MILCOM)*, Tampa, FL, October 26-28, 2015.
- 31) D. Phanish, P. Garver, G. Matalkah, T. Landes, F. Shen, J. Dumond, R. Abler, D. Zhu, X. Dong, Y. Wang, and E.J. Coyle, "Design, Development and Deployment of a Sensor Network for Monitoring the Structural Behavior and Health of a Football Stadium," *Proceedings of the 2015 IEEE World Forum on the Internet of Things*, Milan, Italy, Dec. 14-16, 2015.
- 32) P. Garver, E.J. Coyle, and R.T. Abler, "MAC Layer Assisted Localization in Wireless Environments with Multiple Sensors and Emitters," submitted to the *2017 Wireless Communications and Networking Conference*, San Francisco, CA, March 19-22, 2017.

- 33) E.J. Coyle, R.T. Abler, J. Sonnenberg-Klein, et.al, "Vertically Integrated Projects (VIP) Programs: Multidisciplinary Projects with Homes in Any Discipline," submitted to the *ASEE Annual Conference and Exposition*, Columbus, OH, June 25-28, 2017.
- 34) E.J. Coyle, et.al., "Vertically Integrated Projects (VIP) Programs: Variations in Implementation across Multiple Institutions," Panel for *ASEE Annual Conference and Exposition*, Columbus, OH, June 25-28, 2017.
- 35) J. Sonnenberg-Klein, R.T. Abler, and E.J. Coyle, "Multidisciplinary Vertically Integrated Teams: Social Network Analysis of Peer Evaluations for Vertically Integrated Projects (VIP) Program Teams," submitted to the *ASEE Annual Conference and Exposition*, Columbus, OH, June 25-28, 2017.

Presentations

- 1) Invited Presentation: "Management Issues with Virtual LANs", 1995 Spring Interop Convention, Las Vegas.
- 2) Invited Presentation: "Experiences in Early ATM Networks", 1995 Spring Interop Conference, Las Vegas.
- 3) Invited Presentation: "Yamacraw Research at GTREP", 2001 Yamacraw Days session at Armstrong Atlantic State University.
- 4) "Networking Research at GT Savannah", April 2004, ECE Advisory Board.
- 5) "Georgia Tech Savannah", presentation and campus tour for IEEE Frontiers in Education Conference participants, October 2004.
- 6) "Issues in Deploying Advance Internet Technologies", November 2005, Seminar at Skidaway Institute of Oceanography.
- 7) "High Resolution Classroom Deployment", June 15, 2007 presentation and budget proposal to the University System of Georgia Chancellor demonstrating the need for improved distance learning, and request of \$7.7 million to upgrade the Georgia Tech Savannah related distance learning facilities.
- 8) "High Resolution Classroom Deployment", October, 2007 presentation and budget proposal to the University System of Georgia Board of Regents demonstrating the need for improved distance learning, and request of \$7.7 million to upgrade the Georgia Tech Savannah related distance learning facilities.
- 9) "High Resolution Classroom Deployment", Presentation and panel for the Electrical and Computer Engineering Department Heads Association (ECEDHA), San Diego, Ca, March 2008
- 10) "_Bridging the Intellectual Divide: Integrating Research and Education in the Vertically-Integrated Projects Program", Boise State University, Spring 2015
- 11) "_Bridging the Intellectual Divide: Integrating Research and Education in the Vertically-Integrated Projects Program", Colorado State CS/EE faculty, Spring 2015
- 12) "_Bridging the Intellectual Divide: Integrating Research and Education in the Vertically-Integrated Projects Program", Purdue ECE Faculty, Spring 2015

- 13) "_Bridging the Intellectual Divide: Integrating Research and Education in the Vertically-Integrated Projects Program", Virginia Commonwealth University CoE department heads meeting, Spring 2015
- 14) "_Bridging the Intellectual Divide: Integrating Research and Education in the Vertically-Integrated Projects Program", Rice University ECE Faculty, Fall 2015

SERVICE

Professional Contributions

Reviewed Book: "MPLS: Implementing the Technology", by Eric Gray, 2001, Addison-Wesley

Senior Member, Institute of Electrical and Electronics Engineers (IEEE), 2005 - present.

Program Committee member (reviewer) for 7th *LASTED International Conference on "Internet and Multimedia Systems and Applications"*, IMSA-2003

NSF Review Panel, "Enhancing Access to the Radio Spectrum (EARS)", August 5-6, 2013, Washington D.C.

Campus Contributions

Georgia Tech Research Faculty Senate, Fall 2015 - present

Georgia Tech Institute Research Faculty Promotions Committee, Fall 2015

Arbutus Chair search committee member, summer 2006-spring 2007

GT-Savannah Graduate Recruitment Task Force, Fall 2005

GT-Savannah/Skidaway Coastal Engineering Taskforce, Fall 2005 – Spring 2006

School of Electrical and Computer Engineering Undergraduate Curriculum Committee, Fall 2005- present

GTREP Coordinator, Information Technology and System Support 2001-2003

Presentation on "Computer Engineering" at Introduction to Engineering Class, Armstrong Atlantic State University, Fall 2000

Ph.D./M.S. Committee Service

Ph.D. Thesis Defense: 11 students (Georgia Tech –Electrical and Computer Engineering)

M.S. Reading Committee: 3 students (Georgia Tech –Electrical and Computer Engineering)

Other Contributions

Consultant for the redesign of Skidaway Institute of Oceanography's Information Technology Infrastructure (Sept 2004 - August 2006)

RESEARCH GRANTS AND CONTRACTS

- 1) PI: Harris Corporation, "VIP Partnership Program Membership," Randal Abler, Ed Coyle 1/1/2016-12/31/2018, \$90,000.

- 2) Co-PI and Co-Director - Technology: The Leona M. and Harry B. Helmsley Charitable Trust, "The Vertically Integrated Projects (VIP) Consortium: Achieving Systemic Reform of Higher Education in STEM Fields," Randal Abler, Ed Coyle, (with sub-award/Site Directors from 14 other institutions) Jan 1, 2015 to Dec. 31, 2017, \$5,000,000.
- 3) Co-PI: Cisco Systems, Inc, "VIP Innovation Showcase and Competition," Ed Coyle(PI), J. Sonnenberg-Klein , gift made July 2014 for the 2014-15 AY, \$10,000.
- 4) PI: BIT-Systems, "High Performance Architecture and Algorithms for Software Radio", Randal Abler, Edward J Coyle, 1/1/2013-9/31/2014, \$312,426
- 5) Co-PI: Global GT-FIRE Program, "Creating & Studying a Global Web of Vertically-Integrated Projects (VIP) Programs," Ed Coyle (PI), Julia Melkers, July 1, 2012 – June 30, 2013, \$30,000.
- 6) Co-PI: NSF, "The VIP Program – Integrating Undergraduate Design Projects and Graduate Research", Edward J Coyle, Randal Abler, Julia E Melkers, 1/1/2009 – 12/31/2011, \$67,268
- 7) Co-PI: National Instruments, "The eStadium Sensor Network," Ed Coyle and the eStadium VIP team, Nov. 2010, \$26,626.
- 8) Co-PI: Texas Instruments, "The eStadium SensorNet Project: The College Football Stadium of the Future," Ed Coyle and the eStadium VIP team, Fall 2009, \$7500.
- 9) Co-PI: NSF DUE-0837225, "Collaborative Research: The VIP Program - Integrating Undergraduate Design Projects and Graduate Research," Ed Coyle (GT/PI), Julia Melkers (GT), James V. Krogmeier (PI/Purdue), Saurabh Bagchi (Purdue) and Jan P. Allebach (Purdue), June 1, 2009 – May 31, 2011, \$67,268 for GaTech; \$82,731.53 for Purdue.
- 10) Co-PI: University System of Georgia, "High Definition Distance Learning Classrooms", Gary S. May(PI), J. David Frost, Randal T. Abler, 7/1/2008-6/30/2009, \$200,000.
- 11) Co-PI: GT/COE, Leadership in Undergraduate Engineering Education (LUEE) Phase II, "Sustainable, Scaleable, Widespread Improvements to Engineering Education", Amy Pritchett (PI), Randal Abler, Nelson Baker, Donna Lewellyn, Wendy Newstetter, 2008, \$60,000 total, \$35,000 allocation.
- 12) Co-PI: GT/COE, LUEE Phase 1, "Coherent Design of Engineering Education", Amy Pritchett (PI), Randal Abler, Tom Barnwell, Nelson Baker, Donna Lewellyn, Wendy Newstetter, GT/COE, \$50,000 for Spring 2007, allocation: \$5,000 direct + \$10,000 Arbutus Center.
- 13) Co-PI: NSF "Network Security Vulnerability via Large Scale Simulation", George Riley (PI), Randal Abler, Henry Owen, 9/15/03 – 8/31/06, \$309,000 total, \$111,000 allocation.
- 14) Co-PI: "Real-time wave and current measurements at Tybee Island, GA.", Subcontract to Skidaway Institute of Oceanography as part of the ONR SEA-COOS program, 9/1/03-8/31/05, \$190,000 (PI: Paul Work, Civil and Environmental Engineering).
- 15) PI: Ga. Electronic Design Center, FY 2004, \$42,400.
- 16) PI: Yamacraw, "IP MPLS for optical networks", FY 2001-2003, \$191,000.
- 17) PI: NSF "The Olympics MPEG-II traffic library", R. Abler, R. Hutchins, A. Mukerjee, 1996, \$44,261.

- 18) Cabletron Grant, "IP Multicast & Layer 3 switching", 1997, \$30,000.
- 19) Newbridge Networks Grant, "ATM data network testing & analysis", 1995, \$30,000.