Bryan W. Weber

Contact Information

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Research Interests

Education

The Ohio State University, Columbus, OH

Ph.D., Electrical and Computer Engineering, August 2010

- Thesis Topic: *Design and Analysis of Optimal Task-Processing Agents*
- Candidacy: *Research Problems in Distributed Control for Energy Systems*
- Adviser: Professor Kevin M. Passino
- Area of Study: Control Engineering

M.S., Electrical and Computer Engineering, August 2007

- Thesis Topic: *Optimal Foraging Theory Revisited*
- Adviser: Professor Kevin M. Passino
- Area of Study: Control Engineering

B.S., Electrical and Computer Engineering, June 2004

- *Magna cum Laude*, With Honors in Engineering
- Electrical specialization (emphasis on electromagnetics and digital computers)
- Minor in Computer and Information Systems (programming and algorithms)

Journal Publications

[1] Pavlic, T.P., and K.M. Passino. Distributed and Cooperative Task Processing: Cournot Oligopolies on a Graph. *IEEE Transactions on Cybernetics*. 2013. In press. doi:10.1109/TCYB.2013.2271776

[2] Pavlic, T.P., and K.M. Passino. Generalizing foraging theory for analysis and design. *The International Journal of Robotics Research [Special Issue on Stochasticity in Robotics and Bio-Systems Part 1]*. 30(5):505–523. 2011. doi:10.1177/0278364910396551

[3] Pavlic, T.P., and K.M. Passino. The sunk-cost effect as an optimal rate-maximizing behavior. *Acta Biotheoretica*, 59(1):53–66. 2011. doi:10.1007/s10441-010-9107-8

[4] Pavlic, T.P., and K.M. Passino. When rate maximization is impulsive. *Behavioral Ecology and Sociobiology*, 64(8):1255–1265. August 2010. doi:10.1007/s00265-010-0940-1

[5] Pavlic, T.P., and K.M. Passino. Foraging theory for autonomous vehicle speed choice. *Engineering Applications of Artificial Intelligence*, 22(3):482–489, April 2009. doi:10.1016/j.engappai.2008.10.017

Conference Publications

[6] Kumar, G.P., A. Buffin, T.P. Pavlic, S.C. Pratt, and S.M. Berman. A Stochastic Hybrid System Model of Collective Transport in the Desert Ant *Aphaenogaster cockerelli*. In: *Proceedings of the 16th International Conference on Hybrid Systems: Communication and Control (HSCC 2013)*, April 8–11, 2013.

[7] Pavlic, T.P., and K.M. Passino. Cooperative task-processing networks. In: *Proceedings of the Second International Workshop on Networks of Cooperating Objects (CONET 2011)*, April 11, 2011.

[8] Freuler, R.J., M.J. Hoffmann, T.P. Pavlic, J.M. Beams, J.P. Radigan, P.K. Dutta, J.T. Demel, and E.D. Justen. Experiences with a Comprehensive Freshman Hands-On Course – Designing, Building, and Testing Small Autonomous Robots. In: *Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition*, 2003.

CONFERENCE TALKS

[9] Pavlic, T.P. Stochastic strategies for modeling self-organization in complex systems of social insects. In: 2013 International Symposium on Biomathematics and Ecology Education and Research (BEER 2013), Arlington, VA, October 11–13, 2013.

[10] Pavlic, T.P., and S.C. Pratt. Sequential-sampling models of quorum sensing in house-hunting *Temnothorax* ants. In: *50th Annual Conference of the Animal Behavior Society*, July 28–August 1, 2013.

[11] Pavlic, T.P. Speed–accuracy tradeoffs in *Temnothorax rugatulus* ants: Sequential-sampling models of quorum detection while house hunting. In: *2013 Society for Mathematical Biology Annual Meeting and Conference (SMB 2013)*, June 10–13, 2013.

[12] Pavlic, T.P., and S.C. Pratt. Sequential-sampling models of quorum detection in house-hunting ants. In: *2012 IUSSI-NAS Meeting*, October 5–7, 2012.

CONFERENCE POSTERS

[13] Pavlic, T.P. Physical Stigmergy for Decentralized Constrained Optimization: An Intelligent Lighting Example. In: *Proceedings of the 4th International Conference on Cyber-Physical Systems (ICCPS 2013)*, April 8–11, 2013. Poster abstract.

[14] Pavlic, T.P., S. P. Peddi, P.A.G. Sivilotti, and B.W. Weide. Getting Out of the Way – Safety Verification without Compromise. In: *Proceedings of the 2012 IEEE/ACM Third International Conference on Cyber-Physical Systems (ICCPS 2012)*, April 17–19, 2012. Poster abstract.

[15] Pavlic, T.P., P.A.G. Sivilotti, A.D. Weide, and B.W. Weide. Verification of Smooth and Close Collision-Free Cruise Control. In: *Proceedings of the 2011 Symposium on Control and Modeling Cyber-Physical Systems*, October 20–21, 2011. Poster abstract.

[16] Özgüner, Ü., A. Krishnamurthy, F. Özgüner, K. Redmill, P. Sivilotti, B. Weide, and T. Pavlic. CPS: Autonomous driving in urban environments. In: *Proceedings of the 2011 NSF CPS PI Meeting*, August 1–2, 2011. Poster abstract.

[17] Pavlic, T.P., and K.M. Passino. Cooperative task processing. In: *Proceedings of the ICAM 2009 Symposium: Emergence in Physical, Biological, and Social Systems IV*, November 13, 2009. Poster abstract.

OTHER PRESENTATIONS

[18] Pavlic, T.P., P.A.G. Sivilotti, A.D. Weide, and B.W. Weide. Comments on 'Adaptive Cruise Control: Hybrid, Distributed, and Now Formally Verified'. Tech. report OSU-CISRC-7/11-TR22, The Ohio State University, 2011.

[19] Pavlic, T.P., and K.M. Passino. Cooperative Task-processing Networks: Parallel Computation of Non-trivial Volunteering Equilibria. Tech. report OSU-CISRC-3/11-TR05, The Ohio State University, 2011.

[20] Pavlic, T.P. *Design and Analysis of Optimal Task-Processing Agents.* PhD thesis, The Ohio State University, Columbus, OH, 2010.

[21] Pavlic, T.P. *Optimal Foraging Theory Revisited.* Master's thesis, The Ohio State University, Columbus, OH, 2007.

Teaching Experience

The Ohio State University, Columbus, OH

Instructor **March 2012 to August 2012**

- Instructor for ECE 683: Undergraduate Design Project
  - Students designed retrofitable vehicle-to-vehicle communications system to aid in the development of verifiably safe adaptive cruise control.
  - Design project folded into larger research project on autonomous vehicles in mixed-traffic urban environments.

Teaching Assistant **September 2007 to August 2009**
(sample graded material and student evaluations available upon request)

- Instructor for ECE 327: Electronic Devices and Circuits Laboratory I
  - Autumn 2007, Winter (2) and Spring 2008 (2), Winter (2) and Summer 2009
  - Responsible for 1-hour lecture and supervision of 3-hour laboratory. Students design and implement infrared modem and 8-ohm speaker driver.
  - Authored hundreds of pages of course material archived at http://www.tedpavlic.com/teaching/osu/ece327.
- Grader for ECE 481 Ethics in Electrical and Computer Engineering
  - Autumn 2007 and Autumn 2008
- Instructor for ECE 209: Circuits and Electronics Laboratory
  - Autumn 2008
  - Responsible for lecture and supervision of basic electronics laboratory.
  - Authored material at http://www.tedpavlic.com/teaching/osu/ece209.
- Instructor for ECE 557: Control, Signals, and Systems Laboratory
  - Summer 2008 (2 sections) and Summer 2009
  - Responsible for lecture and supervision of laboratory. Students used Simulink and dSPACE RTI1104 units for linear system control design.
  - Authored material at http://www.tedpavlic.com/teaching/osu/ece557.
- Lab Instructor for ECE 758: Control Systems Implementation Laboratory
  - Spring 2009 (2 sections)
  - Responsible for lecture and supervision of laboratory. Graduate and senior undergraduate students used Simulink, with dSPACE RTI1104 units for analysis of and advanced control implementation for linear and non-linear systems.
  - Authored material at http://www.tedpavlic.com/teaching/osu/ece758.

National Science Foundation GK-12 Graduate Fellow **September 2006 to October 2007**

Developed, implemented, and evaluated daily inquiry-based fourth-grade science lessons for a local inner-city public school class.

Instructor **March 2002 to June 2004**

- Member of Fundamentals of Engineering for Honors instructional team.
- Special graduate teaching appointment as undergraduate.
- Lectured weekly engineering laboratory for ENG H191, H192, and H193.
- Trained in-class undergraduate teaching assistants in laboratory procedure.
- Graded weekly lab reports and provided laboratory exams.

Teaching Assistant **September 2000 to March 2002**

- Assisted Fundamentals of Engineering for Honors instructional team.
- Provided support to first-year engineering students (ENG H191, H192, and H193).
- Graded daily assignments on programming and drafting.
- Developed on-line journal system for Physics Education Research Group (PERG).

Undergraduate Researcher **September 2000 to March 2002**

- Participated in the Europa Undergraduate Research Forum, a part of the Reusable Software Research Group.
- Studied component-based software engineering undergraduate pedagogy.
- Researched changes to RESOLVE/C++ implementation for ANSI compliance.

Grader **September 2001 to December 2001**

- Graded daily electromagnetics assignments (ECE 311).

Professional Experience

Arizona State University, Tempe, AZ

Postdoctoral Scholar **July 2012 to present**

- Supervisor: Professor Stephen C. Pratt
- Novel application of sophisticated quantitative analysis and modeling techniques to animals, with social insects as a particular focus.
- Development of new algorithms for robotics and other autonomous systems based on animal behavior, with focus on distributed decision making.
- Supervision of graduate and undergraduate students in engineering, computer science, and biology in tasks related to biological analysis and modeling as well as technological bio-mimetic design.

The Ohio State University, Columbus, OH

Postdoctoral Researcher **September 2010 to June 2012**

- Funding: National Science Foundation Cyber-Physical Systems (ENG, ECCS)
  - "Autonomous Driving in Mixed-Traffic Urban Environments" (grant #0931669)
  - Supervisor (co-PI): Professor Paolo A. G. Sivilotti
  - PI: Professor Ümit Özgüner
- Development of new approaches to software verification in the context of hybrid-state and hybrid-time dynamical systems.
- Supervision of student design project for novel vehicle-to-vehicle communications systems to assist in adaptive cruise control.

National Instruments, Austin, TX

Hardware R&D Intern for Multifunction DAQ **June 2003 to September 2003**

- Designed final verification test fixture for use with STC2 MIO products.
- Designed and executed study of the effect of varying burn-in time on long-term drift of common industry voltage references.

Hardware R&D Intern for Multifunction DAQ **June 2002 to September 2002**

- Designed and performed validation tests for 16-bit 800 kHz NI-6120 SMIO DAQ.
- Designed high-quality source to use with NI-5411 arbitrary function generator.

IBM Network Storage, Research Triangle Park, NC

Core Systems Software Developer for FlexNAS **June 2001 to September 2001**

- Designed and implemented highly available multihop communications subsystem.
- Participated in software development of various vital box services.

CallTech Communications, Columbus, OH

Information Technology Systems Engineer **June 1997 to May 2001**

- Responsible for the acquisition, setup, and administration of all hardware and software systems supporting NetWalk Internet service and web presence provider.
- Designed and implemented state-of-the-art open-source highly available load-balancing system supporting thousands of virtual servers.
- Developed call-center software for clients such as CompuServe, AOL, and Priceline.

MegaLinx Communications, Dublin, OH

Web Developer and Support Representative **June 1995 to May 1997**

- Produced web content for commercial clients.
- Assisted in administration of UltraSPARC, x86, 680x0, and PowerPC systems.
- Developed multi-platform open-source file-sharing solution.
- Provided technical support for Internet and web presence customers.

Professional Memberships

Institute for Electrical and Electronics Engineers (IEEE), Member, 2002–present

- IEEE Control Systems Society (2004–present)
- IEEE Communications Society (2012–present)
- IEEE Computer Society (2009–present)
- IEEE Intelligent Transportation Systems Society (2011–present)
- IEEE Systems, Man, and Cybernetics Society (2011–present)
- IEEE Robotics and Automation Society (2011–present)

Animal Behavior Society, Member, 2011–present

International Union for the Study of Social Insects, Member, 2012–present

- North American Section (2012–present)

Society for Mathematical Biology, Member, 2012–present

Computer Programming:

- C, C+ +, Java, JavaScript, NetLogo, Pascal, Perl, PHP, Lisp, UNIX shell scripting (including POSIX.2), GNU make, AppleScript, SQL, MySQL, and others

Numerical Analysis:

- MATLAB, R, Maple, Mathematica

Version Control and Software Configuration Management:

- DVCS (Mercurial/MQ, Git/StGit), VCS (RCS, CVS, SVN, SCCS), and others

MATLAB skill set:

- Linear algebra, Fourier transforms, Monte Carlo analysis, nonlinear numerical methods, polynomials, statistics, N-dimensional filters, visualization
- Toolboxes: communications, control system, filter design, genetic algorithm and direct search, signal processing, system identification

Software Verification:

- KeY, PRISM, KeYmaera

Information/Internet Technology:

- Networking (UDP, TCP, ARP, DNS, Dynamic routing), Services (Apache, SQL, MediaWiki, POP, IMAP, SMTP, application-specific daemon design)

Desktop Editing and Productivity Software:

- Vim, Emacs, Eclipse
- TEX (LATEX, BIBTEX, PSTricks),
- Microsoft Office, OpenOffice.org, LibreOffice, Corel WordPerfect, Google Docs
- GIMP, InkScape

Operating Systems:

- Microsoft Windows family, Apple OS X, IBM OS/2, Linux, BSD, IRIX, AIX, Solaris, and other UNIX variants

Awards

National Science Foundation

- GK-12 Graduate Fellowship, 2006–2007
- Graduate Research Fellowship Honorable Mention, 2005

The Ohio State University

- Dean's Distinguished University (DDU) Graduate Fellowship, 2004–2010
- Electrical and Computer Engineering Bradshaw Scholarship, 2002–2004
- Electrical and Computer Engineering Shafstall Scholarship, 2001–2003
- University Scholarship, 1999–2003