Jim Pugh **Curriculum Vitae**

CONTACT INFORMATION

Swarm-Intelligent Systems Group
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RESEARCH INTERESTS

Multi-robot systems, evolutionary robotics, swarm intelligence, distributed robotic search, parallel robotic learning

EDUCATION

École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

Ph.D. Candidate, Computer Science, October 2003 (expected graduation date: June 2008)

- Dissertation Topic: "Synthesis, Modeling, and Exploration of Distributed Robotic Search"
- Advisor: Alcherio Martinoli

California Institute of Technology, Pasadena, California USA

B.S., Electrical and Computer Engineering, June, 2003

HONORS AND AWARDS

Caltech Residence Life Leadership Award, 2003

California Institute of Technology: Graduated with Honors, 2003

ACADEMIC EXPERIENCE

École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland

Graduate Student **October, 2003 - present**
Includes current Ph.D. research, Ph.D. and Masters level coursework, academic paper reviews, and grant proposal drafting.

Association President **March, 2006 - present**
Founder and president of the Graduate Student Association for the Computer and Communication Science department. Active in organizing numerous seminar and panel events, as well as lead representative on multiple academic committees.

Student Research Project Supervisor **June, 2004 - present**
Proposed and supervised numerous research projects for upper-level undergraduate and Masters students.

Teaching Assistant **October, 2004 - present**
Duties have included guest lectures, assignment and exam development, course project supervision, and leading weekly lab exercises.

- Swarm Intelligence, Winter 2004-2006.
- Information Theory, Spring 2007.

California Institute of Technology, Pasadena, California USA

Committee Co-Chair **Winter, 2002-2003**
Acted as student co-chair for the Student-Faculty Committee on Electrical Engineering and Computer Science. Evaluated and proposed changes for Electrical Engineering and Computer Science studies. Faculty co-chair: Robert J. McEliece.

Teaching Assistant **October, 2001 - June, 2003**
Duties included office hours, assignment grading, and teaching weekly review session.

- EE/CS 50, Advanced Digital Design, Fall 2002.
- EE/CS 51, Principles of Microprocessor Systems, Winter 2001-2002, 2002-2003.
- EE/CS 52, Microprocessor Systems Laboratory, Spring 2002, 2003.
- EE/CS 53, Microprocessor Project Laboratory, Fall 2001.
- CS/181 181a, VLSI Design Laboratory, Fall, 2002.

Community Teaching, Boonville, California, USA

Instructor **May 2006**

Co-designed and co-taught community-oriented mini-course on Artificial Intelligence. Shared responsibility for lectures and activities.

Publications

Peer-Reviewed Journal Articles

R. Guerraoui, R. R. Levy, B. Pochon, & J. Pugh. 2007. The Collective Memory of Amnesic Processes. ACM Transactions on Algorithms (TALG), to appear.

Peer-Reviewed Conference Articles

C. M. Cianci, T. Lochmatter, J. Pugh, & A. Martinoli. 2007. Toward Multi-Level Modeling of Robotic Sensor Networks: A Case Study in Acoustic Event Monitoring. Proceedings of the International Conference on Robot Communication and Coordination (ROBOCOMM 2007), to appear.

J. Pugh & A. Martinoli. 2007. Parallel Learning in Heterogeneous Multi-Robot Swarms. Proceedings of the IEEE Congress on Evolutionary Computation (CEC 2007), pages 3839-3846.

J. Pugh & A. Martinoli. 2007. The Cost of Reality: Effects of Real-World Factors on Multi-Robot Search. Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2007), pages 397-404.

J. Pugh & A. Martinoli. 2007. Inspiring and Modeling Multi-Robot Search with Particle Swarm Optimization. Proceedings of the IEEE Swarm Intelligence Symposium (SIS 2007), pages 332-339.

C. M. Cianci, X. Raemy, J. Pugh, & A. Martinoli. 2007. Communication in a Swarm of Miniature Robots: The e-Puck as an Educational Tool for Swarm Robotics. In Simulation of Adaptive Behavior (SAB 2006), Swarm Robotics Workshop, Lecture Notes in Computer Science (LNCS), pages 103-115.

J. Pugh & A. Martinoli. 2006. Small-Scale Robot Formation Movement Using a Simple On-Board Relative Positioning System. In the International Symposium on Experimental Robotics (ISER 2006), Springer Tracts in Advanced Robotics, to appear.

J. Pugh & A. Martinoli. 2006. Relative Localization and Communication Module for Small-Scale Multi-Robot Systems. Proceedings of the IEEE International Conference on Robotics and Automation (ICRA 2006), pages 188 - 193.

J. Pugh & A. Martinoli. 2006. Discrete Multi-Valued Particle Swarm Optimization. Proceedings of the IEEE Swarm Intelligence Symposium (SIS 2006), pages 103 - 110.

J. Pugh & A. Martinoli. 2006. Multi-Robot Learning with Particle Swarm Optimization. Proceedings of the International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2006), pages 441 - 448.

J. Pugh, Y. Zhang, & A. Martinoli. 2005. Particle swarm optimization for unsupervised robotic learning. Proceedings of the Swarm Intelligence Symposium (SIS 2005), pages 92-99.

A. J. Martin, M. Nystrom, K. Papadantonakis, P. I. Penzes, P. Prakash, C. G. Wong, J. Chang,

K. S. Ko, B. Lee, E. Ou, J. Pugh, E.-V. Talvala, J. T. Tong, & A. Tura. 2003. The Lutonium: A Sub-Nanojoule Asynchronous 8051 Microcontroller. Proceedings of the International Symposium on Asynchronous Circuits and Systems (ASYNC 2003), pages 14-23.

Peer-Reviewed Workshop Articles

J. Pugh, L. Segapelli, & A. Martinoli. 2006. Applying Aspects of Multi-Robot Search to Particle Swarm Optimization. Proceedings of the International Workshop on Ant Colony Optimization and Swarm Intelligence (ANTS 2006), pages 506-507.

Papers in preparation

Peer-Reviewed Book Chapters

J. Pugh & A. Martinoli. 2008. An Exploration of Online Parallel Learning in Heterogeneous Multi-Robot Swarms. In Computational Intelligence in Autonomous Robotic Systems, invited book chapter, under review.

Peer-Reviewed Conference Articles

J. Pugh, M. Karlen, & A. Martinoli. 2008. An Exploration of Basic Strategies for Indoor Sound Search using Real Miniature Robots. Proceedings of the IEEE International Conference on Robotics and Automation, under review.

C. Cianci, J. Pugh, & A. Martinoli. 2008. Exploration of an Incremental Suite of Microscopic Models for Acoustic Event Monitoring Using a Robotic Sensor Network. Proceedings of the IEEE International Conference on Robotics and Automation, under review.

J. Pugh & A. Martinoli. 2008. Distributed Adaptation in Multi-Robot Search using Particle Swarm Optimization. Proceedings of the International Conference on Autonomous Agents and Multiagent Systems, under review.

Professional Experience

Lawrence Livermore National Laboratory, Livermore, California USA

Summer researcher **June, 2001 - August, 2001**

Designed and implemented algorithms for visual defect inspection of optics for the National Ignition Facility, the world's largest laser.

Research Supervision

Masters Student Theses

Sven Gowal. Traffic Planning for DARPA Grand Challenge. Summer 2007. Co-supervisor: Noel duToit.

Mehmet Erbas. Modeling Multi-Robot Search. Winter 2006-2007.

Upper-level Undergraduate Semester Projects

Michael Karlen. Single Robot Sound Search. Spring 2007.

Pablo Tueta. Exploring Scalability of Multi-Robot Search. Spring 2007.

Loïc Segapelli. Adaptation of Machine-Learning Algorithm to Model Multi-robot Systems. Winter 2005-2006.

Loïc Etienne & Sylvain Luiset. Exploration of Multi-robot Sound Search Tasks in a Robotic Simulator. Winter 2005-2006.

Jérôme Favre & Julien Eperon. Implementation of a Search Algorithm using a Group of Robots. Winter 2004-2005.

Sean Bronée. Collaborative, GPS-Free Techniques for Localization in Miniature Robots. Winter 2004-2005. Co-supervisor: Nikolaus Correll

Miscellaneous Student Research Projects

Cédric Favre. Improvement and Validation of On-Board Robotic Relative Positioning System. Summer 2007.

Sven Gowal. Single Robot Sensor-Based Navigation, Exploration, and Mapping. Summer 2006.

Vlad Trifa. Upgrading of Current Robotic Platform and Development of Platform-Independent Collective Robotic API. Summer 2004.

Professional Affiliations and Activities

- Student member, IEEE
- Technical Program Committee, IEEE Swarm Intelligence Symposium
- Reviewer, IEEE Transactions on Robotics
- Reviewer, IEEE Transactions on Evolutionary Computation
- Reviewer, Swarm Intelligence Journal
- Reviewer, International Journal of Computational Intelligence Research
- Reviewer, IEICE Transactions on Information and Systems
- Reviewer, IEEE International Conference on Robotics and Automation
- Reviewer, IEEE Swarm Intelligence Symposium

Skills

- Computer Languages: C, C++, Java, x86 Assembly, Lisp, ABEL, VHDL, Matlab.
- Operating Systems: Unix/Linux, Windows.
- Extensive experience with both analog and digital electronics.
- Strong background in physics and mathematics.

Other Interests

- Ballroom dancing
- Tennis
- Billiards
- Community education

References

Available upon request.