

Robert Sim, Ph.D.

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Current Position

01/2004–present NSERC/Canadian Space Agency Postdoctoral Fellow, Laboratory for Computational Intelligence, Department of Computer Science, University of British Columbia (UBC), Vancouver.
Supervisor: Prof. James Little
Design and implementation of autonomous vision-based robotic explorer. Strategies for information-optimal exploration.

Education

1998–2004 Doctor of Philosophy, Computer Science, McGill University.
Thesis title: “On visual maps and their automatic construction.”
Supervisor: Professor Gregory Dudek.

1996–1998 Master of Science, Computer Science, McGill University.
Thesis title: “Mobile robot localization from learned landmarks.”
Supervisor: Professor Gregory Dudek.

1992–1996 Bachelor of Engineering, Computer Engineering, McGill University.

Research Interests

My main research interests are at the intersection of computer vision, machine learning, robotics, and human-machine interaction. I have more than a decade of experience in developing representations that facilitate vision-based object recognition and position estimation. I have subsequently implemented automated methods for acquiring and constructing these representations using a mobile platform, ultimately aimed at full 3D environment reconstruction from video. My work involves applying methods from active learning and Bayesian analysis for determining optimally informative viewpoints, and has led to the implementation of the world’s first fully autonomous, 100% vision-based robotic explorer.

Professional Experience

2003-2005 Postdoctoral Fellow (part-time), Artificial Intelligence Lab, University of Toronto

Minimal environment descriptions.

- Vision-based CAD object model augmentation.
Supervisor: Prof. Sven Dickinson
- 1998–2003 Lead *Robodaemon* developer and project manager, McGill Mobile Robotics Lab
- Design, development and maintenance of *Robodaemon*, a network-oriented, multi-threaded mobile robot controller and simulator
Implemented plugin and module architectures for extending platform.
Designed API's for C++ and Java clients.
Supervisor: Prof. Gregory Dudek
- 2000–2001 Vice President, University and Academic Affairs, McGill Post-Graduate Students' Society (PGSS).
- Representing graduate students on a wide variety of University committees, including Senate, Budget Planning, Research Policy and Intellectual Property.
- 1999–2000 Ph. D. Senator, PGSS.
Representing Ph. D. students at the University Senate.
- 1998–1999 Team leader, consultant, McGill University Mobile Robotics Team
- Provide expertise to team assembling mobile robot system for American Association for Artificial Intelligence (AAAI) Mobile Robot Competition.
- Lead consultant on vision system architecture (1999). Design and implement real-time vision system to assist mobile robot navigation, obstacle avoidance, and object recognition (1998).
- Implemented colour training architecture, shape recognition system for distinguishing objects, obstacles and floor.
- First place finish in category (both years).
Supervisor: Prof. Gregory Dudek
- 1995–1995 Research Assistant, Centre for Intelligent Machines.
- Design and implement an object recognition system by actively controlling a laser-stripe range sensor.
Supervisor: Prof. Martin D. Levine.

Selected Awards

- 2004–present Natural Sciences and Engineering Research Council (NSERC) Postdoctoral Fellowship.

2004-present	Canadian Space Agency Postdoctoral Supplement.
2000–2002	Hydro Quebec McGill Major Fellowship.
2001	Dean’s Award for Student Service to Graduate and Postdoctoral Education.
1998–2000	NSERC PGS B Fellowship.
1998–2000	Canadian Space Agency NSERC Supplement.
1998	Canadian Advanced Technology Alliance Prize for academic excellence.
1996–1998	NSERC PGS A Fellowship.
1996	British Association Medal for Academic Achievement.
1992–1996	Canada Scholar.
1992–1996	J.W. McConnell entrance scholarship.

Technical Skills

Languages	C++, C, Perl, Matlab.
Core skills	Scientific computing, Pthreads and concurrency, TCP/IP Sockets, real-time systems, distributed systems.
Graphics and UI	OpenGL, Gtk+, Gtkmm, MFC.
Markup	LaTeX, AJAX, RSS, HTML, CSS, custom languages.
Other skills	LAMP architecture, CGI programming, parsers.

Selected Publications

Complete list: <http://www.cs.ubc.ca/~simra/research.html>

- [1] R. Sim, P. Elinas, M. Griffin, A. Shyr, and J. J. Little, “Design and analysis of a framework for real-time vision-based SLAM using Rao-Blackwellised particle filters,” in *Proceedings of the 3rd Canadian Conference on Computer and Robotic Vision (CRV)*, (Québec City, QC), CIPPRS, IEEE Press, June 2006. To appear.
- [2] P. L. Sala, R. Sim, A. Shokoufandeh, and S. J. Dickinson, “Landmark selection for vision-based navigation,” *IEEE Transactions on Robotics*, May 2006.
- [3] R. Sim, “Stabilizing information-driven exploration for bearings-only SLAM using range gating,” in *Proceedings of Intelligent Robots and Systems (IROS)*, (Edmonton, AB), pp. 2745–2750, IEEE/RSJ, IEEE Press, 2005.
- [4] R. Sim and G. Dudek, “Learning generative models of scene features,” *International Journal of Computer Vision*, vol. 60, pp. 45–61, October 2004.