UNIVERSITY OF TORONTO, DEPARTMENT OF COMPUTER SCIENCE

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SAM T. ROWEIS

CURRICULUM VITAE

Date of Birth: April 27, 1972. Citizenship: Dual Canadian/USA

ACADEMIC BACKGROUND

- **Assistant Professor**, University of Toronto (July 2001–present)
  Department of Computer Science
- **Visiting Faculty**, Massachusetts Institute of Technology (Jan.–Sept. 2005)
  Computer Science & Artificial Intelligence Laboratory (CSAIL)
- **Bogue Research Fellow**, on leave from University College London (April – June 2001)
  Massachusetts Institute of Technology, BCS (affiliation: Seung Lab)
- **Senior Research Fellow**, University College London (April 1999 – April 2001)
  Gatsby Computational Neuroscience Unit (director: Geoffrey Hinton)
- **Doctor of Philosophy**, California Institute of Technology (Sept. 1994 – Jan. 1999)
  Computation and Neural Systems Option (advisor: John Hopfield)
- **Bachelor of Applied Science**, University of Toronto (Sept. 1990 – May 1994)
  Engineering Science Program, Honours Degree

GRANTS & FELLOWSHIPS

- Sloan Research Fellowship in Science & Technology (US$90K, UofT, 2005-2007)
- Canada Research Chair (CRC) in Statistical Machine Learning (C$400K, UofT, 2004-2009)
- Canada Foundation for Innovation (CFI), (C$412K, with R. Zemel, UofT, 2002-2007)
- Premier's Research Excellence Award (PREA), Ontario (C$150K, UofT, 2002-2007)
- NSERC Individual Research Award (C$128K, UofT, 2002-2006)
- Institute for Robotics and Intelligent Systems (IRIS-LEARN) (C$495K, co-PI, UofT, 2002-2005)
- NSF ITR-ASE (Automated Astrometry) (US$504K, NYU external-collaborator 2004)
- Connaught New Staff Matching Grant (C$45K, UofT, 2002)
- Connaught Startup Grant (C$10K, UofT, 2001)
- Bogue Research Fellowship, Massachusetts Institute of Technology (C$10K, UCL, Nov. 2000)
- Canada-UK Millennium Fellowship, Royal Society/NSERC (C$10K, GCNU, Feb. 2000)
- NSERC Postdoctoral Fellowship (C$70K, GCNU, Jan. 2000)
- NSF International Postdoctoral Fellowship (C$85K, GCNU, April 1999)
- NSF NATO Postdoctoral Fellowship (declined April 1999)
- NSERC 1967 Science Canada Award (May 1994, renewed May 1996)
- NSF Graduate Fellowship (declined March 1994)

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CURRICULUM VITAE

TEACHING EXPERIENCE

- **Assistant Professor**, **University of Toronto**, Department of Computer Science
  CSC2515 (Machine Learning) (Fall 2005/04/03/02)
  CSC412 (Uncertainty and Learning in Artificial Intelligence) (Spring 2005/04/03/02)
  CSC310 (Information Theory) (Fall 2005/04)
  ECE242 (Algorithms and Data Structures) (Fall 2003)
  CSC2506 (Probabilistic Reasoning) (Spring 2005/04)
- **Instructor**, **University College London**, Gatsby Unit
  GCNU Unsupervised Learning (graduate) (Fall 2000)
- **Teaching Assistant**, **California Institute of Technology**, Computation and Neural Systems
  CNS156 (Learning Theory) (Winter 1996)
  CNS185 (Collective Computation) (Winter 1995 & Winter 1996)
- **Teaching Assistant**, **University of Toronto**, Faculty of Applied Science and Engineering
  AER201S (Aerospace Project Design Lab) (Spring 1994)

INDUSTRIAL & RESEARCH EXPERIENCE

- **Adapt Technologies**, Technical Advisory Board (Jan. 2005–present)
- **WhizBang! Labs**, Technical Advisory Board & Visiting Researcher (June 2001–May 2002)
- **Bell Laboratories**, Lucent Technologies – Resident Visitor (Consultant) (May 1997 – Sept. 1998)
- **Microsoft Corporation** – Software Design Engineer (May–Sept. 1992)
- **Northern Telecom Canada** (now Nortel) – Programmer (June–Sept. 1989)
- **Institute for Biomedical Engineering**, U. of Toronto – Research Assistant (May–Sept. 1993)
- **Faculty of Management**, University of Toronto – Multimedia Software Design (June–Sept. 1991)
- **Computing Services**, University of Toronto – Advisor (Aug. 1990 – May 1994)

HONOURS, AWARDS & SCHOLARSHIPS

- Alfred P. Sloan Foundation Research Fellow (USA, 2005)
- Canada Research Chair (CRC) in Statistical Machine Learning (Canada, Spring 2004)
- Premier's Research Excellence Award (PREA) (Ontario, Spring 2002)
- Elected to Member, Acoustical Society of America (July 2000)
- Rank Prize, Most Outstanding Short Paper, Mini-Symposium on Learning (UK, April 2000)
- Distinguished Graduate Student Lecture (California Institute of Technology 1998)
- Graduate Student Teaching Award (California Institute of Technology 1997)
- Rhodes Scholarship Finalist (Ontario, Fall 1993)
- NSERC Undergraduate Research Award (University of Toronto 1993)
- Canada Scholarship (University of Toronto 1990–94)
- J.W.Billes Admission Scholarship (University of Toronto 1990–94)
- Ontario Scholarship (University of Toronto 1990)
- National Book Award (University of Toronto 1990)
- Valedictorian (University of Toronto Schools 1990)

PROFESSIONAL ACTIVITIES

- **Conference Executive Committees**:
  UAI 2005 Senior Program Committee;
  NIPS 2004 Volunteers Chair, NIPS 2003 Tutorials Chair
- **Conference Program Committees**:
  ICML 2004 Area Chair;
  NIPS 2001 & 2002 area chair (Speech & Signal Processing)
- **Editorial Boards**: Journal of Machine Learning Research (JMLR) – Action Editor
- **Workshops Organized**:
  Neural Computation and Adaptive Perception, CIAR, Montreal, Canada (April 25-26, 2005)
  IRIS Machine Learning Workshop (with Yoshua Bengio), Ottawa, Canada (June 9, 2004)
  NIPS 2002 Workshop on Spectral Methods, Whistler, Canada. (Dec. 2002, with Josh Tenenbaum)
- **Grant Reviews**: NSERC (Canada), CRC (Canada), NSF (USA), EPSRC (UK), BSF (Israel-USA)
- **Journal Reviewing**:
  Nature, PNAS, Journal of Machine Learning Research, Machine Learning Journal, Neural Computation, Journal of Artificial Intelligence Research, Computer Speech and Language, IEEE Trans. Speech & Audio Processing, IEEE Trans. PAMI, IEEE Trans. Neural Networks, Neurocomputing
- **Major Conference Reviewing**: NIPS, AI-STATS, ICML, UAI, SIGGRAPH, IJCAI, AI-MATH
- **Book Reviews**: SIAM
- **Society Memberships**:
  Institute of Electrical and Electronic Engineers (IEEE), Acoustical Society of America (member), American Association for the Advancement of Science

INVITED SEMINARS, TUTORIALS, & WORKSHOP PRESENTATIONS

- Toyota Technological Institute Chicago (invited seminar) (April 2005)
- Learning, Language, Vision & Graphics Colloquium, MIT CSAIL (invited seminar) (March 2005)
- Spoken Language Systems Group, MIT CSAIL (invited seminar) (March 2005)
- Hearing Research Center, Boston University (invited seminar) (March 2005)
- Dept. Computer Science, University of Massachusetts, Amherst (invited seminar) (Feb. 2005)
- Stochastic Systems Group, MIT LIDS (invited seminar) (Feb. 2005)
- Australian Centre for Field Robotics, U. Sydney (invited seminar) (Jan. 2005)
- Machine Learning Summer School, 2005, ANU Canberra (Jan. 2005)
  (invited course on probabilistic graphical models)
- MSRI Berkeley, Workshop on High Dimensional Data (invited seminar) (Dec. 2004)
- California Institute of Technology (invited seminar) (Nov. 2004)
- Dept. Statistics, University of Toronto (invited seminar) (Oct. 2004)
- Dept. Statistics, University of Chicago (invited seminar) (Oct. 2004)
- Hanse Institute for Advanced Study, Delmenhorst, Germany (invited speaker) (Aug. 2004)
  International Conference on Auditory Scene Analysis and Speech Perception by Human and Machine

INVITED SEMINARS, TUTORIALS, & WORKSHOP PRESENTATIONS (CONTINUED) ....

- Google Labs, NYC (invited seminar) (July 2004)
- Microsoft Research Seattle (invited seminar) (May 2004)
- UW-Seattle CSE (invited lecture in Course on Vision Algorithms) (May 2004)
- Dept. Computer Science, University of Massachusetts, Amherst (invited seminar) (April 2004)
- Center for Language and Speech Processing, Johns Hopkins (invited seminar) (March 2004)
- *MITACS Workshop on Data Mining*, Montreal (invited speaker) (Nov.2003)
- Hamilton Institute, NUI Maynooth (invited speaker) (Sept.2003)
  European Summer School Workshop on Multi Agent Control
- Eurospeech 2003 Conference, Geneva (invited speaker) (Sept.2003)
  Special Session on Applications of Machine Learning to Text and Speech.
- Scandinavian Conference on Image Analysis (SCIA03), Sweden (invited tutorial) (July 2003)
- *MITACS CRM Workshop on Advances in Machine Learning*, Montreal (invited speaker) (June 2003)
- *Second McMaster-Gennum Workshop on Intelligent Hearing Instruments*, (Oct. 2001)
  Niagara on the Lake, Canada (invited speaker)
- *Banbury Center Meeting on Neural Networks and Cognition* (Sept. 2000)
  Cold Spring Harbor Laboratory, USA (invited speaker)
- *HearNet EPSRC Meeting*, Sussex UK (invited speaker) (June 2000)
- *Rank Prize Mini-Symposium on Model Selection and Learning in Computer Vision* (April 2000)
  Grasmere, UK (invited speaker, best presentation award)
- *Learning Workshops*, Snowbird Utah (Spring 2005/04/03/02/01/00)
- *Kernel Day*, Microsoft Research Cambridge (invited talk) (Jan. 2000)
- *Advances in Neural Information Processing Systems 12 (NIPS'99)*, Denver (Dec. 1999)
  (invited tutorial with Zoubin Ghahramani)
- *Neural Computation Tutorial*, Gatsby Unit, UCL. (invited tutorial) (Sept. 1999)
- *Distinguished Graduate Student Lecture*, California Institute of Technology. (May 1998)
- *Neural Information and Coding Workshop*, Snowbird Utah (March 1997)
- *Speech Recognition Workshop WS96*, Johns Hopkins University CLSP (Summer 1996)
- *DIMACS2 DNA Computing Workshop*, Princeton (invited talk) (June 1996)

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SELECTED SCIENTIFIC PUBLICATIONS

Refereed Journals

- D.W.Hogg, M.R.Blanton, S.T.Roweis & K..V.Johnston
  Modeling Complete Distributions with Incomplete Observations: The Velocity Ellipsoid from Hipparcos Data
  The Astrophysical Journal, to appear.
- Peng et. al.
  A Panoramic View of Noncoding RNA Processing.
  Cell. 113 pp.919-933 (2003)
- Lawrence Saul & Sam Roweis.
  Think Globally, Fit Locally: Unsupervised Learning of Nonlinear Manifolds.
  Journal of Machine Learning Research, v4, pp.119-155 (2003)
- Sam Roweis & Lawrence Saul.
  Nonlinear dimensionality reduction by locally linear embedding.
  Science. 290(5500) pp.2323–2326 (2000).
- Sam Roweis & Zoubin Ghahramani.
  A Unifying Review of Linear Gaussian Models.
  Neural Computation 11(2), pp.305–345 (1999)
- Sam Roweis & Erik Winfree.
  On the Reduction of Errors in DNA computation.
  Journal of Computational Biology 6(1), pp.65–75 (1999)
- Len Adleman, Paul Rothemund, Sam Roweis, Erik Winfree.
  On Applying Molecular Computation to the Data Encryption Standard.
  Journal of Computational Biology 6(1), pp.53–63 (1999)
- S.Roweis, E.Winfree, R.Burgoyne, N.Chelyapov, M.Goodman, P.Rothemund, L.Adleman.
  A Sticker Based Model for DNA Computation.
  Journal of Computational Biology 5(4), pp.615–629 (1998)

Refereed Conferences

- Kannan Achan, Sam Roweis, Aaron Hertzmann & Brendan Frey.
  A Segment-Based Probabilistic Generative Model of Speech.
  International Conference on Acoustics, Speech & Signal Processing (ICASSP 2005), pp.221–224
- Ben Marlin, Sam Roweis & Rich Zemel.
  Unsupervised Learning with Non-Ignorable Missing Data.
  10th International Workshop on Artificial Intelligence & Statistics (AI-STATS 2005)
- Jennifer Listgarten, Radford Neal, Sam Roweis & Andrew Emili.
  Multiple Alignment of Continuous Time Series.
  Neural Information Processing Systems 17 (NIPS'04), pp.817–824
- Jacob Goldberger, Sam Roweis, Geoff Hinton & Ruslan Salakhutdinov.
  Neighbourhood Component Analysis.
  Neural Information Processing Systems 17 (NIPS'04), pp.513–520
- Jacob Goldberger & Sam Roweis.
  Heirarchical Clustering of a Mixture Model.
  Neural Information Processing Systems 17 (NIPS'04), pp.505–512
- Sam Roweis.
  Factorial Models and Refiltering for Speech Separation & Denoising.
  Proceedings of Eurospeech 2003 (Geneva), pp.1009–1012.

SELECTED SCIENTIFIC PUBLICATIONS (CONTINUED)

Refereed Conferences

- Radford Neal & Matthew Beal & Sam Roweis.
  Inferring State Sequences for Non-linear Systems with Embedded Hidden Markov Models.
  Neural Information Processing Systems 16 (NIPS'03), pp.401–408
- Jakob Verbeek & Sam Roweis & Nikos Vlassis.
  Non-linear CCA and PCA by Alignment of Local Models. (oral)
  Neural Information Processing Systems 16 (NIPS'03), pp.297–304
- Kannan Achan & Sam Roweis & Brendan Frey.
  Probabilistic Inference of Speech Signals from Phaseless Spectrograms.
  Neural Information Processing Systems 16 (NIPS'03), pp.1393–1400
- Ruslan Salakhutdinov & Sam Roweis & Zoubin Ghahramani.
  On the Convergence of Bound Optimization Algorithms.
  Uncertainty in Artificial Intelligence 19 (UAI'03), pp.509–516
- Ruslan Salakhutdinov & Sam Roweis.
  Adaptive Overrelaxed Bound Optimization Methods.
  International Conference on Machine Learning 20 (ICML'03), pp.664–671
- Ruslan Salakhutdinov & Sam Roweis & Zoubin Ghahramani.
  Optimization with EM and Expectation-Conjugate-Gradient.
  International Conference on Machine Learning 20 (ICML'03), pp.672–679
- Geoffrey Hinton & Sam Roweis.
  Stochastic Neighbour Embedding.
  Neural Information Processing Systems 15 (NIPS'02), pp. 833–840.
- Yee Whye Teh & Sam Roweis.
  Automatic Alignment of Hidden Representations.
  Neural Information Processing Systems 15 (NIPS'02), pp. 841–848.
- Sham Kakade, Yee Whye Teh & Sam Roweis.
  An Alternate Objective Function for Markovian Fields.
  International Conference on Machine Learning 19 (ICML'02), pp.275–282.
- Sam Roweis & Lawrence Saul & Geoffrey Hinton.
  Global Coordination of Local Linear Models. (oral)
  Neural Information Processing Systems 14 (NIPS'01), pp.889–896.
- Sam Roweis.
  One Microphone Source Separation. (oral)
  Neural Information Processing Systems 13 (NIPS'00), pp.793–799.
- Sam Roweis.
  Constrained Hidden Markov Models.
  Neural Information Processing Systems 12 (NIPS'99), pp.782–788
- Zoubin Ghahramani & Sam Roweis.
  Learning nonlinear dynamical systems using an EM algorithm.
  Neural Information Processing Systems 11 (NIPS'98), pp.431–437
- Sam Roweis.
  EM Algorithms for PCA and SPCA.
  Neural Information Processing Systems 10 (NIPS'97), pp.626–632

SELECTED SCIENTIFIC PUBLICATIONS (CONTINUED) ....

Refereed Conferences

- John Hopfield, Carlos Brody & Sam Roweis.
  Computing with Action Potentials.
  Neural Information Processing Systems 10 (NIPS'97), pp.166–172
- Sam Roweis & Abeer Alwan.
  Towards Articulatory Speech Recognition.
  Proceedings of Eurospeech 1997 (Rhodes) v.3, pp.1227–1230
- M. Ostendorf, W. Byrne, M. Bacchiani, M. Finke, A. Gunawardana, K. Ross,
  S. Roweis, E. Shriberg, D. Talkin, A. Waibel, B. Wheatley, & T. Zeppenfeld.
  Modeling systematic variations in pronunciation via a language-dependent hidden speaking mode.
  Proc. International Conference on Spoken Language Processing (ICSLP) 1996, Philadelphia.
- Len Adleman, Paul Rothemund, Sam Roweis, Erik Winfree.
  On Applying Molecular Computation to the Data Encryption Standard.
  Proceedings of 2nd Annual DIMACS Workshop on DNA Based Computers, 1996.
- S.Roweis, E.Winfree, R.Burgoyne, N.Chelyapov, M.Goodman, P.Rothemund, L.Adleman.
  A Sticker Based Model for DNA Computation.
  Proceedings of 2nd Annual DIMACS Workshop on DNA Based Computers, 1996.

Book Chapters

- Sam Roweis & Ruslan Salakhutdinov.
  Simultaneous Localization and Surveying with Multiple Agents
  in Roderick Murray-Smith & Robert Shorten eds. *Switching and Learning in Feedback Systems*, pp.313–332, *Proc. Maynooth Multi-Agent Control 2003 Summer School*, Springer LNCS v.3355, 2005.
- Sam Roweis.
  Automatic Speech Processing by Inference in Generative Models, pp.97–134
  in Pierre Divenyi, ed. *Speech Separation by Humans and Machines* (Springer, 2005).
- Sam Roweis & Zoubin Ghahramani.
  Learning Nonlinear Dynamical Systems Using the EM Algorithm.
  in Simon Haykin, ed. *Kalman Filtering and Neural Networks* (Wiley, 2001). pp. 175–220

Other

- Kannan Achan, Sam Roweis & Brendan J. Frey.
  A Segmental HMM for Speech Waveforms.
  Technical Report UTML-TR-2004-001, University of Toronto, January 2004.
- Keir Mierle, Sam Roweis & Greg Wilson.
  CVS Data Extraction and Analysis.
  Technical Report UTML-TR-2004-002, University of Toronto, August 2004.
- Sam Roweis & Carlos Brody. *Linear Heteroencoders*.
  GCNU TR1999-002, available from http://www.gatsby.ucl.ac.uk
- Sam Roweis. *Constrained Hidden Markov Models and Applications*.
  GCNU TR1999-003, available from http://www.gatsby.ucl.ac.uk
- Sam Roweis. *EM Algorithms for PCA and Sensible PCA*.
  CNS TR-97-02, available from http://www.cs.toronto.edu
- Sam Roweis & Zoubin Ghahramani.
  An EM Algorithm for Identification of Nonlinear Dynamical Systems. unpublished.