

STI^eT NEWS

Socio-Technical Infrastructure for Electronic Transactions

The STIET
Multidisciplinary
Doctoral Program
Newsletter

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Letter from the Director:

The STIET program is strong and growing. We've been more successful than we anticipated, creating a lot of excitement.

Our mission has been to create a strong interdisciplinary research community focused on the design of infrastructure for electronic transactions. These include e-commerce, social networking, community services, personal communications and network-supported business. Our community is sizeable: we average 35 attendees at our weekly research seminar, and a total of 38 Ph.D. students and 27 faculty from across campus are involved in the program. We have provided fellowships to 29 Ph.D. students (nearly all for two years), and just made offers to five newly-admitted students.

Our students and faculty continue to be very productive, especially in cross-disciplinary, collaborative research. I am especially impressed with how quickly STIET students start publishing. We fund primarily first- and second-year doctoral students; our fellows have produced more than 45 publications over our first four years.

We only started the fellows program in 2002, with funding for first-year students, so most are still enrolled. However, we are pleased that our first graduate, Kurt DeMaagd, just accepted a faculty position at Michigan State University in their Department of Telecommunications, Information Studies, and Media.

STIET was honored to be selected to host the Association for Computing Machinery (ACM) Electronic Commerce 2006 conference in June this year (<http://stiet.si.umich.edu/ec06/>). We are busy preparing for what we think may be the largest and most successful EC conference to date, and look forward to showing our colleagues from industry and other universities just how large and active our community has become.

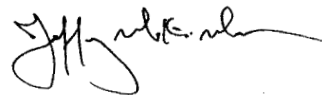
Our \$3.2 million NSF grant that provides primary support for the fellowship program expires next year. We are busy writing a proposal for renewal funding to continue our success. With the NSF funding and generous additional support from the University, we offer one- and two-year fellowships with a 12-month stipend of \$30,000 plus full tuition and health insurance. Fellows also receive travel funds and funds for computer hardware, software and services. Fellows take two required courses and three electives. They also attend our weekly research seminar, in which faculty and students interact with local and visiting scholars who present new research results. We also hold two full-day research workshops each year at which our students present their research in progress to get early feedback and collaboration.

As we look forward, we find that our most significant research innovations to date have grown out of a blending of ideas from game theory, computer science, economics and social psychology to develop a principled approach to *incentive-centered design* (ICD). We believe that careful attention to individual incentives can lead

to vast improvements in the design of systems that rely on information, communication and collaboration technologies to mediate interactions. By incorporating the role of motivated human behavior into system design we improve performance and efficiency, and reduce the problem of unanticipated consequences. We plan to make ICD research the core of STIET as we move into the program's next five years.

We look forward with enthusiasm. Please spread the word about this opportunity to top quality students interested in pursuing a Ph.D. in one of our several participating departments, while engaging in a strong community of cross-disciplinary researchers. For more info visit <http://stiet.si.umich.edu>.

Sincerely,



The STIET Fellowship

- a \$30,000 stipend and tuition/fees for first and second year STIET fellows
- a faculty research mentor
- weekly seminar
- bi-annual research workshop
- 2 required core courses for 2 year fellows:
Econ 601/602: Micro-economics/Game Theory
EECS 547/SI 652: E-Commerce
- plus 3 STIET advanced electives, including 2 from depts outside of the Fellow's specialty (stiet.si.umich.edu/courses.html)
- travel funding to participate in research conferences
- health care coverage
- computing resources funded by STIET and also available in special labs such as the Intel lab at the Business School.
- ongoing multidisciplinary research (see pp. 2 and 3)
- research opportunities at facilities of our partners in business and industry such as Microsoft and IBM
- **STIET program activities are open to all UM students and faculty interested in the social and technical aspects of electronic transactions.** If you are interested in receiving emails about STIET activities, contact woollams@umich.edu

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FOCUS ON: STIET Research

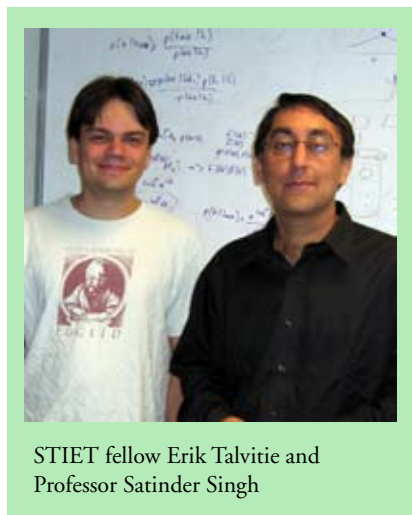
Machine Learning in Game Theory and Economics

by Satinder Singh, Electrical Eng. and Computer Science

Together with STIET fellow Erik Talvitie and Harvard Professor David Parkes I am working on the design of autonomous agents who must make sequential decisions in complex, partially observable environments. These agents can learn through repeated interaction with other agents. Our work originated in computer science, but we have turned to computational game theory and economics for formalisms and inspiration.

As a first step we have designed a Vickrey-Clarke-Groves mechanism for a class of online sequential resource allocation problems (e.g., consider the problem of allocating WiFi channels over a day at Starbucks) in which the agents can potentially lie about their arrival and departure times in addition to their valuation of resources. Currently, we are investigating how to design mechanisms for such sequential resource allocation problems in which neither the central organization nor the agents have knowledge of the distribution of heterogeneous preferences of potential users and thus have to learn over repeated trials. Designing mechanisms that bring learning agents into equilibrium and achieve efficient solutions (possibly asymptotically) is an open research problem that is at the heart of my current research.

More generally my interest in computational economics stems from a desire to answer the following question: how would a single agent or mind built as a collection or society of minds or modules be organized? In particular, the field of mechanism design among others from economics offers an opportunity to organize a society of minds using market principles.



STIET fellow Erik Talvitie and Professor Satinder Singh

How would a single agent or mind built as a collection or society of minds or modules be organized?

This research builds on my earlier research on a single agent learning to solve unknown Markov decision processes (MDPs) and partially observable MDPs. My contributions to that area include the first algorithm for learning to solve general unknown MDPs in time polynomial in the size of the MDP and the mixing time of the optimal policy, a general representation of

temporally abstract actions in sequential decision environments as well as algorithms for learning these representations and planning with them, and new class of methods for efficient state estimation.

I also have worked on the problem of computing equilibria efficiently in large-scale games in which the participants have local

interactions with their neighbors in a graph. With colleagues, I have developed polynomial time message-passing algorithms for computing approximate Nash equilibria in tree-games as well as their heuristic extensions to general graph-games.

STIET Research Workshop

STIET faculty and students gathered on Monday, October 17 to share their research activity and enjoyed the following presentations. See the link at <http://stiet.si.umich.edu> for more information.

Kurt DeMaagd — IT in the Developing World: A Location Theory Approach

Rick Wash — Content Provision and Digital Rights Management Technologies

Blake Nicholson — Optimizing the State of a Production Line in Preparation for Planned Downtime

Cory Knobel and Nese Nasif — Mobile Phones, Highway Fatality, and Incentive Engineering: A Proposed ICD Solution to Mobile Phone-Based Driver Distraction



Cory Knobel, SI fellow, and Nese Nasif, Economics fellow

Erik Talvitie — Mediating Policies in a World With State

Benjamin Chiao — The Effects of Switching and Information Costs on the Competition in Spam Reduction and Email Services

Derek Hansen — Information Reuse in an Online Technical Community

Pierre-Yves Brunet — Risk, Financing and the Optimal Number of Suppliers

Ali Tafti — Examining the Alignment Between HR and IS Strategies

Chris Kiekintveld and Patrick Jordan — Deep Maize-05: A Predictive, Value-Based Supply Chain Agent

Yagil Engel and Kevin Lochner — Bidding Languages and Clearing Algorithms for Multiattribute Call Markets

Tapan Khopkar — The Impact of Negative Feedback on eBay

Jonathan Whitaker — Does Information Intensity Explain the Offshoring of Service Occupations?



Pierre-Yves Brunet, IOE fellow

STIET Student Recent Publications

STIET Fellows and Students are in **bold**.

Bardhan, I.R., **Jonathan Whitaker** and S. Mithas. "Antecedents of Business Process Outsourcing in Manufacturing Plants," Proceedings of the 39th Annual Hawaii International Conference on System Sciences, R.H. Sprague (ed.), IEEE Computer Society Press, Hawaii, 2006.

Cheng, Shih-Fen, Daniel M. Reeves, **Yevgeniy Vorobeychik**, and Michael P. Wellman. "Notes on Equilibria in Symmetric Games." AAMAS-04 Workshop on Game Theory and Decision Theory, 2004.

DeMaagd, Kurt, C. Lampe. Everything2: Cataloging All Human Knowledge. ACM/CHI Beyond Threaded Discussions Workshop, Portland, OR, 2005.

DeMaagd, Kurt, S. Moore. Using IT to Enter Previously Unprofitable Markets, Forthcoming at HICSS 2006.

Estelle, Joshua, Yevgeniy Vorobeychik, Michael P. Wellman, Satinder Singh, **Christopher Kiekintveld**, and Vishal Soni. "Strategic Interactions in a Supply Chain Game." Fourth International Conference on Computers and Games, 2004 and the AAMAS-04 Workshop on Trading Agent Analysis and Design, 2004.

Harper, Maxwell, **Xin Li**, Yan Chen, and Joseph Konstan. "An Economic Model of User Rating in an Online Recommender System." Accepted at the 10th International Conference on User Modeling 2005. To appear in Springer's LNAI series, UM 2005 User Modeling: Proceedings of the Tenth International Conf.

Johnston, Erik and Hicks, D. "Speaking in Teams: Motivating a Pattern Language for Collaboration", Interdisciplinary Description of Complex Systems. Volume 2, Number 2 (December 2004): 136 – 143.

Johnston, V., Seidenstat, P., and **Erik Johnston**. "Transportation Security Management Adjustments" Intermodal Fare – ASPA Section on Transportation Policy and Administration. (Winter 2005): 12-20.

Khopkar, Tapan, Xin Li, and Paul Resnick. "Self-Selection, Slipping, Salvaging, Slacking, and Stoning: the Impacts of Negative Feedback at eBay" To appear in Proceedings of ACM (Association for Computing Machinery) EC 05 Conference on Electronic Commerce. Vancouver, Canada. 2005.

Kiekintveld, Christopher, Michael P. Wellman, **Yevgeniy Vorobeychik**. An Analysis of the 2004 Supply Chain Management Trading Agent Competition. IJCAI-05 Workshop on Trading Agent Design and Analysis and Proceedings of NAFIPS-05, 2005.

Kiekintveld, Christopher, Michael Wellman, Satinder Singh, **Joshua Estelle, Yevgeniy Vorobeychik**, Vishal Soni, Matthew Rudary. "Distributed Feedback Control for Decision Making on Supply Chains." Proceedings of Fourteenth International Conf. on Automated Planning and Scheduling, Whistler, BC, 2004.

Kiekintveld, Christopher, M. P. Wellman, S. Singh, and V. Soni. "Value-driven procurement in the TAC supply chain game." SIGecom Exchanges 4(3), 2004.

Knobel, Cory, Ryan, M., and Jackson, S. "Matters of Scale and the Scales that Matter." I-Conference 2005, September 28-30, 2005. Penn State University.

Knobel, Cory. "Information Science as Emerging Metadiscipline." I-Conference 2005, September 28-30, 2005. Penn State University.

Lampe, C. and **Erik Johnston**. "Follow the (Slash) dot: Effects of feedback on new members in an online community". ACM Group. Nov, 2005.

Lampe, C. and **Erik Johnston**. "Follow the (Slash) dot: Effects of feedback on new users in a virtual public sphere," Journal of Computer-Mediated Communication (under review, Initial acceptance).

Ling, Kimberly, Gerard Beenen, Pamela J. Ludford, Xiaoqing Wang, Klarissa Chang, **Xin Li**, Al Mamunur Rashid, Paul Resnick, and Robert E. Kraut. "Using Social Psychology to Motivate Contributions to Online Communities" Journal of Compute- Mediated Communication, Volume 10, Issue 4, July 2005.

Lochner, Kevin, and Wellman, Michael P. (2004). "Rule-Based Specification of Auction Mechanisms." Third International Joint Conference on Autonomous Agents and Multi-Agent Systems, New York.

Loder, Thede, Marshall Van Alstyne, and **Rick Wash**. "Information Asymmetry and Thwarting Spam." National Bureau of Economic Research — Universities

Research Conference, May, 2004.

Loder, Thede, Marshall Van Alstyne, and **Rick Wash**. "An Economic Solution to the Spam Problem." At the MIT Spam Conference 2004 and ACM EC'04. Also see the Wall Street Journal article on 1/15/04.

Loder, Thede, Marshall van Alstyne, and **Rick Wash**. "An Economic Response to Unsolicited Communications" Advances in Economic Analysis and Policy. Berkeley Electronic Press, 2005.

Maul, Tim. "Portfolio Investment with Market Frictions." Bachelier Finance Society Third World Congress, Chicago, 2004.

Moore, S. and **Kurt DeMaagd**. "Investigating the Value of Information and Computational Capabilities by Applying Genetic Programming to Supply Chain Management." In S. Kimbrough (ed.), Formal Models of Electronic Commerce. Forthcoming. New York: Springer-Verlag, 2004.

Moore, S. and **Kurt DeMaagd**. "Using a Genetic Program to Search for Supply Chain Reordering Policies." In R. Riolo & B. Worzel (eds.), Genetic Programming Theory and Practice. Boston: Kluwer Academic, 2004.

Nan, N., **Johnston, Erik**, Olson, J., and Bos, N. "Beyond Being in the Lab: Using Multi-Agent Modeling to Isolate Competing Hypotheses," Computer Human Interaction Conference Proceedings. (April 2-7, 2005). Portland, Oregon.

Rader, E. J. and **Erik Johnston** "Cooperation and Competition in Video Games: Implications for Collaborative Systems," Connections 2005 - 10th Great Lakes Information Studies Conference Conference Proceedings. (May 14 - 16, 2005). Montreal, Canada.

Resnick, P., **Derek Hansen**, and C. Richardson, "Calculating Error Rates for Filtering Software." Forthcoming in Communications of the ACM.

Slaughter, S., S. Ang, D. Harter and **Jonathan Whitaker**, "Contract Choice and Software Quality in IT

Outsourcing," Symposium — Coordination and Control in Outsourcing Relationships, Academy of Management Annual Meeting, 2004.

Vorobeychik, Yevgeniy, Michael P. Wellman, and Satinder Singh. "Learning Payoff Functions in Infinite Games." AAAI Symposium on Artificial Multiagent Learning, 2004.

Wash, Rick, Libby Hemphill, and Paul Resnick. 'Design Decisions in the RideNow Project.'. In ACM GROUP 2005.

Wellman, Michael, **Joshua Estelle**, Satinder Singh, **Yevgeniy Vorobeychik**, **Christopher Kiekintveld**, and Vishal Soni. "Strategic interactions in a supply chain game." Computational Intelligence, 21:1-26, 2005. Previous versions in: Fourth International Conference on Computers and Games (2004), AAMAS-04 Workshop on Trading Agent Design and Analysis (2004)

Wellman, Michael P., Daniel M. Reeves, **Kevin M. Lochner**, and **Yevgeniy Vorobeychik**. "Price Prediction in a Trading Agent Competition." In Journal of Artificial Intelligence Research, Vol. 21:19-36, 2004.

Whitaker, Jonathan, Mithas, S. and Krishnan, M.S. "Effects of IT Infrastructure, Process Knowledge and Internationalization on Onshore and Offshore Business Process Outsourcing," INFORMS Conference on Information Systems & Technology, 2005.

Whitaker, Jonathan, Mithas, S. and Krishnan, M.S. "Antecedents of Onshore and Offshore BPO," Proceedings of the 26th International Conference on Information Systems, W.R. King and R. Torkzadeh (eds.), Association for Information Systems, Las Vegas, NV, 2005.

Wu, H., M. Gordon, **Kurt DeMaagd**. Collaborative Structuring in a Document Repository. Workshop on Information Technology Systems, Wash. D.C., 2004.

Wu, H., M. Gordon, **Kurt DeMaagd**. Document Co-Organization in an Online Knowledge Community. ACM/CHI, Vienna, Austria, 2004.

Wu, H., M. Gordon, **Kurt DeMaagd**, W. Fan. "Mining Web Navigations for Intelligence." Decision Support Systems, 2004.



Business STIET fellow Kurt DeMaagd

The Fall '05 STIET Seminar Series

The STIET Research Seminar Series is funded by a Rackham Interdisciplinary Workshop grant and the UM Office of the VP for Research. For descriptions and links to articles, see stiet.si.umich.edu/calendar.

Sept 8 Scott E. Page, Prof of Complex Systems, Political Science and Economics and Assoc Director, Center for the Study of Complex Systems, UM, "**Thoughts on Path Dependence**"

Sept 15 Paul Resnick and Caroline R. Richardson, MD, Prof of Information (Resnick) and Asst Prof, Dept of Family Medicine, and Research Scientist, VA HSR&D (Richardson), "**Centralized and Decentralized Responses to the Aftermath of Hurricane Katrina**"

Sept 22 John Riedl, Prof of Computer Science, Univ of Minnesota, "**Recommenders for Commerce, Content, and Community**"

Sept 29 Michael Gordon, Assoc Dean for Information Technology; Arthur F. Thurnau Prof of Business Administration and Business Information Technology, Stephen M. Ross School of Business, UM, "**Exploring the Base of the Pyramid: An Empirical Study of Cases from the Field**"

Oct 6 Romesh Saigal, Prof of Industrial and Operations Engineering, UM, "**The Effect of Reputation on Internet Transactions**"

Oct 13 David Messerschmitt, Roger A. Strauch Prof Emeritus of Electrical Eng and Computer Sci, Univ of California at Berkeley, "**Components: From Hardware and Software to Systems**"

Oct 20 Hila Etzion, Asst Professor of Business Information Technology, UM, "**Analyzing the Simultaneous Use of Auctions and Posted Prices for Selling Consumer Goods Online**"

Nov 3 Rahul Sami, Asst Prof of Information, UM, "**Computation in a Distributed Information Market**"

Nov 10 Yan Chen, Assoc Prof of Information, UM, "**Social Information and Contribution to Online Communities: A Field Experiment at MovieLens**"

Nov 17 Brian Kahin, Visiting Prof of Information, Public Policy and Communication, UM, "**Standards, Patents, and the Politics of Reform**"

Dec 1 Christopher Yoo, Prof of Law, Vanderbilt Univ Law School, "**Network Regulation: The Many Faces of Access**"

Dec 8 John L. King, Dean, School of Information, UM

Dec 15 Wolfgang Koenig, Electronic Finance Laboratory, Univ of Frankfurt, Germany



Professor John Riedl speaks at Sept 22 seminar

The 2005-06 STIET Fellows

STIET admitted the largest class of fellows to date with seven new two-year fellows and two new one-year fellows who are second year doctoral students:

Sajeev Cherian has a BA in Biology from the Univ. of Pennsylvania and an MS in Information Systems from DePaul Univ.. For six years he was involved in drug discovery research at the U of M and at Abbott Labs. Since 2000 he has been a project manager responsible for identifying and implementing information systems to support pharmaceutical R&D. His interests are in technologies that can promote drug discovery and development and in collaborative systems. Sajeev began doctoral work in Business this year.

Stanko Dimitrov earned a BSE in computer science from the U of M and is currently pursuing a PhD in industrial and operations engineering. His research interests are in discrete and network optimization and algorithm development. He is currently working on Internet routing with Professor Sharma.

Emily Gray has a BA in Mathematical Economic Analysis and Computational and Applied Mathematics from Rice University. Her interests are in network design and optimization. She is working with Dr. Cohn and Dr. Sharma on robust network design in the Industrial and Operations Engineering doctoral program.

Patrick Jordan is a doctoral student in Computer Science and Engineering studying under Professor Michael Wellman. In addition, he is pursuing an M.S.E. in Financial Engineering. His research interests include trading agent strategies and distributed agent systems.

John Lin is a first year doctoral student in the School of Information. Before entering the U of M, he received an B.S. in Economics from Caltech and worked there for five years as a research assistant. He worked on implementing auctions and market mechanisms for selling and trading goods that exhibit complementary values. John is interested in continuing to explore the area of auction and market design by combining insights from the fields of computer science and economics.

Mark Madrilejo has a BS in computer engineering from the U of M and an MBA from Western Michigan Univ. He has worked 10 years in information technology at companies including American Management Systems and Provia Software, on projects such as medical records processing, color measurement, and supply chain execution. Mark began doctoral work in Business in September 2005.

Nese Nasif is a first-year doctoral student of Economics. She received her BA in Economics from University of Chicago and worked for three years in the antitrust and competition policy practice of an economic consulting firm. Her academic interests include microeconomics and industrial organization, particularly topics involving the regulation of high-technology and other network industries.

Erik Talvitie is a computer science PhD student in the AI lab, working with Satinder Singh. He has a BA in computer science and mathematics from Oberlin College. His research interests focus on the behavior and the formation of collectives of autonomous agents.

Kevin Yamami is a first-year doctoral student in the School of Information. He holds a B.S. in Information Systems from U.C. Santa Cruz and a M.S. in Public Policy from the Heinz School at Carnegie Mellon University. Before coming to Michigan he was a Peace Corps Volunteer in Uzbekistan and an aid worker around the world. His research interests involve ICT and 3rd world economic development.



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Socio-Technical Infrastructure for Electronic Transactions

STIET is a multidisciplinary doctoral program for scholars interested in the social and technical aspects of electronic transactions, including E-commerce