

Erin Treacy Solovey

Department of Computer Science
Tufts University
161 College Avenue, Medford, MA 02155

(617) 275-3178
<http://www.cs.tufts.edu/~etreat01>
erin.solovey@gmail.com

RESEARCH INTERESTS

Human-Computer Interaction, Brain-Computer Interfaces, Next-Generation User Interfaces, Machine Learning, Computer Graphics

EDUCATION

Tufts University, Medford, MA

Ph.D. Candidate in Computer Science
GPA: 4.0 / 4.0

Expected, 2011

Tufts University, Medford, MA

M.S. in Computer Science
GPA: 3.9 / 4.0

February, 2007

Harvard University, Cambridge, MA

A.B. Cum Laude in Computer Science

June, 2001

AWARDS, RECOGNITIONS AND GRANTS

- Computing Innovation Fellowship sponsored by the Computing Research Association (CRA) & National Science Foundation (NSF) [Acceptance Rate: 11%] 2011
- Invited to serve as guest editor of ACM XRDS special "neuroscience & brain-computer interfaces" issue 2011
- IEEE Information Visualization Conference 2011 Best Poster Award 2011
- Doctoral Symposium, ACM Symposium on User Interface Software and Technology (UIST) 2009 2009
- ACM CHI Video Showcase Golden Mouse Award 2009
- Tufts Office of Graduate Studies Travel Award 2009
- Clare Boothe Luce Graduate Fellowship in Computer Science, Tufts University 2005-2008
- Grace Hopper Scholarship sponsored by the National Science Foundation 2008
- Tufts Diversity Fund Grant, "Computer Science, Engineering and Math Scholars Program – Offsite Field Trips/Retreats for AY 2007-2008" 2008
- Tufts School of Engineering Travel Award 2007
- Tufts Diversity Fund Grant, "Computer Science, Engineering and Math Scholars Program – Junior Mentor Program for AY 2007-2008" 2007
- Harvard College Scholarship, Harvard University 1997-2001

RESEARCH EXPERIENCE

Human-Computer Interaction Lab, Tufts Computer Science Department, Medford, MA

Research Advisor: Robert Jacob

Fall, 2005-Present

Currently exploring non-invasive brain imaging techniques (functional near-infrared spectroscopy and electroencephalography) for use in adaptive user interfaces, specifically to support users during multitasking. Work involves designing experiments to measure brain activity during various tasks and developing machine learning algorithms to classify brain activity. Also developing Reality-Based Interaction framework for understanding the next generation of human-computer interaction techniques. Made significant contributions to grant proposals submitted to NSF and NIH.

Microsoft Research, Redmond, WA

Research Intern

Summer, 2008

Research Mentors: Desney Tan, Dan Morris

Conducted study on selective attention with electroencephalography (EEG). Using machine learning, investigated whether there are patterns in EEG data related to selective attention that could be used in

adaptive user interfaces.

Boston Museum of Science, Boston, MA

Technical Intern for Exhibit Development

2007-2008

Worked with Michael Horn to develop and evaluate the Robot Park Exhibit in *Cahners ComputerPlace*, featuring the Tern tangible programming language, which was created in the Tufts HCI lab. The exhibit was deployed in October 2007 and was visited by approximately 20,000 people in its first year.

<http://hci.cs.tufts.edu/tern/robotpark.html>

MIT Lincoln Laboratory, Lexington, MA

Graduate Research Program

Summer, 2006

Developed federated search prototype for space sensor data to demonstrate a service-oriented, net-centric architecture for space systems, using NCES framework.

PUBLICATIONS

Refereed Full Conference Papers

- E.T. Solovey, K. Chauncey, F. Lalooses, M. Parasi, D. Weaver, M. Scheutz, P. Schermerhorn, A. Sassaroli, S. Fantini, A. Girouard, R.J.K. Jacob, "Sensing Cognitive Multitasking for a Brain-Based Adaptive User Interface," *Proc. ACM Conference on Human Factors in Computing Systems CHI'11*, ACM Press (2011). [Acceptance Rate: 26%].
- E.T. Solovey, A. Girouard, K. Chauncey, L.M. Hirshfield, A. Sassaroli, F. Zheng, S. Fantini, R.J.K. Jacob, "Using fNIRS Brain Sensing in Realistic HCI Settings: Experiments and Guidelines," *ACM UIST 2009 Symposium on User Interface Software and Technology*, ACM Press (2009). [Acceptance Rate: 18%].
- E.T. Solovey. "Using Your Brain for Human-Computer Interaction," Doctoral Consortium, *ACM UIST 2009 Symposium on User Interface Software and Technology*, ACM Press (2009).
- L.M. Hirshfield, E.T. Solovey, A. Girouard, J. Kebinger, R.J.K. Jacob, A. Sassaroli, S. Fantini. "Brain Measurement for Usability Testing and Adaptive Interfaces: An Example of Uncovering Syntactic Workload with Functional Near Infrared Spectroscopy," *Proc. ACM Conference on Human Factors in Computing Systems CHI'09*, ACM Press (2009). [Acceptance Rate: 24.5%].
- M.S. Horn, E.T. Solovey, R.J. Crouser, and R.J.K. Jacob. "Comparing the Use of Tangible and Graphical Programming Languages for Informal Science Education," *Proc. ACM Conference on Human Factors in Computing Systems CHI'09*, ACM Press (2009). [Acceptance Rate: 24.5%].
- A. Girouard, E.T. Solovey, L.M. Hirshfield, K. Chauncey, A. Sassaroli, S. Fantini, and R.J.K. Jacob, "Distinguishing Difficulty Levels with Non-invasive Brain Activity Measurements," *Proc. INTERACT 2009 Conference* (2009). [Acceptance Rate 29%].
- L.M. Hirshfield, K. Chauncey, E.T. Solovey, A. Girouard, R. Jacob, A. Sassaroli, and S. Fantini, "Combining Electroencephalograph and Near Infrared Spectroscopy to Explore Users' Instantaneous and Continuous Mental Workload States," *HCI International 2009 13th International Conference on Human-Computer Interaction*, Springer (2009).
- A. Sassaroli, F. Zheng, M. Coutts, L.M. Hirshfield, A. Girouard, E.T. Solovey, R.J.K. Jacob, Y. Tong, B. deB. Frederick, S. Fantini, "Application of near-infrared spectroscopy for discrimination of mental workloads," *SPIE Proceedings 7174*, (2009).
- M.S. Horn, E. T. Solovey, R.J.K. Jacob. "Tangible Programming and Informal Science Learning: Making TUIs Work for Museums," *Proc. of Interaction Design and Children*, ACM Press (2008).
- R.J.K. Jacob, A. Girouard, L.M. Hirshfield, M.S. Horn, O. Shaer, E. T. Solovey, and J. Zigelbaum, "Reality-Based Interaction: A Framework for Post-WIMP Interfaces," *Proc. ACM CHI 2008 Human Factors in Computing Systems Conference*, ACM Press (2008). [Acceptance Rate: 22%]
- A. Girouard, E. T. Solovey, L. Hirshfield, S. Ecott, O. Shaer, and R.J.K. Jacob, "Smart Blocks: A Tangible Mathematical Manipulative," *Proc. TEI 2007 First International Conference on Tangible and Embedded Interaction*, pp. 183-186 (2007).

Journal Articles

- A. Girouard, E.T. Solovey, and R.J.K. Jacob, "Designing a Passive Brain Computer Interface using

Real Time Classification of Functional Near-Infrared Spectroscopy," *International Journal of Autonomous and Adaptive Communications Systems* (2010).

- E. M. Peck, E.T. Solovey, K. Chauncey, A. Sassaroli, S. Fantini, A. Girouard, L.M. Hirshfield, R.J.K. Jacob, "Your Brain, Your Computer, and You," *IEEE Computer*, vol. 43, no. 12, December, 2010.
- A. Sassaroli, F. Zheng, L.M. Hirshfield, A. Girouard, E.T. Solovey, R.J.K. Jacob, and S. Fantini, "Discrimination of Mental Workload Levels in Human Subjects with Functional Near-Infrared Spectroscopy," *Journal of Innovative Optical Health Sciences*, vol. 1, no. 2 (2008).

Book Chapter

- A. Girouard, E. T. Solovey, L. Hirshfield, E. Peck, K. Chauncey, A. Sassaroli, S. Fantini, and R. Jacob, "From Brain Signals to Adaptive Interfaces: Using fNIRS in HCI," in *Brain-Computer Interfaces: Applying our Minds to Human-Computer Interaction*, ed. by A. Nijholt, pp. 221-237, Springer (2010).

Workshop Papers (Peer Reviewed)

- E.T. Solovey, R.J.K. Jacob, "Meaningful Human-Computer Interaction Using fNIRS Brain Sensing," *Proc. CHI 2011 Workshop on Brain and Body Interfaces: Designing for Meaningful Interaction* (2011).
- A. Girouard, E.T. Solovey, R. Mandryk, D. Tan, L. Nacke, R.J.K. Jacob, "Brain, Body, and Bytes: Psychophysiological User Interaction," *ACM CHI 2010 Extended Abstracts* (2010).
- E.T. Solovey, O. Shaer, A. Girouard, L.M. Hirshfield, M.S. Horn, J. Zigelbaum, R.J.K. Jacob, "Programming reality within the reality-based interaction framework," *Proc. ACM CHI 2009 Workshop on Programming Reality* (2009).
- L.M. Hirshfield, E.T. Solovey, A. Girouard, R.J.K. Jacob, J. Kebinger, M.S. Horn, O. Shaer, J. Zigelbaum, and R.J.K. Jacob, "Using Brain Measurement to Evaluate Reality Based Interactions," *Proc. ACM CHI 2009 Workshop on Challenges in Evaluating Usability and User Experience of Reality-Based Interaction* (2009).
- A. Girouard, L.M. Hirshfield, E. Solovey, and R.J.K. Jacob, "Using functional Near-Infrared Spectroscopy in HCI: Toward evaluation methods and adaptive interfaces," *Proc. ACM CHI 2008 Workshop on Brain-Computer Interfaces for HCI and Games* (2008).
- M.S. Horn, O. Shaer, A. Girouard, L.M. Hirshfield, E.T. Solovey, J. Zigelbaum, and R.J.K. Jacob, "Putting Tangible User Interfaces in Context: A Unifying Framework for Next Generation HCI," *Proc. ACM CHI 2007 Workshop on Tangible User Interfaces in Context and Theory* (2007).

Poster Presentations (Peer Reviewed)

- E. Peck, E.T. Solovey, S. Su, R.J.K. Jacob, R. Chang, "Near to the brain: Functional near-infrared spectroscopy as a lightweight brain imaging technique for visualization," *IEEE Conference on Information Visualization*, 2011. **Best Poster Award**
- E.T. Solovey, R.J.K. Jacob, "Using fNIRS to Support User Interfaces," *fNIRS Conference*, Cambridge, MA, Oct 15-17, 2010.
- A. Sassaroli, F. Zheng, A. Girouard, E.T. Solovey, K. Chauncey, L.M. Hirshfield, E. Peck, R.J.K. Jacob, and S. Fantini, "Application of correlation analysis tools for the classification of mental workloads in functional near-infrared spectroscopy," *BIOMED OSA Topical Meeting* (2010).
- A. Sassaroli, Y. Tong, L. M. Hirshfield, A. Girouard, E. T. Solovey, R. J. K. Jacob, S. Fantini, "Real-time assessment of mental workload with near infrared spectroscopy: potential for human-computer interaction", *BIOMED, OSA topical meeting*, St. Petersburg Bayfront, FL, March 16-19 2008.
- L.M. Hirshfield, A. Girouard, E.T. Solovey, R.J.K. Jacob, A. Sassaroli, Y. Tong, and S. Fantini, "Human-Computer Interaction and Brain Measurement Using Functional Near-Infrared Spectroscopy," *ACM UIST 2007 Symposium on User Interface Software and Technology*, ACM Press (2007).
- R.J.K. Jacob, A. Girouard, L.M. Hirshfield, M.S. Horn, O. Shaer, E.T. Solovey, and J. Zigelbaum, "Reality-Based Interaction: Unifying the New Generation of Interaction Styles," *ACM CHI 2007 Human Factors in Computing Systems Conference*, pp. 2465-2470, ACM Press, Work in Progress paper (2007).

Videos (Peer Reviewed)

- M. Bernstein, P. André, K. Luther, E.T. Solovey, E.S. Poole, S.A. Paul, S.K. Kane, J. Grudin. "CHIstory," *CHI 2009 Video Showcase* (2009). **Golden Mouse Award**.

Other Papers

- E. Peck, K. Chauncey, A. Girouard, R. Gulotta, F. Lalooses, E.T. Solovey, D. Weaver, and R. Jacob, "From Brains to Bytes," *ACM XRDS: Crossroads*, vol. 16, no. 4, pp. 42-47 (2010)
- E. T. Solovey. "Using your brain for human-computer interaction," Grace Hopper Celebration of Women in Computing. Poster Session (2008).
- A. Girouard, E. T. Solovey, L. M. Hirshfield, K. Chauncey, A. Sassaroli, S. Fantini, and R. J. K. Jacob, "Distinguishing Difficulty Levels with Non-invasive Brain Activity Measurements," Technical Report 2008-3, Department of Computer Science, Tufts University, Medford, Mass. (2008).
- R.J.K. Jacob, A. Girouard, L.M. Hirshfield, M. Horn, O. Shaer, E.T. Solovey, and J. Zigelbaum, "What Is the Next Generation of Human-Computer Interaction?," *interactions*, vol. 14, no. 3, pp. 53-58 (May 2007).

TALKS

- Guest Lecture, 6.835 – Intelligent Multimodal User Interfaces, MIT Department of Electrical Engineering and Computer Science (Course 6), Cambridge, MA. April 12, 2011.
- "Non-invasively Detecting Cognitive State with fNIRS to Support User Interfaces," Humans & Automations Laboratory, MIT Department of Aeronautics and Astronautics, Cambridge, MA. July, 2010.
- "Tangible Programming at the Museum of Science and Brain-Computer Interfaces," Guest Lecture, CS349 – Tangible User Interfaces, Wellesley College, Wellesley, MA. December 4, 2009.
- "Programming with the Brain," When Everything is Programmable Conference, Institute for the Future, Palo Alto, CA. October 2009.
- "Using your brain for HCI," Guest Lecture, MAS 672 - New Paradigms for Human-Computer Interaction, MIT Media Lab, Cambridge, MA. March 2009.
- "Sensing Auditory Attention," HCI Intern Lunch Talks series, Microsoft Research, Redmond, WA. August, 2008.
- "Introduction to SCORM," Education Development Center, Newton, MA. October 9, 2007.
- "A window into the brain: new techniques for brain-computer interaction," Graduate Research Symposium Talk, Tufts University, April 13, 2007.
- "Finding the Needle in Haystack (HAX), Federated Search using the NCES Framework." E. Treacy, M. Beynon, G. Mezynski. Presented at MIT Lincoln Laboratory. August 8, 2006.

COMMUNITY AND PROFESSIONAL ACTIVITIES

Workshop Organization

- Brain, Body, and Bytes: Psychophysiological User Interaction, at ACM Conference on Human Factors in Computing Systems (CHI), April 2010.

Program Committee

- ACM SIGCHI Conference on Tangible, Embedded, Embodied Interaction (TEI) 2012
- ACM SIGCHI Conference on Human Factors in Computing Systems Work-in-Progress (CHI WiP) 2012

Editor

- Invited guest editor for ACM XRDS Magazine Issue on Brain-Computer Interfaces and Neuroscience (Fall, 2011)

Journal and Conference Reviewer

- ACM Transactions on Computer-Human Interaction Journal (TOCHI) 2008
- ACM Conference on Human Factors in Computer Systems (CHI) 2007, 2008, 2009, 2010, 2011
- ACM Conference on Tangible and Embedded Interaction (TEI) 2007, 2008
- ACM Symposium on User Interface Software and Technology (UIST) 2009, 2010, 2011
- ACM Conference on Computer Supported Cooperative Work (CSCW) 2011
- Brain-Computer Interfacing Special Session at Conference on Multimodal Interaction (ICMI) 2011
- ACM International Conference on Advances in Computer Entertainment Technology (ACE) 2010
- Ergonomics 2011

Student Volunteer

- Conference on Human Factors in Computer Systems (CHI) 2006, 2007, 2009

Professional Membership

- Founding Team, Boston CHI Labs: <http://bostonchilabs.org/>
- ACM Special Interest Group on Computer-Human Interaction (SIGCHI)
- Greater Boston chapter of ACM Special Interest Group on Computer-Human Interaction (SIGCHI)
- Association for Computing Machinery (ACM)
- Institute of Electrical and Electronics Engineers (IEEE)
- Human Factors and Ergonomics Society Augmented Cognition Technical Group
- Computing Research Association Committee on the Status of Women in Computing Research (CRAW) Graduate Cohort for Women Program 2006, 2007, 2008
- Tufts Women in Computer Science (WICS)

Other Activities

- Graduate Leader for NSF-sponsored Computer Science, Engineering, and Math Scholar Program (CSEMS) 2005-2009
- I³ Harvard College Innovation Challenge Judge (2009, 2010)
- Student Founder of Technology and Entrepreneurship Center at Harvard (2000)
- Harvard University Admissions Interviewer for prospective students (2003-present)
- Radcliffe Mentor for undergraduate mentees (2003-present)

TEACHING & SUPERVISING EXPERIENCE

Tufts Department of Computer Science, Medford, MA

Masters Project Co-Supervisor: Nada Attar, Margarita Parasi **2009-2010**

Undergraduate Research Co-Supervisor (as part of Computing Undergraduates Scholars Program): Hadar Rosenhand, Kelly Moran **Spring, 2007**

Brain-computer Interface Seminar **Fall, 2009**
Participated in the creation and organization of seminar.

Graduate Leader – Computer Science, Engineering, and Math Scholars (CSEMS) **2005-2009**
Acted as a mentor to students and built supportive community of students and faculty to encourage students to become members of the high technology workforce after graduation. Organized weekly seminar for first and second year computer science, engineering, and math undergraduates from disadvantaged backgrounds. Invited speakers from academia, industry, or within Tufts as well as planned field trips to local companies to expose students to resources and career paths in their fields.

Secured grant funding for lab and company visits and to support the junior mentor program within CSEMS.

Instructor – Introduction to Digital Information **Summer, 2007**
Prepared syllabus, lectures, labs, assignments and exams. Lectured, met regularly with students, graded programming assignments, written work, and exams.

Teaching Assistant – *Theory of Computation* **Summer, 2007**
Graded written work, met regularly with students, conducted review sessions.

Teaching Assistant – Human-Computer Interaction **Spring, 2007**
Collaborated on development of assignments, graded all written work, and met regularly with students.

Laboratory Instructor – Introduction to Digital Information **Fall, 2006**
Led laboratory sessions, met regularly with students, and graded programming assignments, written work, and exams.

Teaching Assistant – Human-Computer Interaction **Spring, 2006**
Collaborated on development of assignments, graded all written work, and met regularly with students.

Laboratory Instructor – Data Structures **Fall, 2005**
Developed laboratory curriculum, led laboratory sessions, met regularly with students.

INDUSTRY WORK EXPERIENCE

Bluefin Labs, Cambridge, MA **Summer, 2010**
User Interface Design & Development

Brijit **2006-2007**
One of four founders of online media business. Designed and built entire user experience and back-end system for original Brijit website.

Oracle Corporation, Redwood Shores, CA and Burlington, MA **2001-2005**
Senior Applications Engineer, Oracle Learning Architecture
Designed and implemented highly complex enhancements to Oracle iLearning, Oracle's enterprise learning management system using Java, JSP, SQL, PL/SQL, Web Services and XML. Analyzed and integrated external requirements and performed high-level and detailed design based on external requirements. Communicated with QA team to ensure quality and consistency across product. Interacted with external clients to discuss feasibility of suggested features and usability of existing ones. Resolved highly complex bugs, improving performance and usability of Oracle iLearning

Oracle Corporation, Redwood Shores, CA **Summer, 2000**
Summer Intern, Manufacturing Applications

Sun Microsystems, Cupertino, CA **Summer, 1999**
Summer Intern, Java Software Division, Web Engineering

Planet Direct / MyWay.com (A CMGI Company), Andover, MA **Summer, 1998**
Java Component Development Team Intern

COMPUTER SKILLS

- **Programming Languages:** Java, C++, JSP, C, XML, Lisp, Visual Basic, ASP, HTML, PHP, Flash, Flex
- **Database:** SQL, PL/SQL, Oracle, MySQL
- **Operating Systems:** UNIX, Windows
- **Software Packages:** Eclipse, Weka, OpenGL, Matlab, Illustrator, Omnigraffle

PRESS

- Tufts Journal. (Feb. 3, 2008). "Mind-reading Computers: It may sound like sci-fi, but one day a computer may sense when you're stressed and tell you to take a break," <http://tuftsjournal.tufts.edu/archive/2008/february/features/computer.shtml>
- Computerworld. (Feb. 1, 2008). "Give your computer the finger: Touch-screen tech comes of age," http://computerworld.com/action/article.do?command=viewArticleBasic&taxonomyName=hardware&articleId=9058841&taxonomyId=12&intsrc=kc_feat
- Tufts Daily (Oct. 18, 2007). "Tufts researchers delve into the human brain with cutting-edge 'light imaging' technology," <http://media.www.tuftsdaily.com/media/storage/paper856/news/2007/10/18/Features/Tufts.Researchers.Delve.Into.The.Human.Brain.With.CuttingEdge.light.Imaging.Tech-3041180.shtml>
- EE Times (Oct. 5, 2007). "Mind controls computer," <http://www.eetimes.com/news/latest/showArticle.jhtml;jsessionId=E1PLXMX4NMTT2QSNLSCCKHA?articleID=202201609>
- Science Daily, (Oct. 1, 2007). "Technology Could Enable Computers To 'Read The Minds' Of Users," <http://www.sciencedaily.com/releases/2007/10/071001125649.htm>
- Diversity/Careers in Engineering & Information Technology, Vol. XVI, No. 3, pp. 83-84 (Summer/Fall 2007). "Tufts University attracts women to computer science," http://www.diversitycareers.com/articles/college/07-sumfall/saluting_tufts.htm
- Tufts Engineering eNews, (May 2007). "Technology May Bridge Emotion Gap between Humans and Computers," http://engineering.tufts.edu/Engineering-Page-eng2w_1181737584903.html
- Tufts.edu, (April 23, 2007). "A Smooth Transition," http://www.tufts.edu/home/feature/?p=women_engineering&p3=3