

Audrey Girouard

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RESEARCH INTERESTS

My research in human computer interaction focuses on the design, implementation and evaluation of interfaces and systems that are more receptive to the user's needs. Specifically, I am observing the user through alternative modalities and background sensing of affective and workload signals. My current work involves adaptive passive brain-computer interfaces for healthy users using non-invasive technology. These systems are designed to use brain activity as an additional input, allowing for a lightweight adaptation of the interface in real time according to the user's mental state. My long-term goal is to pioneering the future of alternative modalities, with a current focus on healthy participants to enhance the reliability, efficiently and enjoyment of the user experience.

Human Computer Interaction (HCI), Adaptive Interfaces, Brain Computer Interfaces, Affective Computing, Reality Based Interfaces, Tangible User Interfaces, Machine Learning

EDUCATION

Tufts University, Medford, MA, USA

Doctorate in Computer Science, specializing in Human Computer Interaction 2007 - Present

Dissertation: Adaptive Brain Computer Interface

Advisor: Robert J.K. Jacob

Anticipated date of graduation: Spring 2010

Tufts University, Medford, MA, USA

Master's in Computer Science, specializing in Human Computer Interaction 2005 - 2006

Project: Human Computer Interaction and Brain Measurement Using Functional Near-Infrared Spectroscopy

École Polytechnique de Montréal, Montréal, Canada

Bachelor of Software Engineering 2001 - 2005

RESEARCH AND PROFESSIONAL EXPERIENCE

Tufts University, Computer Science Department

Research Assistant 2007 - Present

Project: Brain computer interfaces using functional near-infrared spectroscopy

- Current Ph.D. research on developing the use of this brain measurements for HCI by exploring brain signals interesting to this field, providing sound statistical analysis and machine learning classification of the measured signals, showing the usefulness of the tool in realistic settings, making the tool work in real time and investigating how to adapt interfaces with this signal.

- Awarded the 'CHI Doctoral Consortium Award' at the ACM CHI Conference on Human Factors in Computing Systems.

- Includes significant contributions to several grant proposals submitted to the NSF and NIH

INRIA, Université de Paris-Sud & CNRS, Laboratoire de Recherche en Informatique

Visiting Researcher 2008

In|Situ| research group, advisor: Wendy Mackay

- Study and improve how people brainstorm by themselves through the use of automatic intervention to encourage a renewed flow of ideas using brain measurements.

Common Media, Inc.

Software Engineer and Community Manager for CommonKitchen.com 2007
- User experience analysis, design and web development of an online food community

Tufts University, Computer Science Department

Site Director 2006

Workshop: Problem Solving and Critical Thinking with Discrete Mathematics

- Organization of discrete math workshop for K-12 teachers: responsible of selecting participants, preparing material, assisting professors and teachers.

École Polytechnique de Montréal, Computer Engineering Department

Research Assistant 2004 - 2005

Project: Computerized environment for self-evaluation and support of the learning process for first year undergraduate students in computer science

BancTec Inc., Research and Development for Payments Products Department

Analyst – Developer for PCR2P product 2005

Internship as an analyst-developer for PCR2P product 2004

- Creation, design and development of modules for a check processing software suite

TEACHING EXPERIENCE

Tufts University, Department of Computer Science

Independent Study Advisor 2008-Present

Master's project Advisor 2008-Present

Participated in the creation and coordination of the *Brain-Computer Interfaces* seminar 2007, 2009

Teaching Assistant for the course *Databases* 2007

Teaching Assistant for the course *Object Oriented Programming for Graphical User Interfaces* 2006

Teaching Assistant for the course *Programming Languages* 2006

Teaching Assistant for the course *Introduction to Computers for Engineers* 2005

École Polytechnique de Montréal, Department of Computer Engineering

Teaching Assistant for the course *Software Engineering Workshop* 2005

Teaching Assistant for the course *Fundamentals of Software Engineering* 2003- 2005

RECOGNITIONS, AWARDS AND SCHOLARSHIPS

ACM CHI Conference on Human Factors in Computing Systems

CHI Doctoral Consortium 2009

Grace Hopper Celebration of Women in Computing

National Science Foundation Student Scholarship 2009

National Sciences and Engineering Research Council of Canada Scholarship

Postgraduate Scholarship – Doctorate (\$21000/year) 2007 - 2010

Undergraduate Student Research Award (\$5625, declined) 2003

Fond Québécois de la Recherche sur la Nature et les Technologies

Doctorate Scholarship – Research (\$20000/year, declined) 2007

Tufts University

Graduate Student Research Award (\$700)	2008
Computer Science Scholarship (Tuition waver)	2005 - Present
Graduate Assistantship (\$18000/year)	2005 - 2007
Travel award (total of \$1200)	2006, 2007, 2008, 2009

École Polytechnique de Montréal

Da Vinci Profile, a certificate of excellence recognizing the achievements of the student (\$1000)	2005
Research Scholarship from the Unit of Participation and Initiation to Research (\$1500)	2004

PUBLICATIONS AND PRESENTATIONS

JOURNAL PAPER

1. Sassaroli, A., Zheng, F., Hirshfield, L.M., **Girouard, A.**, Solovey, E.T., Jacob, R.J.K. and Fantini, S. Discrimination of Mental Workload Levels in Human Subjects with Functional Near-Infrared Spectroscopy. *Journal of Innovative Optical Health Sciences*, 1 (2). 2008, 227-237.

BOOK CHAPTER

2. **Girouard, A.**, Solovey, E.T., Hirshfield, L.M., Peck, E.M., Chauncey, K., Fantini, S., Sassaroli, A. and Jacob, R.J.K. From Brain Signals to Adaptive Interfaces: using fNIRS in HCI. in Tan, D.S. and Nijholt, A. eds. *(B+H)CI: The Brain in Human-Computer Interaction and the Human in Brain-Computer Interfaces*, Springer, 2010 (in print).

MAGAZINE ARTICLES

3. Jacob, R.J.K., **Girouard, A.**, Horn, M., Miller, L., Shaer, O., Treacy, E. and Zigelbaum, J. What Is the Next Generation of Human-Computer Interaction? *interactions*, 2007, 53-58.

REVIEWED CONFERENCE PAPERS

Full Papers

4. Solovey, E.T., **Girouard, A.**, Hirshfield, L.M., Chauncey, K., Sassaroli, A., Zheng, F., Fantini, S. and Jacob, R.J.K., Using fNIRS Brain Sensing in Realistic HCI Settings: Experiments and Guidelines. in *ACM UIST'09 Symposium on User Interface Software and Technology*, (2009), 157-166.
5. **Girouard, A.**, Solovey, E., Hirshfield, L., Chauncey, K., Sassaroli, A., Fantini, S. and Jacob, R. Distinguishing Difficulty Levels with Non-invasive Brain Activity Measurements. in *Human-Computer Interaction – INTERACT 2009*, 2009, 440-452.
6. Hirshfield, L.M., Solovey, E.T., **Girouard, A.**, Kebinger, J., Sassaroli, A., Tong, Y., Fantini, S. and Jacob, R.J.K., Brain Measurement for Usability Testing and Adaptive Interfaces: An Example of Uncovering Syntactic Workload with Functional Near Infrared Spectroscopy. in *Proceedings of ACM CHI'09 Conference on Human Factors in Computing Systems*, (2009), 2185-2194.
7. Sassaroli, A., Zheng, F., Coutts, M., Hirshfield, L.H., **Girouard, A.**, Solovey, E.T., Jacob, R.J.K., Tong, Y., Frederick, B.d. and Fantini, S., Application of near-infrared spectroscopy for discrimination of mental workloads. in *Proceedings SPIE*, (2009), 7174, 71741H 1-7.
8. Jacob, R.J.K., **Girouard, A.**, Hirshfield, L.M., Horn, M.S., Shaer, O., Solovey, E.T. and Zigelbaum, J., Reality-Based Interaction: A Framework for Post-WIMP Interfaces. in *Proc. ACM CHI 2008 Human Factors in Computing Systems Conference*, (2008), ACM Press, 201-210.
9. **Girouard, A.**, Treacy, E., Hirshfield, L., Ecott, S., Shaer, O. and Jacob, R.J.K., Smart Blocks: A Tangible Mathematical Manipulative. in *TEI 2007 First International Conference on Tangible and Embedded Interaction*, (2007), 183-186.

10. **Girouard, A.**, Smith, N.W. and Slonim, D.K., Motif Evaluation by Leave-one-out Scoring. in *IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology*, (2006), 1-7.

Short Papers

11. **Girouard, A.**, Solovey, E.T., Mandryk, R., Tan, D., Nacke, L. and Jacob, R.J.K., Brain, Body and Bytes: Psychophysiological User Interaction. in *ACM CHI 2010 Extended Abstracts Conference on Human Factors in Computing Systems*, Workshop Abstract (2010) (in print).
12. **Girouard, A.**, Adaptive Brain Computer Interfaces. in *Proceedings of CHI '09 extended abstracts on Human factors in computing systems*, (2009), 3097-3100.
13. Jacob, R.J.K., **Girouard, A.**, Hirshfield, L.M., Horn, M.S., Shaer, O., Solovey, E.T. and Zigelbaum, J., Reality-Based Interaction: Unifying the New Generation of Interaction Styles. in *Proceedings of ACM CHI 2007 Extended Abstracts on Human Factors in Computing Systems Conference*, (2007), 2465-2470.
14. Hirshfield, L.M., **Girouard, A.**, Solovey, E.T., Jacob, R.J.K., Sassaroli, A., Tong, Y. and Fantini, S., Human-Computer Interaction and Brain Measurement Using Functional Near-Infrared Spectroscopy. in *ACM UIST 2007 Symposium on User Interface Software and Technology*, (2007), ACM Press, Poster Paper.

REVIEWED ABSTRACTS

15. Rebbapragada, U., **Girouard, A.** and Winbladh, K., Tips, Tricks and Software for Keeping Research Organized. *Grace Hopper Celebration of Women in Computing*, Tuscon, Arizona, October 2009.
16. Hirshfield, L., Chauncey, K., Gulotta, R., **Girouard, A.**, Solovey, E.T., Jacob, R., Sassaroli, A. and Fantini, S., Combining Electroencephalograph and Near Infrared Spectroscopy to Explore Users' Mental Workload. in *HCI International 2009 13th International Conference on Human-Computer Interaction*, (2009), 239 - 247.
17. Fantini, S., Sassaroli, A., Tong, Y., Hirshfield, L.H., **Girouard, A.**, Solovey, E.T. and Jacob, R.J., Real-Time Assessment of Mental Workload with Near-Infrared Spectroscopy: Potential for Human-Computer Interaction. in *Biomedical Optics*, (2008), Optical Society of America, BMD14.
18. **Girouard, A.**, Miller, L. and Lomasky, R. Everything You Always Wanted to Know About Graduate School but Were Afraid to Ask, *Grace Hopper Celebration of Women in Computing*, San Diego, October 2006.
19. **Girouard, A.**, Smith, N.W. and Ritter, F.E., Lessons from decompiling an embodied cognitive model. in *Cognitio*, (2006).

WORKSHOP PAPERS (PEER REVIEWED)

20. Solovey, E.T., Shaer, O., **Girouard, A.**, Hirshfield, L.M., Horn, M.S., Zigelbaum, J. and Jacob, R.J.K. Programming Reality within the Reality-Based Interaction Framework *Proc. ACM CHI 2009 Workshop on Programming Reality: From Transitive Materials to Organic User Interfaces*, (2009).
21. Hirshfield, L.M., Solovey, E.T., **Girouard, A.**, Jacob, R.J.K., Kebinger, J., Horn, M.S., Shaer, O., Zigelbaum, J. and Jacob, R.J.K. 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).
22. **Girouard, A.**, Hirshfield, L.M., Solovey, E.T. and Jacob, R.J.K., Using functional Near-Infrared Spectroscopy in HCI: Toward evaluation methods and adaptive interfaces. in *ACM CHI 2008 Workshop on Brain-Computer Interfaces for HCI and Games*, (2008).
23. Horn, M.S., Shaer, O., **Girouard, A.**, Hirshfield, L.M., Solovey, E.T., Zigelbaum, J. and Jacob, R.J.K., Putting Tangible User Interfaces in Context: A Unifying Framework for Next Generation HCI. in *ACM CHI 2007 Workshop on Tangible User Interfaces in Context and Theory*, (2007).

INVITED TALKS

24. **Girouard, A.** and Clarke, L., Identifying and Benefiting from Advisors & Mentors. *CRA-W Graduate Cohort Workshop*, San Mateo, CA, March 2009.
25. **Girouard, A.**, Adapting Pacman: Brain Computer Interfaces using functional near infrared spectroscopy. *Wellesley College*, March 2009.
26. **Girouard, A.**, Pacman adaptable : les interfaces cerveau-machines grâce à la spectroscopie proche infrarouge. *École Polytechnique de Montréal*, Montréal, Qc, February 2009.
27. **Girouard, A.** Brain Computer Interfaces: an fNIR research study, Graduate Research Symposium, Tufts University, November 2007.
28. **Girouard, A.**, "Using mental workload measured with fNIRS in adaptive user interfaces", Graduate Research Symposium, Tufts University, April 2007.

PROFESSIONAL ACTIVITIES

Program committee

Conference on Human-Computer Interactions – INTERACT 2009

Journal and Conference Reviewer

ACM CHI Conference on Human Factors in Computing Systems 2006 - 2010
TEI Conference on Tangible and Embedded Interaction 2007, 2009
ACM Transactions on Computer-Human Interaction 2008 - 2009
ACM UIST Symposium on User Interface Software and Technology 2007, 2009

Workshop Organization

Brain, Body and Bytes: Psychophysiological User Interaction, at ACM CHI 2010

Conference Committee

Canadian Undergraduate Software Engineering Conference 2003 - 2006

Computer Research Association – Women Graduate Cohort Workshop **selected participant** 2006-2007

Student Volunteer (ACM CHI Conference on Human Factors in Computing Systems) 2006-2007

Junior Professional Engineer, Order of Professional Engineers of Quebec (OIQ) 2005 - Present

ACM SIGCHI (Special interest group on Computer Human Interaction) student **member** 2006 - Present

ACM SIGCHI Boston **member** 2008 - Present

Human Factors and Ergonomic Society Augmented Cognition Technical Group **member** 2008 - Present

REFERENCES

References available on request