MASSACHUSETTS INSTITUTE OF TECHNOLOGY
School of Engineering Faculty Personnel Record

Date: February 19, 2012

Name: Robert C. Miller
Department: Electrical Engineering and Computer Science

1. Date of Birth: November 22, 1972

2. Citizenship: US

3. Education:

Degree	School	Date
SB,MEng	MIT	1995
PhD	Carnegie Mellon University	2002

4. Title of Thesis for Most Advanced Degree:

   Lightweight Structure in Text

5. Principal Fields of Interest:

   Human-computer interaction; user interfaces; software engineering; crowdsourcing, human computation, social computing; end-user programming; programming environments.

6. Name and Rank of Other Department Faculty in the Same Field:

   Randall Davis, Professor
   Daniel Jackson, Professor
   David Karger, Professor

7. Name and Rank of Faculty in Other Departments in the Same Field:

   Mary Cummings, Associate Professor (Aeronautics & Astronautics)
   Chris Schmandt, Principal Research Scientist (Media Arts & Sciences)
   Henry Lieberman, Research Scientist (Media Arts & Sciences)
   Ruth Rosenholtz, Research Scientist (Brain & Cognitive Sciences)

8. Non-MIT Experience (including military service):

Employer	Position	Beginning	Ending
Searchcraft Inc.	Software Engineer	Jan 1988	Aug 1990
Microsoft	Software Dev. Intern	June 1993	Aug 1993
Microsoft Research	Software Dev. Intern	June 1994	Aug 1994
Carnegie Mellon	Research Assistant	Sept 1995	May 2002
DEC Systems Research Center	Research Intern	June 1997	Aug 1997

9. History of MIT Appointments:

Rank	Beginning	Ending
Assistant Professor	Aug 2002	June 2006
Associate Professor (without tenure)	July 2006	June 2007
NBX Career Development Associate Professor	July 2007	June 2009
Associate Professor	July 2009	present

10. Consulting Record:

Firm	Beginning	Ending
None		

11. Department and Institute Committees, Other Assigned Duties:

Activity	Beginning	Ending
Undergraduate Advisor (Dept.)	Sept. 2003	present
Education Committee (Dept.)	Sept 2003	May 2004
Graduate Admissions (Dept.)	Dec 2005	Feb 2006
Information Science Committee (Dept.)	April 2007	July 2011
Web Site Redesign Committee (Lab)	Feb 2008	Dec 2008
CSAIL Executive Committee (Lab)	July 2009	July 2011
Co-chair, Area II graduate admissions (Dept)	Dec 2009	Apr 2010
Faculty search committee (Dept)	Dec 2010	present
Course evaluation revision committee (Dept)	Feb 2011	July 2011
chair, EECS website redesign committee (Dept)	July 2011	present
EECS education strategic working group (Dept)	July 2011	present

12. Professional service:

Activity	Beginning	Ending
UIST, CHI, WWW, TOCHI, IUI, VL/HCC SOUPS reviewer	Jan 2001	present
USENIX 2001 program committee	Jan 2001	Feb 2001
NSF award panel	Jan 2003	Feb 2003
CADUI 2003 program committee	Oct 2003	Dec 2003
UIST 2005 program committee	Mar 2005	Jun 2005
ICSE 2005 End-user SW Engineering Workshop committee	Mar 2005	Apr 2005
AAAI 2004 Pen-Based Interaction program committee	Apr 2004	Dec 2004
NSF award panel	Nov 2005	Dec 2005
WWW 2005 program committee	Nov 2005	May 2005
Co-chair, AAAI 2006 Intelligent Systems Demonstrations	Jan 2006	Apr 2006
SOUPS 2006 Security User Studies workshop	Feb 2006	July 2006
NSF award panel	Aug 2006	Sept 2006
Co-chair, WWW 2007 Browsers & UI track	Dec 2006	May 2007
Co-chair, CHI 2007 Student Research Competition	Sept 2006	Apr 2007
Co-chair, AAAI 2007 Intelligent Systems Demonstrations	Jan 2007	Apr 2007
SOUPS 2007 program committee	Mar 2007	Jul 2007
eCrime 2007 program committee	May 2007	Oct 2007
WWW 2008 program committee	Nov 2007	May 2008

SOUPS 2008 program committee	Feb 2008	Jul 2008
Co-chair, SOUPS 2008 poster track	May 2008	Jul 2008
UIST 2008 program committee	Apr 2008	Jun 2008
IUI 2008 senior program committee	May 2008	Nov 2008
IS-EUD 2008 program committee	Aug 2008	Nov 2008
Co-chair, CHI 2009 Student Research Competition	Jan 2009	Apr 2009
SOUPS 2009 program committee	Feb 2009	Jul 2009
UIST 2009 program committee	Apr 2009	Jun 2009
Co-chair, SOUPS 2009 poster track	May 2009	Jul 2009
CHI 2010 program committee	Sep 2009	Dec 2009
VL/HCC 2009 program committee	April 2010	May 2010
Co-chair, UIST 2010 program committee	Dec 2009	Oct 2010
CHI 2011 program committee	Sep 2010	Dec 2010
WWW 2011 program committee	Nov 2010	Feb 2011
VL/HCC 2011 program committee	April 2011	May 2011
HCOMP 2010 workshop program committee	April 2011	August 2011
Co-organizer, CHI 2011 workshop on Crowdsourcing & Human Computation	Dec 2010	May 2011
HCOMP 2011 workshop program committee	April 2011	July 2011
EC 2011 Workshop on Social Media & User-Generated Content program committee	April 2011	June 2011
FutureCSD 2012 program committee	Oct 2011	Feb 2012
TOCHI associate editor	July 2011	present
General Chair, UIST 2012	Oct 2010	Oct 2012

13. Awards Received:

Award	Date
National Merit Scholarship	May 1990
Microsoft Technical Scholarship	May 1993
NDSEG Fellowship	Apr 1995
USENIX 1999 Outstanding Paper Award	June 1999
USENIX 2000 Best Student Paper Award	June 2000
CMU SCS Distinguished Dissertation Award	Nov 2002
ACM Doctoral Dissertation, honorable mention	Nov 2002
NSF CAREER Award	Mar 2005
UIST 2005 Best Paper Award	Oct 2005
Louis Smullins Award for Teaching Excellence	May 2007
NBX Career Development Associate Professorship	July 2007
UIST 2009 Best Student Paper Award	Oct 2009
UIST 2010 Best Student Paper Award	Oct 2010
UIST 2010 Best Paper Award	Oct 2010
Jamieson Prize for Excellence in Teaching	May 2011

14. Current Organization Membership:

Organization	Offices Held
Association of Computing Machinery	
Phi Beta Kappa	

15. Patents and Patent Applications Pending:

    Krishna A. Bharat and Robert C. Miller. "Method for learning character patterns to interactively control the scope of a web crawler." US Patent No. 6411952, June 25, 2002.

16. Professional Registration:

    None.

17. Major New Products, Processes, Designs, or Systems:

    None.

Educational Contributions Other than Classroom Teaching of Robert C. Miller

1. Teaching Materials Developed:
   a) New advanced-undergraduate/introductory-graduate course, 6.813/6.831 User Interface Design and Implementation, developed in Fall 2003 and taught annually ever since. New materials included syllabus, lectures, detailed lecture notes, multi-phase term project, and programming problem sets.
   b) New sophomore-level course, 6.005 Elements of Software Construction, in cooperation with Prof. Daniel Jackson. New materials included lectures, significant code examples for lectures, and two-week programming projects.
   c) Recitation notes and exercises for 6.001 Structure & Interpretation of Computer Programs, which have been heavily used by subsequent recitation instructors.
   d) New lectures on usability for 6.170 Lab in Software Engineering, including detailed lecture notes, and presented by me as a guest lecturer every term since Fall 2002.

2. Education Contributions:
   a) UPOP: taught Specifications module, January 2010, March 2010, January 2011, March 2011.

3. Contributions to the Education commons, such as freshman advising and reading admissions folders:
   a) Co-founder and faculty advisor for 6.470 IAP Web Programming Competition, 2008-2010. Recruited the initial team of student organizers, raised money from sponsors, recruited judges (and served as a judge myself), and taught guest lectures on usability.

Publications of Robert C. Miller

1. Books

   None.

2. Papers in Refereed Journals

   1. Myers, B. A., R. G. McDaniel, R. C. Miller, A. Ferrency, A. Faulring, B. D. Kyle, A. Mickish, A. Klimovitski, and P. Doane, "The Amulet Environment: New Models for Effective User Interface Software Development," *IEEE Transactions on Software Engineering*, v23 n6, pp. 347—365, June 1997.
   2. Vander Zanden, B. T., R. Halterman, B. A. Myers, R. McDaniel, R. Miller, P. Szekely, D. Giuse, and D. Kosbie, "Lessons Learned About One-Way, Dataflow Constraints in the Garnet and Amulet Graphical Toolkits," *ACM Transactions on Programming Languages and Systems*, v23 n6, pp. 776—796, November 2001.
   3. Myers, B. A., J. Nichols, J. O. Wobbrock, and R. C. Miller, "Taking Handheld Devices to the Next Level." *IEEE Computer*, v37, n12, pp. 36—43. December 2004.
   4. Little, G., and R. C. Miller. "Keyword Programming in Java." *Journal of Automated Software Engineering*, v16 n1, pp. 37-71. 2009.**
   5. Goldman, M. and R. C. Miller. "Codetrail: Connecting Source Code and Web Resources." *Journal of Visual Languages and Computing*, v20 n4, pp 223-235. August 2009.**

3. Proceedings of Refereed Conferences

   1. Myers, B. A., F. Modugno, R. McDaniel, D. Kosbie, A. Werth, R. C. Miller, J. Pane, J. Landay, J. Goldstein, and M. A. Goldberg, "The Demonstrational Interfaces Project at CMU," *1996 AAAI Spring Symposium on Acquisition, Learning and Demonstration: Automating Tasks for Users*, Technical Report SS-96-02, pp. 85—91, March 1996.
   2. Myers, B. A., R. C. Miller, R. McDaniel, and A. Ferrency, "Easily Adding Animations to Interfaces Using Constraints," *Proceedings of the 9th ACM Symposium on User Interface Software and Technology (UIST '96)*, pp. 119—128, November 1996.
   3. Miller, R. C. and K. Bharat, "SPHINX: A Framework for Creating Personal, Site-Specific Web Crawlers," *Proceedings of the Seventh International World Wide Web Conference (WWW7)*, April 1998, in *Computer Network and ISDN Systems*, v30, pp. 119—130, 1998.
   4. Berger, A. and R. C. Miller, "Just-in-time Language Modelling," *Proceedings of the International Conference on Acoustics, Speech, and Signal Processing (ICASSP '98),* pp. 705—708, May 1998.
   5. Miller, R. C. and B. A. Myers, "Lightweight Structured Text Processing," *Proceedings of 1999 USENIX Annual Technical Conference*, pp. 131—144, June 1999.
   6. Miller, R. C. and B. A. Myers, "Synchronizing Clipboards of Multiple Computers," *Proceedings of the 12th ACM Symposium on User Interface Software and Technology (UIST '99)*, pp. 65—66, November 1999.

** Outgrowth of Supervised Student Research

7. Miller, R. C. and B. A. Myers, "Integrating a Command Shell into a Web Browser," *Proceedings of USENIX 2000 Annual Technical Conference*, pp. 171—182, June 2000.
8. Myers, B. A., R. C. Miller, B. Bostwick, and C. Evankovich, "Extending the Windows Desktop Interface With Connected Handheld Computers," *Proceedings of the 4th USENIX Windows Systems Symposium*, pp. 79—88, August 2000.
9. Miller, R. C. and B. A. Myers, "Interactive Simultaneous Editing of Multiple Text Regions," *Proceedings of USENIX 2001 Annual Technical Conference*, pp. 161—174, June 2001.
10. Myers, B. A., C. H. Peck, J. Nichols, D. Kong, and R. Miller, "Interacting At a Distance Using Semantic Snarfing," *Proceedings of the Third International Conference on Ubiquitous Computing (UbiComp 2001)*, pp. 305—314, Sept. 2001.
11. Miller, R. C. and B. A. Myers, "Outlier Finding: Focusing User Attention on Possible Errors," *Proceedings of the 14th ACM Symposium on User Interface Software and Technology (UIST 2001)*, pp. 81—90, November 2001.
12. Miller, R. C. and B. A. Myers, "Multiple Selections in Smart Text Editing," *Proceedings of the 6th International Conference on Intelligent User Interfaces (IUI 2002)*, pp. 103—110, January 2002.
13. Myers, B. A., R. Bhatnagar, J. Nichols, C. H. Peck, D. Kong, R. Miller, and A. C. Long, "Interacting At a Distance: Measuring the Performance of Laser Pointers and Other Devices," *Conference on Human Factors in Computing Systems (CHI 2002)*, pp. 33—40, April 2002.
14. Miller, R. C. and B. A. Myers, "LAPIS: Smart Editing With Text Structure," *CHI '02 Extended Abstracts on Human Factors in Computer Systems*, pp. 496—497, April 2002.
15. Quan, D., D. Huynh, D. R. Karger, and R. Miller, "User Interface Continuations," *Proceedings of the ACM Symposium on User Interface Software and Technology (UIST 2003)*, pp. 145-148, October 2003. **
16. Miller, R. C. and A. A. Marshall, "Cluster-based Find & Replace," *Conference on Human Factors in Computing Systems (CHI 2004)*, pp. 57—64, April 2004. **
17. Notowidigdo, M. and R. C. Miller, "Off-line Sketch Interpretation," *Proceedings of AAAI Fall Symposium on Making Pen-Based Interaction Intelligent and Natural*, pp. 120-126, October 2004. **
18. Garfinkel, S. L., J. I. Schiller, E. Nordlander, D. Margrave, and R. C. Miller, "Views, Reactions, and Impact of Digitally-Signed Mail in e-Commerce," *Proceedings of the Ninth International Conference on Financial Cryptography and Data Security (FC 2005)*, pp. 188-202, February 2005. **
19. Garfinkel, S. L., E. Nordlander, R. C. Miller, D. Margrave, J. I. Schiller, "How to Make Secure Email Easier to Use," *Proceedings of the Conference on Human Factors in Computing Systems (CHI 2005)*, April 2005, pp. 701-710. **

** Outgrowth of supervised student research

20. Garfinkel, S. L. and R. C. Miller, "Johnny 2: A User Test of Key Continuity Management with S/MIME and Outlook Express," *Proceedings of the Symposium on Usable Privacy and Security (SOUPS 2005)*, pp. 13-24, July 2005. **
21. Bolin, M., M. Webber, P. Rha, T. Wilson, and R. C. Miller, "Automation and Customization of Rendered Web Pages," *ACM Conference on User Interface Software and Technology (UIST 2006)*, pp. 191-200. October 2005. **
22. Wu, M., R. C. Miller and S. L. Garfinkel, "Do Security Toolbars Actually Prevent Phishing Attacks?" *Conference on Human Factors in Computing Systems (CHI 2006)*, pp. 601-610, 2006. **
23. Wu, M., R. C. Miller and G. Little, "Web Wallet: Preventing Phishing Attacks by Revealing User Intentions," *Symposium on Usable Privacy and Security (SOUPS 2006)*, pp. 102-113, 2006. **
24. Little, G., and R. C. Miller, "Translating Keyword Commands into Executable Code," *ACM Conference on User Interface Software and Technology (UIST 2006)*, pp 135-144, 2006. **
25. Huynh, D., R. C. Miller, and D. R. Karger, "Enabling Web Browsers to Augment Web Sites' Filtering and Sorting Functionalities," *ACM Conference on User Interface Software and Technology (UIST 2006)*, pp. 125-134, 2006. **
26. Sinha, V., D. Karger, and Rob Miller, "Relo: Helping Users Manage Context During Interactive Exploratory Visualization of Large Codebases," *Proceedings of Visual Languages and Human-Centric Computing (VL/HCC 2006)*, pp. 187-194, 2006. **
27. Huynh, D. F., R. C. Miller, and D. Karger, "Exhibit: Lightweight Structured Data Publishing," *Proceedings of the 16th International World Wide Web Conference (WWW 2007)*, pp. 737-746, 2007. **
28. Lieberman, E., and R. C. Miller, "Facemail: Showing Faces of Recipients to Prevent Misdirected Email," *Symposium on Usable Privacy and Security (SOUPS 2007)*, pp. 102-113, 2007. **
29. Huynh, D. F., R. C. Miller, and D. Karger, "Potluck: Data Mash-Up Tool for Casual Users," *Proceedings of the International Semantic Web Conference (ISWC 2007*), pp. 239-252, 2007. **
30. Little, G., and R. C. Miller, "Keyword Programming in Java," *Proceedings of Automated Software Engineering (ASE 2007)*, pp. 84-93, 2007. **
31. Hupp, D., and R. C. Miller, "Smart Bookmarks: Automatic Retroactive Macro Recording on the Web," *Proceedings of User Interface Software and Technology (UIST 2007)*, pp. 81-90, 2007. **
32. Goldman, M. and R.C. Miller. "Codetrail: Connecting Source Code and Web Resources." *Proceedings of Visual Languages and Human-Centric Computing (VL/HCC 2008)*, pp. 65-72, 2008.**
33. Miller, R.C., V. Chou, M. Bernstein, G. Little, M. Van Kleek, D. Karger, and mc schraefel. "Inky: A Sloppy Command Line for the Web." *Proceedings of User Interface Software and Technology (UIST 2008)*, pp. 131-140, 2008.**

** Outgrowth of Supervised Student Research

34. Sangmok Han, David R. Wallace, and Robert C. Miller. "Code Completion From Abbreviated Input." *Proceedings of Automated Software Engineering (ASE 2009)*, pp. 332-343, 2009.**
35. Tom Yeh, Tsung-Hsiang Chang, and Robert C. Miller. "Sikuli: Using GUI Screenshots for Search and Automation." *Proceedings of User Interface Software and Technology (UIST 2009)*, pp. 183-192, 2009.**
36. Michael Bernstein, Adam Marcus, David R. Karger, and Robert C. Miller. "Understanding and Supporting Directed Content Sharing on the Web." 10 pages, 2010. **
37. Chen-Hsiang Yu and Robert C. Miller. "Enhancing Web Page Readability for Non-native Readers." *Conference on Human Factors in Computing Systems (CHI 2010)*, 10 pages, 2010. **
38. Tsung-Hsiang Chang, Tom Yeh, and Robert C. Miller. "GUI Testing Using Computer Vision." *Conference on Human Factors in Computing Systems (CHI 2010)*, 10 pages, 2010.**
39. Lydia B. Chilton, John J. Horton, Robert C. Miller, and Shiri Azenkot. "Task search in a human computation market." *Proceedings of the ACM SIGKDD Workshop on Human Computation (HCOMP 2010),* 9 pages, 2010.
40. Greg Little, Lydia B. Chilton, Max Goldman, and Robert C. Miller. "Exploring iterative and parallel human computation processes." *Proceedings of the ACM SIGKDD Workshop on Human Computation (HCOMP 2010),* 9 pages, 2010.**
41. Greg Little, Lydia B. Chilton, Max Goldman, and Robert C. Miller. "TurKit: Human Computation Algorithms on Mechanical Turk." *Proceedings of User Interface Software and Technology (UIST 2010),* 10 pages, 2010. **
42. Michael Bernstein, Greg Little, Robert C. Miller, Bjoern Hartmann, Mark S. Ackerman, David R. Karger, David Crowell, and Katrina Panovich. "Soylent: A Word Processor with a Crowd Inside." *Proceedings of User Interface Software and Technology (UIST 2010),* 10 pages, 2010. **
43. Jeffrey Bigham, Chandrika Jayant, Hanjie Ji, Greg Little, Andrew Miller, Robert C. Miller, Robin Miller, Aubrey Tatarowicz, Brandyn White, Samuel White, and Tom Yeh. "VizWiz: Nearly Real-Time Answers to Visual Questions." *Proceedings of User Interface Software and Technology (UIST 2010),* 10 pages, 2010.
44. Eirik Bakke, David R. Karger, and Robert C. Miller. "A Spreadsheet-Based User Interface for Managing Plural Relationships in Structured Data." *Conference on Human Factors in Computing Systems (CHI 2011)*, 10 pages, 2011. **
45. Adam Marcus, Michael S. Bernstein, Osama Badar, David R. Karger, Samuel R. Madden, and Robert C. Miller. "TwitInfo: Aggregating and Visualizing Microblogs for Event Exploration." *Conference on Human Factors in Computing Systems (CHI 2011)*, 10 pages, 2011. **
46. Walter S. Lasecki, Kyle I. Murray, Sean White, Robert C. Miller, Jeffrey P. Bigham. "Real-time Crowd Control of Existing Interfaces." *Proceedings of User Interface Software and Technology (UIST 2011),* 10 pages, 2011.
47. Michael S. Bernstein, Joel Brandt, Robert C. Miller and David R. Karger. "Crowds in Two Seconds: Enabling Realtime Crowd-Powered Interfaces." *Proceedings of User Interface Software and Technology (UIST 2011),* 10 pages, 2011. **
48. Max Goldman, Greg Little, and Robert C. Miller. "Real-Time Collaborative Coding in a Web IDE." *Proceedings of User Interface Software and Technology (UIST 2011),* 10 pages, 2011. **

49. Tsung-Hsiang Chang, Tom Yeh, and Robert C. Miller. "Associating the Visual Representation of User Interfaces with their Internal Structures and Metadata." *Proceedings of User Interface Software and Technology (UIST 2011),* 10 pages, 2011. **
50. Adam Marcus, Eugene Wu, David Karger, Samuel Madden, and Robert Miller. "Human-powered Sorts and Joins." *Proceedings of the VLDB Endowment*, v5 n1, September 2011, 12 pages.**
51. Katrina Panovich, Rob Miller, David Karger. "Tie Strength in Question and Answer on Social Network Sites." *Proceedings of Computer-Supported Cooperative Work (CSCW 2012)*, 10 pages, 2012.**
52. Haoqi Zhang, Edith Law, Robert C. Miller, Krzysztof Gajos, David Parkes, and Eric Horvitz. "Human Computation Tasks with Global Constraints." *Conference on Human Factors in Computing Systems (CHI 2012)*, 10 pages, 2012.
53. Michael Bernstein, David Karger, Rob Miller, Joel Brandt. "Analytic Methods for Optimizing Realtime Crowdsourcing." *Proceedings of Collective Intelligence 2012*, 8 pages.**

4. Other Major Publications

1. Miller, R. C., *A Type-checking Preprocessor for Cilk, a Multithreaded C Language,* M.Eng. thesis, Massachusetts Institute of Technology, 38 pages, May 1995.
2. Myers, B. A., R. McDaniel, R. Miller, B. Vander Zanden, D. Giuse, D. Kosbie, and A. Mickish, "Our Experience with Prototype-Instance Object-Oriented Programming in Amulet and Garnet," *Interfaces*, n39 (August 1998), pp. 4—9, 1998.
3. Myers, B. A., R. McDaniel, R. Miller, B. Vander Zanden, D. Giuse, D. Kosbie and A. Mickish, "The Prototype-Instance Object Systems in Amulet and Garnet," in *Prototype Based Programming: Concepts, Languages and Applications*, James Noble, Antero Taivalsaari and Ivan Moore, eds. Singapore: Springer-Verlag, pp. 141—176, 1999.
4. Myers, B. A., R. McDaniel, and R. Miller, "The Amulet Prototype-Instance Framework," in *Domain-Specific Application Frameworks*, Mohamed Fayad and Ralph E. Johnson, eds. New York: John Wiley & Sons, pp. 529—546, 2000.
5. Miller, R. C., *Lightweight Structure in Text.* PhD thesis, Computer Science Department, Carnegie Mellon University, 319 pages, May 2002. Available as CMU Computer Science technical report CMU-CS-02-134.
6. Miller, R. C. and Min Wu, "Fighting Phishing at the User Interface," in *Security and Usability: Designing Secure Systems that People Can Use*, L. Cranor and S. Garfinkel, eds, O'Reilly, pp. 275-292, 2005. **
7. Wu, Min, R. C. Miller, and S. L. Garfinkel, "Do Browser Toolbars Actually Prevent Phishing?" in *Phishing and Counter-measures: Understanding the increasing problem of electronic identity theft*, M. Jakobsson and S. Myers, eds, Wiley, pp. 514-521, 2005. **
8. Robert C. Miller, Michael Bolin, Lydia B. Chilton, Greg Little, Matthew Webber, and Chen-Hsiang Yu. "Rewriting the Web with Chickenfoot". In *No Code Required: Giving Users Tools to Transform the Web*, A. Cypher, M. Dontcheva, T. Lau, and J. Nichols, eds, Elsevier, 2010.**

** Outgrowth of Supervised Student Research

9. Greg Little, Robert C. Miller, Victoria Chou, Michael Bernstein, Tessa Lau, and Allen Cypher. "Sloppy Programming" In *No Code Required: Giving Users Tools to Transform the Web*, A. Cypher, M. Dontcheva, T. Lau, and J. Nichols, eds, Elsevier, 2010.**
10. Lydia B. Chilton, Robert C. Miller, Greg Little, and Chen-Hsiang Yu. "Why We Customize the Web". In *No Code Required: Giving Users Tools to Transform the Web*, A. Cypher, M. Dontcheva, T. Lau, and J. Nichols, eds, Elsevier, 2010.**
11. Michael S. Bernstein, Mark S. Ackerman, Ed H. Chi, Robert C. Miller. "The Trouble with Social Computing Systems Research." alt.chi track, *Conference on Human Factors in Computing Systems (CHI 2011)*, 6 pages, 2011.

5. Internal Memoranda and Progress Reports
    1. Miller, R. C., A. Marshall, and M. Notowidigdo, "LAPIS: Smart Editing with Text Structure," *MIT Laboratory for Computer Science Annual Research Abstracts*, 2003. **
    2. Marshall, A. M. and R. Miller, "Cluster-Based Find & Replace," *MIT CSAIL Annual Research Abstracts*, 2004. **
    3. Wu, M., S. L. Garfinkel, and R. Miller, "Secure Web Authentication with Mobile Phones," *MIT CSAIL Annual Research Abstracts*, 2004. **
    4. Garfinkel, S. L., E. Nordlander, D. D. Clark, & R. Miller, "Designing for Usable Security," *MIT CSAIL Annual Research Abstracts*, 2004. **
    5. Jazayeri, R. and R. Miller, "Google as a Bookmarking Tool," *MIT CSAIL Annual Research Abstracts*, 2004. **
    6. Notowidigdo, M. and R. Miller, "User-Directed Sketch Interpretation," *MIT CSAIL Annual Research Abstracts*, 2004. **
    7. Rha, P. and R. Miller, "Detecting and Parsing Embedded Lightweight Structures," *MIT CSAIL Annual Research Abstracts*, 2005. **
    8. Bolin, M. and R. Miller, "End-User Programming for the Web," *MIT CSAIL Annual Research Abstracts*, 2005. **
    9. Webber, M. and R. Miller, "Automatic Web Page Concatenation," *MIT CSAIL Annual Research Abstracts*, 2005. **
    10. Wilson, T. and R. Miller, "Separating Foreground and Background for Computer Displays," *MIT CSAIL Annual Research Abstracts*, 2005. **
    11. Chow, C. and R. Miller, "Learning Wrappers Efficiently Using Unlabeled Examples," *MIT CSAIL Annual Research Abstracts*, 2005. **
    12. Wu, M. and R. Miller, "Fighting Phishing at the User Interface," *MIT CSAIL Annual Research Abstracts*, 2005. **
    13. Dobuzhskaya, M., R. A. Brown, and R. Miller, "Timeliner Integrated Development Environment," *MIT CSAIL Annual Research Abstracts*, 2005. **

14. Little, G. and R. Miller. "Keyword Commands," *MIT CSAIL Annual Research Abstracts*, 2007. **
15. Huynh, D.F., R.Miller, and D.R. Karger. "Making Reusable Structured Data on The Web Cheaper," *MIT CSAIL Annual Research Abstracts*, 2007. **
16. Goldman, M. and R. Miller. "Finding, Using, and Sharing Source Code Snippets," *MIT CSAIL Annual Research Abstracts*, 2007. **
17. Yu, C.H. and R.C. Miller. "Web Page Readability Enhancement," *MIT CSAIL Annual Research Abstracts*, 2007. **
18. Hupp, D. and R.C. Miller. "Automating the Web with Smart Bookmarks," *MIT CSAIL Annual Research Abstracts*, 2007. **
19. Chou, V. and R.C. Miller "Accessing Website Functionality Through Keyword Commands," *MIT CSAIL Annual Research Abstracts*, 2007. **
20. Su, K. and R.C. Miller. "Continuous Execution of Code in Chickenfoot," *MIT CSAIL Annual Research Abstracts*, 2007. **
21. Miller, R.C., G. Little, D. Hupp, V. Chou, R. Hanna, and C.H. Yu. "End-user Programming for the Web," *MIT CSAIL Annual Research Abstracts*, 2007. **

6. Invited Lectures

December 2001, "Exploiting Lightweight Structure in Text: Multiple-Selection Editing and Outlier Finding", University of Maryland HCI Seminar; also February-October 2002 at Georgia Tech, RPI, Tufts University, University of Illinois Urbana-Champaign, University of Massachusetts Lowell, University of Vermont, University of Washington, IBM Research Cambridge.

January 2003, "Exploiting Text Structure for Multiple-Selection Editing and Outlier Finding," Carnegie Mellon School of Computer Science Distinguished Lecture Series.

April 2003, "End-user Programming for Web Users," End User Development Workshop, Conference on Human Factors in Computer Systems (CHI 2003).

June 2004, "Secure Web Authentication with Mobile Phones," DIMACS Workshop on Usable Privacy and Security Software.

July 2005, "When User Studies Attack: Evaluating Security by Intentionally Attacking Users," Panel session, Symposium on Usable Privacy and Security (SOUPS), Carnegie Mellon University.

June 2006, "Web Wallet: Preventing Phishing Attacks by Revealing User Intentions", 2nd Annual Workshop on Trustworthy Interfaces for Passwords and Personal Information (TIPPI).

July 2006, "Automation and Customization of Rendered Web Pages," New Paradigms for Using Computers (NPUC) Workshop, IBM Almaden.

July 2006, "Developing Javascript with Chickenfoot," Google Tech Talk.

March 2007, "Usable Security: Fighting Phishing and Email Information Disclosure at the User Interface," MITACS Digital Security Seminar Series, Carleton University.

** Outgrowth of Supervised Student Research

February-September 2008, “Automating & Customizing the Web with Keyword Programming,” University of Illinois Urbana-Champaign, Oregon State University, Adobe Research, University of California Berkeley, Stanford University, IBM Research Cambridge, University of Washington, Microsoft LiveLabs, Carnegie Mellon University, Tufts University.

March 2010, “User Interface Automation using Keywords and Pictures,” Harvard University.

September 2010, “Helping Professional and End-user Programmers Alike: Programming with Keywords and Pictures,” IBM Research Symposium on Human-Computer Interaction and Software Engineering.

July 2010-May 2012, “Crowd Computing and Human Computation Algorithms,” Qualcomm; BostonCHI SIG; Adobe Technical Forum; University of California Berkeley EECS Distinguished Lecture Series; Harvard AIRG Seminar Series; invited talk for AAAI Spring Symposium on Wisdom of the Crowd; invited talk for Collective Intelligence 2012.

Theses Supervised by Robert C. Miller

	Total	Completed	In Progress
Bachelor's	32	19	13
Master's	1	0	0
MEng	26	26	1
Engineer's	0	0	0
Doctoral			
As Supervisor	9	5	4
As Reader	13	9	4

Thesis Descriptions:

Bachelor's Theses

Webber, Matthew, "Detecting and Concatenating Sequences of Web Pages," May 2005.

Tsai, David, "Fast Identifier Search in Eclipse," May 2005.

Waldman, Billy, "An Intramural Sports Management System," May 2005.

Marra, Anibal, "A Strong Authentication Mechanism for Consumer-Facing Online Transactions," May 2005.

Phan, Nancy, "Improving the iCampus Front Desk Interface from a User Perspective," May 2005.

Pell, Richard, "RSSNews: A Personalized Newspaper Interface for Viewing RSS Feeds," May 2006.

Reichert, Will, "Developing a Google Maps Mashup Using AJAX and User Centric Design," May 2006.

Aspell, Bob, "ISMS Scheduling System," May 2006.

Chilton, Lydia, "Graphically Based Statistical Editing Software for Economists," May 2007.

Adeagbo, Makinde, "Leveraging Click Paths Through the Web to Aid Page Revisitation," May 2007.

Grimm, Jonathan, "Learning Favorite Web Sites," May 2007.

Cabellero, Julian, "Usability of Web-Based Database Administration Tool for the Undergraduate Practice Opportunities Program," May 2007.

Lim, Anthony, "The MIT Subject Listings and Schedule Page for Course 6," May 2007.

Stritar, Jon, "Scripting Firefox with Keyword Commands," May 2007.

Gerard, Evan, "A Web Platform Studying the Bayesian Truth Serum," May 2008.

Dayal, Arjun, "Dynamic DJ", May 2008.

Stafl, Erik, "Studying the User Interface Design of a Computer Game," May 2008.

Teh, Michelle, "Media Mash," May 2008.

Mattos, Isabel, "Imagine possibilities," May 2010.

Chang, Angela, "Web Application Development in Collabode," May 2011.

Theses Supervised by Robert C. Miller

Kumar, Akansha, “Sinch Adapted for the Car,” May 2011.

Yamane, Patrick, “Adding a File Tree to Collabode,” May 2011.

Conrad, Shawn, “Crowd Labour Aiding Search Pane,” May 2011.

Tran, Tony, “Sinch: A Delegated Search Service,” May 2011.

Tatarchenko, Elena, “An Alternative to the TurKit Crash and Rerun Programming Model,” May 2011.

Crowell, David “Flesh-Kincaid: A Human-Powered Readability Tool,” May 2011.

Zheng, Daniel, “Spammers on Mechanical Turk: Nuisance or Deal Breakers?”, May 2011.

Jiang, Alexandra, “TurkRate: Reputation Manager for Mechanical Turk,” May 2011.

Casteel , Kelly, “Expanding the Quick-Question Interface in TurKit,” May 2011.

Iannucci, Peter, “Visual Assistive Device Design and Prototyping in Preparation for User Studies,” May 2011. (Co-supervised with S. Teller)

Landa, Yafim, “Videation Assistant for Blind and Cognitively-Impaired Users,” May 2011. (Co-supervised with S. Teller)

Mallory, Eleanor, “Facebook Related Links Application,” December 2011.

Leonard, Adam, in progress, expected May 2012.

Lopez-Pineda, Andres, in progress, expected May 2012.

Fleisher, Tamara, in progress, expected May 2012.

Master's Theses

Little, Greg, “Keyword Programming,” May 2007.

Lieber, Tom, in progress, expected May 2013.

MEng Theses

Marshall, Alisa, “Cluster-Based Find and Replace,” May 2003.

Venugopalan, Vishwanath, “Human-Intelligible Positioning,” December 2003.

Notowidigdo, Matthew, “User-Directed Sketch Interpretation,” May 2004.

Jazayeri, Ryan, “Google as a Bookmarking Tool,” May 2004.

Stube, Brian, “Automatic Generation of XSLT by Simultaneous Editing,” May 2004.

Bolin, Michael, “End-user Web Programming,” May 2005.

Rha, Philip, “Detecting and Parsing Embedded Lightweight Structures,” May 2005.

Dobouzshkaya, Maya, “A Timeliner Integrated Development Environment,” May 2005.

Rideout, Ariel, “An Email Spam Filtering Proxy Using Secure Authentication and Micro-bonds,” May 2005.

Sharma, Nidhi, “FireViz: A Personal Network Firewall Visualizing Tool,” May 2005.

Wilson, Tom, “Gradual Awareness Notification for the Desktop Environment,” May 2006.

Theses Supervised by Robert C. Miller

Lieberman, Eric, “Facemail: Preventing Common Errors When Composing Email,” May 2006.

Hanna, Roger, “EasyLink: Improving Target Acquisition in Web Applications with Link Prediction,” February 2007.

Hupp, Darris, “Smart Bookmarks: Automatic Retroactive Macro Recording on the Web,” May 2007.

Su, Kevin, “Continuous Execution: Improving User Feedback in the Development Cycle,” May 2007.

Chou, Victoria, “Inky: Internet Keywords with User Feedback,” January 2008.

Fitzgerald, Michael, “CopyStyler: Web Design by Example,” May 2008.

Tanwanteng, Matthew, “Applying Quantitative Models to Evaluate Complexity in Video Game Systems,” September 2008.

Chilton, Lydia, “Seaweed: An End-user Programming System for Web-Scale Economic Experiments”, May 2009.

Sims, Clayton, “Scientia: An End User Development Environment for Decision Support Systems”, August 2009.

Webber, Matthew, “A Stateful Web Augmentation Toolkit,” February 2010.

Chan, Richard, “Mobi: Automatic Customization of the Mobile Web ,” May 2010.

Kopylov, Igor, “CourseDiff: A System For Identifying And Reporting Changes To Course Websites,” May 2010.

Yuan, Jessica, “Monitoring Interface and Automated Testing for Seaweed, a Web-based Economic Game System,” May 2010.

Nayak, Rajeev, “Sinch: Searching Intelligently on a Mobile Device,” May 2010.

Wooten, Amy, “Improving the Distributed Evolution of Software through Heuristic Evaluation,” February 2011.

Tang, Mason, “Caesar: A Social Code Review Tool for Programming Education,” August 2011.

Chang, Angela, in progress, expected May 2012.

Tatarchenko, Elena, in progress, expected May 2012.

Kovacs, Geza, in progress, expected May 2013.

Lin, Jessica, in progress, expected May 2013.

Engineers Theses

None

Doctoral Theses, Supervisor

Garfinkel, Simson, “Usable Security: Design Principles for Creating Systems that are Simultaneously Usable and Secure,” June 2005. (Co-supervised with D. Clark)

Wu, Min, “Fighting Phishing at the User Interface,” August 2006.

Huynh, David, "User Interfaces Supporting Casual Data-Centric Interactions on the Web," August 2007. (Co-supervised with D. Karger)

Sinha, Vineet, "Using Diagrammatic Explorations to Understand Code," January 2008. (Co-supervised with D. Karger)

Little, Greg, "Programming with Human Computation", May 2011.

Yu, Chen-Hsiang, "Web Page Enhancement on Desktop and Mobile Browser," expected May 2012.

Goldman, Max, "All the program's a stage, and all the programmers merely players," expected May 2012.

Chang, Tsung-Hsiang, "Using Graphical Representation of User Interfaces as Visual References," expected May 2012.

Bernstein, Michael, "Crowd-Powered Interfaces," expected May 2012. (Co-supervised with D. Karger)

Panovich, Katrina, proposal expected May 2012. (Co-supervised with D. Karger)

Kim, Juho, proposal expected May 2013.

Doctoral Theses, Reader

Quan, Dennis, "Designing End User Information Environments Built on Semistructured Data Models," May 2003. (Supervised by D. Karger)

Hammond, Tracy, "A Domain Description Language for Sketch Recognition," August 2006. (Supervised by R. Davis)

Teevan, Jaime, "Returning to Uncontrolled Dynamic Information," June 2006. (Supervised by D. Karger)

Oltmans, Michael, "Envisioning Sketch Recognition: A Local Feature Based Approach to Recognizing Informal Sketches," May 2007. (Supervised by R. Davis)

Seator, Robert, "Building Dependability Arguments for Software Intensive Systems," January 2009. (Supervised by D. Jackson)

Adler, Aaron, "Multimodal Interactive Digital Whiteboard," May 2009. (Supervised by R. Davis)

Yeh, Tom, "Photo-Oriented Questions—a Multi-Modal Approach to Information Retrieval," May 2009. (Supervised by T. Darrell)

Koch, Olivier, "Vision-based Human-Centered Navigation Guidance", February 2010. (Supervised by S. Teller)

Van Kleek, Max, "Providing Proactive Support for Task and Interrupt Management," February 2011. (Supervised by D. Karger)

Ouyang, Tom, "Understanding Freehand Diagrams: Combining Appearance and Context for Multi-domain Sketch Recognition," December 2011. (Supervised by R. Davis)

Kushman, Nate, expected May 2011. (Supervised by D. Katabi)

Theses Supervised by Robert C. Miller

Marcus, Adam, “Integrating Human Intelligence and Database Systems”, expected May 2012. (Supervised by S. Madden and D. Karger)

McGraw, Ian, “Simple Self-adapting Spoken Language Interfaces”, expected May 2013. (Supervised by S. Seneff)

Monroy-Hernández, Andrés, “Catalyzing Remix Culture,” expected May 2013. (MIT Media Arts & Sciences, supervised by Mitchell Resnick)

Law, Edith, “Human Computation,” expected May 2013. (Carnegie Mellon University, Computer Science, supervised by Tom Mitchell & Luis von Ahn)

Zhang, Haoqi, “Human Computation for Task Decomposition and Planning,” expected May 2012. (Harvard University, Computer Science, supervised by David Parkes)

Correa, Andrew, expected May 2014. (Supervised by R. Davis)

Postdoctoral Associates and Fellows Supervised by Robert C. Miller

Current Postdocs

Name	Dates of Appointment	PhD Granting Institution	Current Position
Joseph Lawrance	9/1/09 – 8/31/10	Oregon State University	Postdoctoral Associate

Previous Postdocs

Name	Current Title	Current Employer
None		

Teaching Evaluations of Robert C. Miller

Term	Course Number	Course Title	Role	Course Type	# Students Registered	# Survey Responses	Instructor's Evaluation	Course Evaluation	Scale
FT02	6.170	Laboratory in Software Engineering	Lecturer	Lecture	125	52	5.2	6.0	7
ST03	6.001	Structure and Interpretation of Computer Programs	Recitation Instructor	Lecture	2 sections	13	6.1	5.4	7
FT03	6.893	User Interface Design and Implementation	Lecturer	Lecture	36	23	6.4	6.1	7
ST04	6.170	Laboratory in Software Engineering	Lecturer	Lecture	140	66	5.9	5.7	7
FT04	6.831	User Interface Design and Implementation	Lecturer	Lecture	48	17	6.1	5.6	7
ST05	Parental Leave								
FT05	6.831	User Interface Design and Implementation	Lecturer	Lecture	50	37	6.3	6.0	7
ST06	Parental Leave								
FT06	6.831	User Interface Design and Implementation	Lecturer	Lecture	66	27	6.2	6.0	7
ST07	6.001	Structure and Interpretation of Computer Programs	Lecturer	Lecture	241	109	5.0	5.4	7
FT07	6.005	Elements of Software Construction	Lecturer	Lecture	24	14	5.8	6.1	7
ST08	6.831	User Interface Design and Implementation	Lecturer	Lecture	70	45	6.0	5.6	7
FT08	6.005	Elements of Software Construction	Lecturer	Lecture	71	38	5.8	5.6	7
ST09	6.813/ 6.831	User Interface Design and Implementation	Lecturer	Lecture	115	48	5.8	5.5	7
FT09	6.005	Elements of Software Construction	Lecturer	Lecture	85	32	5.4	5.1	7

ST10	6.813/ 6.831	User Interface Design and Implementation	Lecturer	Lecture	108	44	5.7	5.6	7
FT10	Sabbatical Leave								
ST11	6.831/ 6.831	User Interface Design and Implementation	Lecturer	Lecture	125	37	6.1	5.8	7
FT11	6.005	Elements of Software Construction	Lecturer	Lecture	157	85	5.3	4.4	7
ST12	6.813/ 6.831	User Interface Design and Implementation	Lecturer	Lecture	200				

Professional Statement of Robert C. Miller

Summary. My work is centered on user interface design and human-computer interaction (HCI). As software and information systems become ever more complex and more tightly woven into our lives, the need for effective user interfaces to technology has never been greater. The goal of my work is not to "dumb down" the interface, or cripple its power, or remove control from the hands of users, but rather to find innovative ways to *align* user interfaces with the needs, tasks, and capabilities of the people they serve.

My research work is focused in three areas. In **web automation and customization**, I study ways for end-users to adapt web sites and applications to their own needs, while reducing the burdens of complexity and learning that often interfere. One of our innovations is *keyword programming*, which relies on keywords to describe computation, rather than formal syntax. This work has won a best-paper award and directly inspired work by researchers at other institutions. In **automatic text editing**, my goal is for every computer user to be able to harness the power of computation for handling repetitive or time-wasting editing tasks, without having to struggle with the complexity of programming. We have developed a range of novel techniques for automatic text editing, including an interface for the familiar find-and-replace command that clusters pattern matches to reduce the risk of making errors. Our work in this area has won two best-paper awards and a prize in a best-tool competition. In **usable security**, we study ways to develop computer security technology that is not only secure against attack but also usable by people. Focusing on email security, we have conducted user studies that show that users do indeed want signed and encrypted email, but that too many usability barriers stand in the way. We have also studied how people behave in response to *phishing* (fraudulent email and web sites) and developed new defenses against this problem. Finally, we have looked at the problem of misdirected email (such as pressing Reply All when you meant Reply), and devised a novel user interface for preventing it.

My educational goals have primarily concerned bringing human-computer interaction into the MIT computer science curriculum. I introduced a new HCI unit into 6.170, the required software engineering course, and taught the unit for 11 semesters. I also created and taught 6.831, a graduate-level HCI course, which has had strong enrollment and high course evaluations every time it has been taught, and have recently helped create 6.005, a new foundation-level programming course, and 6.470, a web programming competition.

Research in web automation and customization. The migration of applications to the World Wide Web opens up new opportunities for user interface customization. Applications that would have been impossible to customize on the desktop sprout numerous hooks for customization when implemented in a web browser, without any effort on the application developer's part. These hooks can be used not only for automating web user interfaces (clicking links, filling in forms, and extracting data) but also for customizing them (changing appearance, rearranging components, and inserting or removing user interface controls or data).

My research group has been focusing on two barriers that users face when customizing an application: the *complexity* of the application, particularly when the user is forced to understand its implementation in order to customize it; and the *syntax* of the programming language that must be learned. By drawing from experience with search engines, we have found that users can write a set of keywords expressing a command,

such as "click I'm Feeling Lucky button", "push the Lucky button", or even just "feeling lucky", which an interpreter can convert into an appropriate script command. We call this technique *keyword programming*, since it relies only on keywords, and not on formal syntax or even well-formed natural language.

My students and I have explored keyword programming in the web automation domain, and also in other domains such as Java development. One surprising result is that programming language syntax often has relatively little information content, and can be inferred automatically from only a handful of keywords -- allowing us to design programming systems that reduce the learning and complexity burdens on their users.

We have built several prototype systems exploring this idea, including a web automation system called Chickenfoot that won best paper award at the 2005 User Interface Software & Technology conference. The work has had impact on other researchers, including the CoScripter system from IBM Almaden, which uses our keyword programming approach for interpreting web scripts.

Research in automated text editing: My research group also studies ways for users to take advantage of the power of custom computation without having to learn how to program, particularly in text editing. In my PhD thesis, I invented *lightweight structure*, a new way of representing and manipulating structured text, and applied it to new user interface techniques for text editing. These techniques include *simultaneous editing*, which enables repetitive editing of large amounts of text using multiple selections inferred from examples given by the user, and *outlier finding*, which reduces errors by drawing the user's attention to inconsistent selections. We have tested these techniques in user studies and found them to be very effective. The techniques are implemented in LAPIS, a prototype text editor that we have released for public use. This work won two best-paper awards at the USENIX Annual Technical Conference.

My students and I have continued this work in several directions. We took a new approach to the find-and-replace command, which traditionally offers only two choices to the user: replacing matches one at a time, a tedious process that leads to errors, or replacing all matches at once, which can also lead to errors if the pattern was wrong. We developed a third way, *cluster-based find and replace*, in which the matches are clustered by similarity and whole clusters can be replaced at once, and found that it helps significantly on some kinds of find-and-replace tasks but not on others.

More recently, we have combined clustering with simultaneous editing, so that a user can edit whole clusters of similar, repetitive text simultaneously. We also simplified the technique so that it can be implemented in Javascript running inside a web browser (http://uid.csail.mit.edu/mass-edit). We found this *mass editing* technique to be a useful subroutine in a tool for mixing and aligning different data collections; this tool, called Potluck, won second prize in the Semantic Web Challenge at the 2007 International Semantic Web Conference.

Research in usable security: My third area of research lies in usable security. Effective security depends on good user interfaces. A door may have the strongest lock in the world, but if authorized users can't open and close it easily, and have to leave it open in

order to get their jobs done, then it has no security at all. A similar situation exists on the Internet today. We face a deluge of attacks – spam, viruses, worms, fraud, break-ins, identity theft, among others. But the cost of locking the door against these attacks – keeping operating system patches up to date, running firewalls and antivirus software, scanning for spyware, filtering spam – is becoming overwhelming.

Our work has focused on *secure email*, which would help solve some of these problems. We already have the technology for digitally signing and encrypting email; why is it almost completely unused? Through surveys and user studies, my students and I have found that the reason isn't lack of desire on the part of users, but rather the usability barriers to its adoption, particularly the cost and difficulty of obtaining a public key certificate. We have also collected data on the ability of users to receive digitally-signed email, and found that the penetration of digital signature technology is sufficient to advocate that legitimate corporate emailers – particularly e-commerce companies like Amazon, eBay, and PayPal – begin digitally signing their email *now*, as one defense against fraudulent email attacks.

We have also studied the *phishing* problem, in which emails purporting to be from legitimate organizations like eBay or PayPal lure users to fake websites that steal their passwords and other personal information. Our studies found that many security indicators proposed for detecting fake web sites (such as toolbars in the web browser) were largely ineffective. We have devised a new approach, founded on design principles like offering a safe path to the user's true goal, and using comparisons to explain the system's warnings. When implemented in a web browser extension and evaluated in laboratory studies, we found that these techniques were significantly more effective at protecting against current phishing attacks, although not proof against new kinds of attacks.

Finally, we have looked at the problem of *misdirected email*, such as pressing Reply All when you meant to press Reply, or mistyping an email address. Sending email to the wrong recipients is a security error – specifically an *access control* error, since it inadvertently grants access to the email's contents to a wider group of people than intended. Even secure email suffers from this error, since even digitally-signed and encrypted messages can be sent, securely, to the wrong people. We have devised a novel solution to this problem that displays the faces of the recipients directly in the mail composition window. This face display is compact, readily noticed, meaningful at a glance, and automatic. Our studies have found that the face display makes a substantial difference in users' ability to detect whether an email is misdirected. Tying in our previous work on web automation and customization, we used our Chickenfoot system to implement the face display as a customization for Google Mail and MIT Webmail, which automatically searches a number of web sources to look up email addresses and find pictures of recipients' faces.

Education: My contributions to education at MIT consist of a syllabus contribution to an existing course (6.170 Laboratory in Software Engineering), and the creation or co-creation of three new courses (6.813/6.831 User Interface Design and Implementation, 6.005 Elements of Software Construction, and 6.470 IAP Web Programming Competition).

6.170 Laboratory in Software Engineering is a required course for MIT computer science majors, teaching concepts and techniques for developing medium- to large-scale software systems. A central feature of the course is a group project, which inevitably has a graphical user interface, but the 6.170 syllabus included no guidance for developing effective user interfaces. More seriously, students left the course with little or no understanding of how usability and usability engineering fit into the software development process, making them ill-prepared to produce usable software in their later careers.

In Fall 2002, I created a two-lecture unit that exposes 6.170 students to basic concepts and techniques for designing usable interfaces. The lectures cover three areas: high-level principles of usability (e.g. "users are different from you"); relevant capabilities of human beings (e.g., Fitts's Law, memory limits, perception); and useful design techniques (e.g., heuristic evaluation, paper prototyping, how to conduct user tests). These usability lectures became a regular staple of the 6.170 syllabus, and I delivered them for 11 semesters, sometimes as the main lecturer for 6.170, but usually as a guest lecturer, until the last time the course was offered in Fall 2007.

6.831 User Interface Design and Implementation is an advanced undergraduate/introductory-graduate-level course on human-computer interaction, which I created in Fall 2003. It was the first course of its kind at MIT, but draws ideas from similar courses at Carnegie Mellon and Berkeley. The course content covers design principles (learnability, visibility, efficiency, simplicity, etc.), design techniques (user-centered design, task analysis, prototyping, heuristic evaluation, predictive evaluation, etc.), and implementation techniques (model-view-controller pattern, event handling, drawing, etc.).

The centerpiece of the course is a user-centered design project that gives students hands-on experience applying the principles and techniques. The project lasts for the entire semester, with seven milestones involving different deliverables (including design documents and several prototypes) and different methods of evaluation (including user testing and heuristic evaluation). By the end of the semester, students have iterated over their designs at least three times, giving direct experience with the benefits of iterative design, rapid prototyping, and constant user-centered evaluation.

The course includes a set of lecture notes, consisting of PowerPoint slides with detailed commentary, which are consistently praised by students. The notes have been published in MIT OpenCourseWare as well as on the 6.831 web site, and some of them have been used in courses at Berkeley, Northwestern, and other schools.

Enrollment in 6.813/6.831 has been strong, initially 35 students in 2003 and rising to a steady state of over 100 students a year by 2009, indicating a substantial interest for this material among the students. Industry demand for these skills is likewise strong. Alumni of the course who went on to jobs at software companies like Google, Yahoo, Microsoft, Oracle, and Facebook, have told me that they used what they learned in 6.831 when interviewing for their jobs, and have drawn on it many times since.

6.005 Elements of Software Construction is a new foundation-level undergraduate course that provides the first substantial programming experience to sophomore computer science majors. The course has a novel structure that covers three paradigms, each roughly a third of the course: *state machine programming*, which regards programs as finite state machines; *symbolic programming*, using functions over immutable data types; and *relational programming*, in which relations among mutable data objects are central. The course gives students tools for modeling, analysis, and implementation in each of these paradigms. In fact, one benefit of the three-paradigm approach is that important analysis techniques, like testing, can be revisited several times in increasingly complex settings. The course also aims to give students exposure to skills needed for today's software world, including the Java language, network sockets, threads, and graphical user interfaces for both the desktop and the Web.

Although the structure and goals of 6.005 were originated by Prof. Daniel Jackson, I co-lectured the first and third iterations of the course, creating half the lectures and helping to shape the programming projects. My largest single contribution lay in the symbolic programming unit, for which I created and taught most of the lectures. My approach incorporated ideas from the department's previous initial programming course, 6.001 Structure and Interpretation of Computer Programs, but translating them into Java. I wrote several large example programs to accompany my lectures, including a "little language" embedded in Java for generating repetitive music, like rounds, canons, and fugues.

6.470 IAP Web Programming Competition is a new course/competition for MIT's January Independent Activities Period. The course teaches web programming (HTML, CSS, Javascript, PHP, and SQL) and design techniques (usability and database design), and then challenges small teams of students to build a database-backed, interactive web site in less than four weeks. The web sites are judged by a panel of experts, and teams with the best sites win cash prizes. Like similar IAP competitions (6.270, 6.370), 6.470 is organized and taught by students.

Since students run the course, my primary role in 6.470 is faculty advisor. For the pilot year, I recruited the initial team of student organizers, raised money from sponsors, recruited judges (and served as a judge myself), and taught a guest lecture on usability. The pilot version of the course in January 2008 drew over 100 students, who were lotteried down to 65 students comprising 34 teams, from which 7 prize winners were selected. To fund the prizes, we raised $10,000 from five sponsors (Microsoft, Adobe, Endeca, Google, and Molecular). Students and sponsors were enthusiastic about the outcome.

The second iteration of the course (January 2009) has 32 teams participating, a total of 69 students, with $18,000 total funding from four sponsors. New in this year's class, Microsoft and Adobe are each providing 10 hours of training on their new web platforms (Microsoft Silverlight and Adobe Flex), along with special prizes for students who make use of those technologies.