EMILY GIBSON HILL

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Department of Computer & Information Sciences

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EDUCATION

Ph.D. in Computer & Information Sciences, University of Delaware, Newark, DE: expected Spring 2010.
Thesis: *Developing Natural Language-based Software Analyses & Tools to Expedite Software Maintenance.*
Advisors: Dr. Lori Pollock & Dr. K. Vijay-Shanker.

M.S. in Computer & Information Sciences, University of Delaware, Newark, DE: May 2005.

B.S. in Computer Science, Minor in Mathematics, The College of New Jersey, Ewing, NJ: May 2003.

RESEARCH INTERESTS

Leveraging natural language clues developers leave in code to improve software engineering tools, specifically, source code search tools to reduce software maintenance costs. Also interested in program comprehension, automated software testing, and software engineering experiment design & data analysis.

RESEARCH EXPERIENCE

Natural Language Program Analysis. Dr. Pollock & Dr. Shanker, University of Delaware, Aug 2006 – present.

Analysis of Sensitive Debugging Feedback. Dr. Pollock, University of Delaware, Sep 2005 – Aug 2006.

Automated Testing of Web Applications. Dr. Pollock, University of Delaware, Jun 2002 – Jun 2007.

Automated Aspect Mining. Dr. Pollock, University of Delaware, Fall 2003.

Parallel Processing on a Linux Cluster. Dr. Knox, The College of New Jersey, Jan 2002 – May 2003.

Question & Answering System Development. Dr. Martinovic, The College of New Jersey, Jan 2001 – May 2003.

GRADUATE HONORS AND AWARDS

UD CIS Frank Pehrson Award for Outstanding Graduate Student. A travel allowance to attend a professional technical meeting awarded annually to one or more UD CIS graduate students in recognition of outstanding performance and future potential in the field, 2009.

NSF Graduate Research Fellowship. Full tuition and stipend, 2005-2008.

Best Paper Award. Emily Hill, Zachary P. Fry, Haley Boyd, Giriprasad Sridhara, Yana Novikova, Lori Pollock, K. Vijay-Shanker. "AMAP: Automatically Mining Abbreviation Expansions in Programs to Enhance Software Maintenance Tools," 5th Working Conference on Mining Software Repositories, 2008.

UD CIS Lauri Pfeffer Shinn Memorial Award. Given annually to one or more women CIS students in recognition of a contribution to the CIS department and academic success, 2007.

UD CIS First Year Fellowship. Funding awarded by the CIS department in addition to regular stipend, 2003-2004.

REFEREED PUBLICATIONS

Emily Hill, Lori Pollock, and K. Vijay-Shanker. "**Automatically Capturing Source Code Context of NL-Queries for Software Maintenance and Reuse**." *International Conference on Software Engineering (ICSE)*, May 2009. 12% acceptance.

Emily Hill, Zachary P. Fry, Haley Boyd, Giriprasad Sridhara, Yana Novikova, Lori Pollock, K. Vijay-Shanker. "**AMAP: Automatically Mining Abbreviation Expansions in Programs to Enhance Software Maintenance Tools**." *5th Working Conference on Mining Software Repositories (MSR)*, May 2008. **Best Paper Award**, 40% acceptance rate.

Emily Hill. "**Developing Natural Language-based Program Analyses & Tools to Expedite Software Maintenance**." Doctoral Symposium at the *International Conference on Software Engineering*, May 2008. 25% acceptance rate.

Emily Hill, Lori Pollock, K. Vijay-Shanker. "**Exploring the Neighborhood with Dora to Expedite Software Maintenance**." *International Conference on Automated Software Engineering (ASE)*, Nov 2007. 12% acceptance rate.

Eric Enslen, <u>Emily Hill</u>, Lori Pollock, K. Vijay-Shanker. "**Mining Source Code to Automatically Split Identifiers for Software Analysis.**" *6th Working Conference on Mining Software Repositories (MSR)*, May 2009. 29% acceptance rate.

Giriprasad Sridhara, <u>Emily Hill</u>, Lori Pollock, and K Vijay-Shanker. "**Identifying Word Relations in Software: A Comparative Study of Semantic Similarity Tools.**" *16th IEEE International Conference on Program Comprehension (ICPC)*, Jun 2008. 35% acceptance rate.

Zachary P. Fry, David Shepherd, <u>Emily Hill</u>, Lori Pollock, K. Vijay-Shanker. "**Analyzing Source Code: Looking for Useful Verb-Direct Object Pairs in All the Right Places.**" *IET Software Special Issue on Natural Language in Software Development*, Feb 2008.

Sreedevi Sampath, Sara Sprenkle, <u>Emily Gibson</u>, Lori Pollock, Amie Souter Greenwald. "**Applying Concept Analysis to User-session-based Testing of Web Applications**." *IEEE Transactions on Software Engineering*, Oct 2007.

Sara Sprenkle, <u>Emily Hill</u>, Lori Pollock. "**Learning Effective Oracle Comparator Combinations for Web Applications**." *First International Workshop on Software Test Evaluation*, Oct 2007.

Thomas Fritz, Gail Murphy, <u>Emily Hill</u>. "**Does a Programmer's Activity Indicate Knowledge of Code**?" *6th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE)*, Sep 2007. 17% acceptance rate.

Lori Pollock, K. Vijay-Shanker, David Shepherd, <u>Emily Hill</u>, Zachary P. Fry, Kishen Maloor. "**Introducing Natural Language Program Analysis**." *Workshop on Program Analysis for Software Tools & Engineering*, ACM, Jun 2007.

David Shepherd, Zachary P. Fry, <u>Emily Hill</u>, Lori Pollock, K. Vijay-Shanker. "**Using Natural Language Program Analysis to Locate and Understand Action-Oriented Concerns**." *International Conference on Aspect Oriented Software Development*, Mar 2007. 18% acceptance rate.

Sreedevi Sampath, Sara Sprenkle, <u>Emily Gibson</u>, Lori Pollock. "**Web Application Testing with Customized Test Requirements—An Experimental Comparison Study**." *International Symposium on Software Reliability Engineering*, Nov 2006. 34% acceptance rate.

Sara Sprenkle, <u>Emily Gibson</u>, Sreedevi Sampath, Lori Pollock. "**A Case Study of Automatically Creating Test Suites from Web Application Field Data**." *Workshop on Testing, Analysis and Verification of Web Services and Applications*, ACM, Jul 2006.

Sreedevi Sampath, Sara Sprenkle, <u>Emily Gibson</u>, and Lori Pollock. "**Integrating Customized Test Requirements with Traditional Requirements in Web Application Testing**." *Workshop on Testing, Analysis and Verification of Web Services and Applications*, ACM, Jul 2006.

Sara Sprenkle, <u>Emily Gibson</u>, Sreedevi Sampath, Lori Pollock. "**Automated Replay and Failure Detection for Web Applications**." *International Conference on Automated Software Engineering*, Nov 2005. 9% acceptance.

Sara Sprenkle, Sreedevi Sampath, <u>Emily Gibson</u>, Lori Pollock, Amie Souter. "**An Empirical Comparison of Test Suite Reduction Techniques for User-session-based Testing of Web Applications**." *International Conference on Software Maintenance*, Sep 2005. 31% acceptance rate.

Sreedevi Sampath, Sara Sprenkle, <u>Emily Gibson</u>, Lori Pollock, and Amie Souter. "**Analyzing Clusters of Web Application User Sessions**." Workshop on Dynamic Analysis, May 2005.

David Shepherd, <u>Emily Gibson</u>, Lori Pollock. "**Design and Evaluation of an Automated Aspect Mining Tool.**" *2004 International Conference on Software Engineering Research and Practice*, Jun 2004. 31% acceptance rate.

TEACHING EXPERIENCE

Instructor, General Computer Science (CISC 105). Summer 2004, University of Delaware. Introductory C programming course in computer science for undergraduates with no prior programming experience. Created and presented lectures, developed course syllabus, assigned labs, created assignments and exams, and supervised teaching assistant.

Instructor, Computer & Information Systems (CISC 101). Winter 2004, University of Delaware. Introductory computer science course for non-majors. Created and presented lectures; developed course syllabus; assigned labs; created assignments, weekly quizzes, and exams; and supervised teaching assistant.

Guest Lecturer, Software Engineering I (CISC 275). Fall 2009, University of Delaware. Sophomore-level course. Taught lecture on challenges in software engineering: why it's difficult, how to use incrementalism and iteration to reduce development costs in class and in practice, and why experience in software engineering is the best learning tool.

Guest Lab Instructor, Software Engineering I (CISC 275). Fall 2009, University of Delaware. Taught lab on basic software development with Eclipse: working with an open source project, how to use the type hierarchy and call hierarchy, introduction to Eclipse's refactoring tools, and using the Eclipse debugger.

Guest Lecturer, General Computer Science (CISC 106). Fall 2009, University of Delaware. Introductory programming course in Matlab. Taught lecture on testing: the testing process, how to write test cases for expected and unexpected inputs, and how to determine whether a test suite is complete in terms of statement coverage and classes of inputs.

Guest Lecturer, Advanced Compiler Construction (CISC 672). Spring 2005 & Fall 2006, University of Delaware. Graduate-level course. Taught two type checking lectures on reading type checking specifications and polymorphism.

Teaching Assistant, Advanced Compiler Construction (CISC 672). Spring 2005, University of Delaware. Graded projects and homework assignments, and held office hours.

Teaching Assistant, Advanced Web Technologies (CISC 474). Spring 2005, University of Delaware. Upper-level undergraduate course to learn how to develop individual and collaborative software projects using JSPs and Java servlets. Created instructions for assignments and development setup, graded projects and written assignments, and held office hours.

Lab Instructor & Teaching Assistant, Introduction to Computer Science (CISC 181). Fall 2004, University of Delaware. Introductory C++ programming course for undergraduates with some prior programming experience. Led weekly lab sessions, graded assignments, contributed to lab and project assignment creation, and held office hours.

Lab Instructor & Teaching Assistant, General Computer Science (CISC 105). Spring 2004, University of Delaware. Led weekly lab sessions, graded labs and projects, proctored exams, and held office hours.

STUDENT MENTORING

Under supervision and collaboration with Drs. Pollock and Shanker, served as graduate research mentor for undergraduate projects in developing natural language analyses for Java software. Collaborated in designing research projects, worked closely with students to guide them through the research process, including reading related work, designing and implementing an approach, evaluating the approach in comparison to existing work, and presenting their research in poster, paper, and oral presentation formats.

Eric Enslen, "Mining Source Code to Automatically Split Identifiers for Source Code Analysis," Research Experience for Undergraduates, 2009.

Sana Malik, "Extending and Evaluating a Software Word Usage Model for C/C++," CRA-W Distributed Research Experience for Undergraduates (DREU), 2009.

Jon Schall, "Towards Generating Useful Comments for Program Code," Research Experience for Undergraduates, 2009.

Haley Boyd, "Analyzing Word Usage in Software to Improve Software Maintenance Tools," Research Experience for Undergraduates, 2008.

Zachary P. Fry, "Automatically Mining Abbreviation Expansions from Software." Senior Honors Thesis, 2008.

Yana Novikova, "Integrating Information Retrieval with NLP for a Program Navigation Tool." Undergraduate independent study, 2007.

Meilani Williams, "Preposition Word Usage in Software." CRA-W Distributed Mentor Program, Summer 2007.

ORAL PRESENTATIONS

"Automatically Capturing Source Code Context of NL-Queries for Software Maintenance and Reuse." *International Conference on Software Engineering (ICSE)*, May 2009.

"Developing Natural Language-based Program Analyses & Tools to Expedite Software Maintenance." Doctoral Symposium at the *International Conference on Software Engineering*, May 2008.

"AMAP: Automatically Mining Abbreviation Expansions in Programs to Enhance Software Maintenance Tools." *5th Working Conference on Mining Software Repositories (MSR)*, May 2008.

"Exploring the Neighborhood with Dora to Expedite Software Maintenance." Invited talk for Empirical and Applied Software Engineering Lab at the University of Maryland, Baltimore County, April 2008.

"Exploring the Neighborhood with Dora to Expedite Software Maintenance." *International Conference on Automated Software Engineering (ASE)*, Nov 2007.

"Introducing Natural Language Program Analysis." *Workshop on Program Analysis for Software Tools & Engineering*, Jun 2007.

"A Case Study of Automatically Creating Test Suites from Web Application Field Data." *Workshop on Testing, Analysis and Verification of Web Services and Applications*, ACM, Jul 2006.

POSTER PRESENTATIONS

E. Hill, L. Pollock, K. Vijay-Shanker. "Towards a Natural Language Program Analysis for Exploring Cross-Cutting Concerns." *International Conference on Aspect Oriented Software Development*, Mar 2007.

E. Gibson, L. Pollock. "An Approach to Providing Remote Debugging Feedback without Revealing Sensitive Information." *Grace Hopper Celebration of Women in Computing*, Oct 2006.

E. Gibson, S. Sampath, S. Sprenkle, L. Pollock, A. Souter. "A Fault Detection Framework for comparing Test Suite Reduction Techniques." *CRA-W DMP Reunion at the 2004 Grace Hopper Conference*, Oct 2004.

E. Gibson, D. Knox. "Parallel Genetic Algorithms: An Exploration of Weather Prediction through Clustered Computing." *Posters Under the Dome*, Mar 2003. Presentation to NJ State Legislatures at State Capitol, met with Senator Thomas Kean, Jr. to discuss research at state colleges.

E. Gibson, L. Pollock. "Modeling Web Applications." *SIGSOFT Foundations of Software Engineering*, Nov 2002.

E. Gibson. "Web Accessibility and Section 508 Compliance." *Journal of Computing in Small Colleges*, May 2002. Honorable Mention in poster competition.

E. Gibson, C. Grape, M. Martinovic. "Design and Development of a Word Conflation Module and its Evaluation by Integration into an Information Retrieval System." *13th Annual Saint Joseph's University Sigma Xi Student Research Symposium*, Apr 2002.

RESEARCH GRANT WRITING EXPERIENCE

NSF Award CCF-0915803. Participated in writing and discussion. PIs: Lori Pollock and K. Vijay-Shanker, *"Analyzing and Modeling Natural Language Usage in Software to Improve Software Maintenance Tools,"* $496,913. 2009-2012.

NSF Award CCF-070240. Participated in writing and discussion. PIs: Lori Pollock and K. Vijay-Shanker, *"Applying and Integrating Natural Language Processing Analysis of Programs to Aid in Software Maintenance and Evolution,"* $444,750. 2007-2010.

INDUSTRY & GOVERNMENT LAB EXPERIENCE

Intern, Business Signatures Corporation, Redwood City, CA   **June - August 2005**
Research & documented ways in which Formal Concept Analysis could be applied to the product, including modeling user behavior, analyzing log files, and calculating reduced test suites for performance testing web applications. Offered internship based on research in the *Automated Testing of Web Applications* project.

Intern, Visiting Student Enrichment Program, NASA Goddard Space Flight Center   **June - August 2001**
Investigated available software tools that test and fix web pages for web accessibility and compliance with Section 508 under the Rehabilitation Act. Educated Goddard web developers within tight compliance deadline.

PROFESSIONAL ACTIVITIES

Reviewer, Transactions on Software Engineering, 2009.

Program Committee Member, MSR Mining Challenge 2009 (6th Working Conference on Mining Software Repositories, General Mining Challenge), 2009.

Panelist, "First Year of Graduate Studies in the Sciences and Medical School Panel," The College of New Jersey, 2009.

Presenter, "A Day in the Life of a Grad Student," CRA-W/CDC Systems Research Mentoring Workshop, 2008.

Panelist, New Graduate Student Seminar on "Time Management" and "Passing the UD Preliminary PhD Examination", University of Delaware, 2004-2007.

CISters Co-Founder, Event Coordinator, Webmaster, 2005-2007. CISters organizes activities to recruit & retain women in technology-driven fields at the University of Delaware.

President, Computer & Information Sciences Graduate Student Association, 2005-2007; member 2003-2007.

Travel Award Co-Organizer. Developed and presented case study to the UD CIS Department and UD Dean of Arts and Sciences, funding 10 graduate and undergraduate women to attend the 2006 Grace Hopper Conference, October 2006.

Webmaster. 2006 International Symposium on Software Testing and Analysis (ISSTA '06), 2005 Mid-Atlantic Student Workshop on Programming Languages and Systems (MASPLAS '05).

Student Volunteer. 2007 International Conference on Aspect Oriented Software Development (AOSD '07), 2005 International Conference on Software Engineering (ICSE '05).

Funded Participant. 2006 Women's Institute for Summer Enrichment at UC Berkeley's Center for the Team in Research for Ubiquitous Secure Technology (TRUST), July 2006.

UNDERGRADUATE ACTIVITIES

High School Outreach Program Co-Organizer, 2003. Initiated and co-organized two high school outreach programs. In the *Computer Architecture: What's Inside Program,* 15 high school students from surrounding schools were instructed by a group of UPE members in the basics of building a computer, its components, software installation, and individualized troubleshooting practice. In the second program, *Divas with Keyboards: Girls Get Connected to Computing*, 4 female UPE members taught a group of 10 high school sophomore and junior women about Flash and HTML basics as well as demonstrating what women in computing are really like and discussing career opportunities for women in the field of computer science.

Founder & Co-Organizer of FACTS: Friday Afternoon Computing Technology Seminar, 2002-2003. Student-run seminar series featuring technology tutorials and research presentations.

UPE Chapter President, 2002-2003; member 2001-2003.

Vice President of Electronic Communications & Web Master, Golden Key Honor Society Chapter, 2001-2003.

Volunteer with Ewing SeniorNet, a non-profit organization offering computer classes and instruction for senior citizens of Ewing, NJ, 2003.

UNDERGRADUATE HONORS AND AWARDS

Honorable Mention, Computing Research Association (CRA) Outstanding Undergraduate Award, 2003.

Charles H. Goldberg Award. Awarded annually by TCNJ CS Department for academic excellence and pursuing graduate studies in CS, 2003.

UPE Microsoft Scholarship Awards. 10 awarded nationally, funded by Microsoft, 2002-2003.

CRA-W CREW Awards. Collaborative Research Experience for Women in Undergraduate CS & E funded by the Computing Research Association's Committee on the Status of Women in Computing research (CRA-W), for projects "Word Conflation Module in Question & Answering System Development" and "*Parallel Genetic Algorithms for Weather Prediction*," 2002-2003.

CRA-W Distributed Mentor Program. Summer research project, "*Modeling Web Applications for Program Analysis*," at the University of Delaware under advisor Dr. Lori Pollock, funded by CRA-W, 2002.

Computer Science Department Awards. Awarded annually to the most outstanding Freshman, Sophomore, Junior, and Senior computer science student by TCNJ CS faculty & funded by UPE, 2000-2003.

Honorable Mention. CCSCNE poster competition for *Web Accessibility Compliance* poster, 2002.

New Jersey Bloustein Distinguished Scholar. Scholarship awarded by the state of New Jersey, 1999-2003.

PERSONAL INTERESTS

Classical singing (solo or choral)

Classic movies from Hollywood's golden age (1930s-50s)

Fantasy Football & NY Giants

Knitting

Home-style cooking & baking

Reading (esp. early twentieth century swashbucklers)

REFERENCES

Dr. Lori Pollock (Ph.D. Advisor)
Dept. of Computer & Information Sciences
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Dr. David Notkin
Dept. of Computer Science & Engineering
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Seattle, WA 98195
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Dr. K. Vijay-Shanker (Ph.D. Advisor)
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Dr. Terry Harvey
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