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Michelle Goodstein

Research Interests

My research interests involve developing new theoretically sound frameworks to tackle important systems problems, with a particular emphasis on parallel processing and sophisticated code analysis. This work allows me to combine my wide-ranging interests in algorithms, theoretical computer science, parallel computer architecture, compiler analysis, and an experimental approach to computer systems research.

Education

August 2014 **PhD, Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA.

Advisor: Prof. Todd Mowry

Thesis Title: *Dataflow Analysis-Based Dynamic Parallel Monitoring*

May 2008 **MS, Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA.

June 2005 **BS, Computer Science** and **BS, Mathematics**, *Univ. of Washington*, Seattle, WA.
Magna Cum Laude with College Honors in Computer Science

Selected Honors and Awards

2011-2012 Intel PhD Fellowship

2005-2007 Clare Booth Luce Graduate Fellowship

2005 Outstanding Graduating B.S. in Mathematics Award (Standard Major)

2003 Phi Beta Kappa

2001-2002 University of Washington Sophomore Medalist

○ Awarded to the sophomore with the highest academic achievement

Research Experience

Carnegie Mellon University

August 2005 - **PhD Student**

Advisor: Prof. Todd Mowry.

August 2014 ○ Adapted static dataflow analysis techniques to dynamic parallel program monitoring to detect errors and security risks, in a provably sound framework called *Butterfly Analysis* (paper in ASPLOS 2010).

- Generalized Butterfly Analysis to incorporate synchronization-based happens-before arcs to improve precision, in a framework called *Chrysalis Analysis* (paper in PACT 2012).
- Current work: Explicitly modeling uncertainty due to the lack of total orderings within Butterfly and Chrysalis Analyses to enable adaptive improvements in precision.
- Contributed to development of *ParaLog*, hardware extensions for dynamic parallel monitoring, especially the Total Store Order (TSO) extensions (paper in ASPLOS 2010).
- Contributed to parallelization of an open source physics simulator for rigid body dynamics, the Open Dynamics Engine (ODE), which was used to accelerate simulation of multimillion robot ensembles (paper in ICRA 2011).

University of Washington

September 2004
- June 2005

Undergraduate Research

Advisor: Prof. Anna Karlin.

- Researched the use of spectral techniques to improve collaborative filtering recommendations and empirically tested the quality of results returned by our algorithm.

Teaching Experience

Carnegie Mellon University

Fall 2009

Teaching Assistant, Graduate Computer Architecture.

Helped design and grade student homework, evaluated final projects and held weekly office hours.

Spring 2007

Teaching Assistant, Undergraduate Algorithms.

Led weekly recitation section, managed course website, graded student homework and exams, and held weekly office hours.

Teaching Seminars.

Attended several seminars for graduate students by the Eberly Center for Teaching Excellence

- Handling Problematic Student Behavior
- How Does the Way Students Organize Knowledge Affect Their Learning?
- Course and Syllabus Design
- Assessing Student Learning and Providing Helpful Feedback
- Overview of Student Motivation
- Monitoring Your Teaching Effectiveness
- Introduction to Student Cognition

University of Washington

March 2004 -
June 2005

Student Lab Assistant, Introduction to Digital Design.

Assisted students with their weekly labs, helped prepare assignments and assisted with lab upkeep.

Professional Experience

Internships/Summer Fellow

Summer 2010

Intel Research Pittsburgh/CMU Summer Fellowship, Intel Labs, Pittsburgh, PA.

Mentor: Dr. Phillip Gibbons.

- Summer 2008 **Intel Research Pittsburgh/CMU Summer Fellowship**, *Intel Labs*, Pittsburgh, PA.
Mentor: Dr. Phillip Gibbons.
- Summer 2006 **Engineering Intern**, *Google*, Kirkland, WA.
Mobile application development.
- Summer 2005 **Engineering Intern**, *Google*, Kirkland, WA.
Web application development, focusing on AJAX.

Career Development

- November 2012 **Rising Stars in EECS: Academic Career Workshop for Women.**
By invitation. Poster: "Parallel Dynamic Dataflow Analysis for Monitoring Parallel Programs"
- June 2011 **CRA-W Career Mentoring Workshop.**
Selected to receive travel support and attended.
- March 2011 **CRA-W/CDC DSW Workshop on Multicore Systems.**
Attendance by application only.

Service

Carnegie Mellon University

- Fall 2011 - **Member, Doctoral Review Committee.**
- August 2014 Serve as a student representative on the Doctoral Review Committee, which is an advisory committee to the director of the graduate program.
- Spring 2008 - **Student Member, Speaking Skills Committee.**
- August 2014 Attend, judge and give feedback to students attempting to fulfill the Speaking Skills requirement necessary for obtaining a PhD in Computer Science.
- Fall 2010 - **Graduate Student Ombudsperson, Computer Science Department.**
- Summer 2013 Act as a confidential resource for graduate students in the Computer Science Department, listening and offering advice when approached.
- Summer 2010 - **Program Committee Webmaster, ASPLOS 2011 Organizing Committee.**
- Winter 2011 Managed paper submission site and troubleshooted problems.
- Fall 2010 **Student Representative, Handshake Committee.**
Served as the student representative on the Handshake Committee, which pairs advisors with new students in the PhD program of the Computer Science Department.

University of Washington

- Fall 2004 - **Undergraduate Student Rep., Undergraduate Curriculum Committee.**
- Spring 2005 Served as one of two undergraduate student representatives.

Publications

Peer Reviewed Conferences

- PACT 2012 **Michelle L. Goodstein**, Shimin Chen, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Chrysalis Analysis: Incorporating Synchronization Arcs in Dataflow-Analysis-Based Parallel Monitoring. In *Proceedings of the Twenty-First International Conference on Parallel Architectures and Compilation Techniques*, September 2012.

- ICRA 2011 Michael P. Ashley-Rollman, Padmanabhan S. Pillai, and **Michelle L. Goodstein**. Simulating multi-million-robot ensembles. In *IEEE International Conference on Robotics and Automation*, May 2011.
- ASPLOS 2010 **Michelle L. Goodstein**, Evangelos Vlachos, Shimin Chen, Phillip B. Gibbons, Michael A. Kozuch, and Todd C. Mowry. Butterfly Analysis: Adapting Dataflow Analysis to Dynamic Parallel Monitoring. In *Proceedings of the Fifteenth International Conference on Architectural Support for Programming Languages and Operating Systems*, March 2010.
- ASPLOS 2010 Evangelos Vlachos, **Michelle L. Goodstein**, Michael A. Kozuch, Shimin Chen, Babak Falsafi, Phillip B. Gibbons, and Todd C. Mowry. ParaLog: Enabling and Accelerating Online Parallel Monitoring of Multithreaded Applications. In *Proceedings of the Fifteenth International Conference on Architectural Support for Programming Languages and Operating Systems*, March 2010.

Technical Reports

Evangelos Vlachos, **Michelle Goodstein**, Michael Kozuch, Shimin Chen, Babak Falsafi, Phillip B. Gibbons, Todd C. Mowry, and Olatunji Ruwase. Parallel LBA: Coherence-based Parallel Monitoring of Multithreaded Applications. Carnegie Mellon University Technical Report: CMU-CS-09-108, March 2009.

Michelle Goodstein, Evangelos Vlachos, Shimin Chen, Phillip Gibbons, Michael Kozuch, and Todd C. Mowry. The Butterfly Model: Theoretical Foundations. Carnegie Mellon University Technical Report: CMU-CS-08-170, February 2009.

Michelle Goodstein and Virginia Vassilevska. A Two Player Game To Combat Web Spam. Carnegie Mellon University Technical Report: CMU-CS-07-134, June 2007.

Conference Poster

Arvind Ramanathan*, **Michelle Goodstein***, Robert Sedgewick, and Dannie Durand. Effect of errors in predicting motifs from high throughput experimental data. In *Fourth Annual RECOMB Satellite on Regulatory Genomics*, 2007.

*First two authors contributed equally